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A Study on Estimation of Chlorine in Drinking Water in an Urban Slum of Guntur District

K.V.S. Prasad¹, Anil Kumar Bathula², R. Nageswara Rao³, Satya Kishore⁴

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Abstract

Background: The share of urban population to the total population of India has increased from 27.81% in 2001 to 31.16% in 2011. This increase has also been accompanied by rapid growth of slums in cities. The 2011 Census of India reveals that 17.4% of urban households in India live in slums. This survey was conducted in the urban slum area of Anandapet, Guntur.

Objective: estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area and also to estimate chlorine levels in the drinking water consumed by the residents in the wake of the recent GE (gastroenteritis) epidemic in Guntur.

Methodology: A community based Cross-sectional study was carried out during May to June 2018 with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area.

Results: 77(38.5%) houses do not follow any method of disinfection of water. Whereas 70(35%) houses follow boiling. 38(19%) houses use filter, and 15(7.5%) use water purifier for disinfection of water. Among those 70 houses that boil the water, 59 houses use different well maintained vessel for storage of boiled water and 11 houses use same vessel for storage of boiled water.

Conclusions: Majority of the households in the study area had access to improved source of drinking water. But a few households practiced unhealthy storage and treatment practices like cleaning the overhead tank/sumps once a month or once in 15 days, not treating water prior to consumption, dipping the glass into the water drum. Absence of free chlorine suggests the need for attention by the concerned authorities and the households.

Keywords: Sanitation; Slum; Disinfection, Safe Drinking Water; Sanitary Latrine.

Introduction

Access to safe water in adequate quantity is one of the biggest challenges in the recent times. Despite the national commitment to supply safe drinking water, access to water is difficult especially in the rural areas.¹ Water scarcity in terms of quantity and quality has severe implications on the overall development and health of citizens. Factors such as poor availability, affordability and distance between water source and home may lead households to depend on less safe sources and reduce the volume of water used for hygiene purposes² resulting in water-related infections.

Many infectious diseases such as bacterial, viral, and protozoal are result of drinking unclean water. Major etiological agents responsible for more than a million...
diarrheal deaths are *Escherichia coli*, *Rotavirus*, *Vibrio cholerae*, *Shigella*, etc., which spread through unsafe drinking water. Worldwide, diarrhea is the second leading cause of mortality among children < 5 years. In India, pneumonia and diarrhea are responsible for 50% of deaths of children < 5 years and this is because of drinking contaminated water; however, the recent studies from India reported even higher prevalence of water-borne diarrheal disease. In diarrhea, cholera is one of the most virulent and if left untreated, it will lead to fatality rate 25%–50%.[3]

In India, 66% of the rural population practices open air defecation. Despite comprehensive programs like total sanitation campaign, Swacch Bharath Mission open defecation still remains the predominant norm and poses one of the biggest threats to the health of the people.[4]

A significant proportion of water may be contaminated at the source itself and the local geographical conditions may have a role to play in it. Hence, water treatment assumes utmost importance in order to ensure the safety of the water consumed. At the community level, it is the responsibility of the municipalities to chlorinate the water being supplied to the households and public taps. Also it is up to the individual household to ensure that the drinking water they consume is adequately safe.[5]

This survey was conducted in the area of Anandapet, Guntur with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area and also to estimate chlorine levels in the drinking water consumed by the residents in the wake of the recent GE (gastroenteritis) epidemic in Guntur as several patients were admitted to the Government General Hospital, Guntur especially from the region of Anandapet. The data obtained is for the purpose of getting a clear cut idea about the current situation of Anandapet so that necessary measures can be undertaken to prevent the occurrence of such epidemics in the future.

**Methodology**

A community based Cross-sectional study was carried out during May to June 2018 at Anandapet, Guntur District, Andhra Pradesh with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area. Approval from the institutional ethical committee was obtained before the start of the study. Initially a pilot study was conducted to assess the chlorination practices in the study area. It was found that 20% of the households used chlorination as one of the method of disinfecting drinking water source.

Sample size was calculated using the formula $4pq/L^2$, considering $p=20\%$ and an allowable error of $6\%$ the minimum sample size was estimated to be 180 which was approximated to 200.

A semi-structured questionnaire was used to collect relevant data from the households regarding the sanitary practices at the household level. Drinking water samples are collected from each house and chlorine levels are estimated with iodometric method of chlorine testing. The results were duly noted, analysed & organized to look up on for easier evaluation.

The final data obtained was analyzed using Microsoft Office Excel 2007 and IBM SPSS statistics 20.

**Results**

Among the 200 households interviewed, majority were Muslims (70%), followed by Hindus (15%), Christians (14%) and others (1%). 39% of the study population was illiterate. The socio-economic grading of the households in the study according to modified Kuppuswamy classification was as follows: upper lower class (19%), lower middle class (46%), upper middle class (29%), upper class (5%) and lower class (1%). Based on the type of family, 63% were nuclear in nature and 37% were joint families.

The main source of drinking water among the households in the study was municipal water 159 (79.5%) houses, followed by mineral water in 34(17%) houses, public tap water by 7 (3.5%) houses and bore well by 1 house(0.5%). The main alternative source of drinking water in the study area was mineral water followed by bore water and water tanker.

About 57.5% of the households surveyed, used buckets/drums to store water. Other method of storage were overhead tanks (35%) and sumps (1%). 6.5% of the study population do not use a proper sanitary method for storing the water. 68% of those who store water in either drums/tanks, clean them once in 7 days. The rest of the population do not have the habit of cleaning the drums/tanks regularly.

77(38.5%) houses do not follow any method of disinfection of water. Whereas 70(35%) houses follow boiling. 38(19%) houses use filter, and 15(7.5%) use...
Among those 70 houses that boil the water, 59 houses use different well maintained vessel for storage of boiled water and 11 houses use same vessel for storage of boiled water.

The method used for dispensing water from stored vessel include dipping glass directly into the vessel by 98 (49%), pouring into the glass by lifting the tumbler 30(15%), by filter tap 35(17.5%) and normal tap by 2(1%).

Among the study population 198 (99%) houses follow hygienic practice of washing the hands with soap after defecation and 197(98.5%) houses responded the importance of washing hands before eating food and after defecation.

Among the houses surveyed, 49 houses (24.5%) had the history of water related diseases in the past 1 year.

Among the surveyed population, all the houses responded that purest form of water is clear water without odour. 184 (92%) houses follow the hygienic practice of disposing the solid waste by segregating it and disposing it by the help of municipal waste collectors. The rest 16(8%) houses are indiscriminately thrown the solid waste outside their houses.

Orthotoludine test was used to test for chlorine in the water samples and it was identified that 100 out of 200 houses were tested negative for OT test. Which predispose them for water related diseases.

---

**Drinking water source**

<table>
<thead>
<tr>
<th>Drinking water source</th>
<th>Protected dugwell</th>
<th>Unprotected dugwell</th>
<th>Public Tap</th>
<th>River Water</th>
<th>Bore well</th>
<th>Municipal Water</th>
<th>Mineral Water</th>
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<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>159</td>
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*Figure No. 1: Drinking Water Source*
Table No. 1: Type of Water storage

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<tr>
<td>Sumps</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Overhead tank</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
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Table No. 2: Frequency of Cleaning

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<td></td>
<td></td>
</tr>
<tr>
<td>Once in 2 days</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Once in 3 days</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Once in 4 days</td>
<td>5</td>
<td>2.5</td>
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<tr>
<td>Once in 7 days</td>
<td>24</td>
<td>12</td>
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<tr>
<td>Once in a month</td>
<td>27</td>
<td>13.5</td>
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<tr>
<td>Once in 2 months</td>
<td>6</td>
<td>3</td>
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<td>Once in 3 months</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Once yearly</td>
<td>13</td>
<td>6.5</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table No. 3: Washing hands with soap post defecation

<table>
<thead>
<tr>
<th>Washing hands with soap post defecation</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>198</td>
<td>99</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table No. 4: History of water related diseases in family in the past 1 year

<table>
<thead>
<tr>
<th>History of water related diseases in family in the past 1 year</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typhoid</td>
<td>17</td>
<td>8.5</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>37</td>
<td>18.5</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Jaundice</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>No</td>
<td>151</td>
<td>75.5</td>
</tr>
</tbody>
</table>

Discussion

The majority of study population were Muslims and About 39 % of Head of the families are illiterate. Most of the families belong to lower- middle class (46%) according to modified kuppuswamy classification. 63% of families are of nuclear type. The major source of drinking water to the area is from the Municipal water supply (79.5%) and the major alternate source of drinking water is through Mineral water cans (46%). Buckets & drums are the primary mode of storage of water. In 43% of the houses, residents clean their sumps/ drums daily. 38.5% of household do not follow any method to maintain cleanliness of drinking water while the majority of others follow boiling method (35 %) & candle filters (18%). Almost the entire population knows the importance of washing hands before eating food & post-defecation. 100 homes out of the 200 we surveyed
are being supplied unsafe/unchlorinated water. Around 14 of the homes in Anandpet 2nd line complained of muddy water with bad odour being supplied to their homes. Some of the houses in Anandapet 4th line are lacking water connections as a whole. Most of the GE cases were treated in a government facility, some of them only requiring outpatient treatment whereas others were admitted in the hospital for an average duration of 7 days. All the people who suffered from GE have completely recovered and did not require dialysis during their hospital stay among the houses we surveyed. Majority of the households hand over their solid waste to the Municipal Waste Collector. In conclusion, safe water practices have to be enforced by the municipality and in every house.

**Conclusion**

Majority of the households in the study area had access to improved source of drinking water. But a few households practiced unhealthy storage and treatment practices like cleaning the overhead tank/sumps once a month or once in 15 days, not treating water prior to consumption, dipping the glass into the water drum. Absence of free chlorine suggests the need for attention by the concerned authorities and the households.

**Recommendations:** Health education is very important for better use of existing facilities and also to prevent the incidences of water and sanitation related diseases. Emphasis needs to be given to behavioural change communication to create awareness among the households regarding the importance of water and sanitation practices by using various media for education.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**

Exploring the Medical Representatives’ Perception towards Motivational Measures Implemented by Selected Pharma Companies, Chennai City

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Abstract

Background: Indian Pharmaceutical industry has significant growth in recent decades and faces hyper competition in the local and international market.

Aim: The primary objective of this research is to explore the medical representatives’ perception towards motivational measures implemented by selected pharma companies, Chennai city.

Method and Material: The primary data of the research was collected through the structured questionnaire. The questionnaire was prepared based on Work Motivation Scale. The final sample size of the survey is 227.

Results: The findings of the study indicates that earnings & benefits given to the medical representatives has highest positive effect on work motivation of medical representatives, which is followed by working conditions, success orientation, task orientation, task orientation, mission orientation, coworker relations, managing others, and supervisor relations. The results of confirmatory factor analysis confirms that all the factors of the conceptual model has significant positive effect on work motivation of medical representatives working in selected pharma companies.

Conclusion: The medical representatives in Pharma industries can be motivated through the adoption of appropriate strategies by considering the right blend of above-mentioned factors.

Keywords: Motivation, Work Motivation Scale, Pharma companies, Medical representative.

Introduction

India being a developing country, it establishes foot prints in all kind of industries in national and international level. India plays a significant role in the international pharmaceuticals sector. India is the leading manufacturer of generic drugs in the globe. India has talent pool of scientists and engineers who drives the industry in par with international standards. In the year 2018, the pharmaceutical exports from India raised at US$ 17.27 billion, which includes the exports of bulk drugs, intermediates, drug formulations, biologicals, Ayush & herbal products and surgical. The medical representatives of pharmaceutical industry play an important role in creating awareness and promotion of the various drugs manufactured by their companies among the doctors, chemists, and patients, therefore the sales turnover, growth, and brand image of the company rests on the shoulders of medical representatives. The competition in pharma industry increases challenges of medical representatives in promoting the company products. The motivation of medical representatives is an important driver which drives them to achieve their sales targets. Therefore, the prime goal of this research is to explore the medical representatives’ perception towards motivational measures implemented by selected pharma companies, Chennai city.
Literature Review: Saroj Kumar et al. (2014), analyzed the influence motivation on the sales force for their sale performance in the selected pharmaceutical industry. The outcome denotes that five factors such as work completion, scope for growth, perspective in career, present internal and no feeling of pressure in work have noteworthy optimistic influence on performance in selling with regards to the pharmaceutical sales force

Wiese & Coetzee (2013), in their research the researcher have analyzed the significance of motivators which are related to non-financial factors with regards to sales representatives working in the chosen pharmaceutical company. From the analysis it is found that ‘being well informed’ and ‘good relationships with customers’ are two significant non-financial motivators and also demographic groups vary in the significance they attach to non-financial motivators.

Amue Gonewa John et al (2012), in their research the researchers have discovered the enhancement of performance in sale by adopting sales force motivation approach. It is found that by setting of sales targets and by providing of financial incentives helps in developing of involvement of salespersons in their job. The outcome of the research proves that there is a robust association among the dimensions of the motivation strategy and performance of sales.

Theoretical Background: In general, the factors motivating a person has been divided in to two set of factors known as intrinsic and extrinsic factors. The extrinsic factors of motivation include - money, status, relationships and network, and other creature comforts (including food, beverages etc). The intrinsic factor - fundamentally responsible for a person’s work habit or a certain way of living/working - is: ‘a deep desire to defend oneself from loss and harm’. If a Medical Representative (MR) knows that lack of involvement in work can cause harm to him in terms of loss of prescriptions, sales and finally his benefits, then the MR will be motivated to work with high involvement (Jack Canfield, 2012)

The motivation of the employees are essential in order to improve their productivity and performance by aligning their individual goal inline with the organizational goal (Suraya and Arif, 2019; Monica et al., 2019). The organizations offers various kinds of monetary and non-monetary measures to motivate their employees to achieve expected performance (Melastuti and Sukartini, 2019)

Source: Work Motivation Scale developed by Bradyd. 2002
Work Motivation Scale: In this context, Bradyd (2002)\(^2\), has developed Work Motivation Scale (WMS) which assist employees discover their values and needs where the main elements that motivate employees not only do perform their job, but also to discover at is faction through it. The Work Motivation Scale contains of eight values measures, or constructs, which has been segmented in to four work drive groups: Hence it is found that earnings & benefits and conditions regarding the working atmosphere are gathered under survival and safety drives, whereas coworker and Supervisor associations lies under association drives, task orientation and handling others lies under self-esteem drives, while the last group like mission and success orientation lies under Fulfillment drive.

The survey questionnaire of the present research was designed based on the work motivation scale. The conceptual model of the research is shown in Figure 1.

![Figure 1: Research Model based on Work Motivation Scale developed by Robert P. Bradyd\(^2\)](image)

Based on the above conceptual model, the following hypothesis can be formulated:

- H1: Earnings & Benefits is having significant positive impact on work motivation of medical representatives.
- H2: Working conditions is having significant positive impact on work motivation of medical representatives.
- H3: Coworker relations is having significant positive impact on work motivation of medical representatives.
- H4: Supervisor relations is having significant positive impact on work motivation of medical representatives.
- H5: Managing others is having significant positive impact on work motivation of medical representatives.
- H6: Task Orientation is having significant positive impact on work motivation of medical representatives.
- H7: Mission Orientation is having significant positive impact on work motivation of medical representatives.
- H8: Success orientation is having significant positive impact on work motivation of medical representatives.

The above mentioned hypothetical relationships are verified using Second order Confirmatory Factor Analysis through Structural equation modeling approach.

Materials and Method

The descriptive research design was adopted in this research to describe the medical representatives’
perception towards motivational measures implemented by selected pharma companies, Chennai city. The primary data of the research was collected through the structured questionnaire. The questionnaire was prepared based on Work Motivation Scale developed by Brady (2002)\(^9\). The population of the research refers to medical representatives working in different Pharmaceutical companies in Tamil Nadu state. The sampling unit of the survey refers to medical representatives working in various pharmaceutical companies located in Chennai city. The survey was done among medical representatives working in top 25 pharma companies in Chennai city. Due to confidentiality and condition imposed by the pharma companies the list of sampling unit is not disclosed in the research paper. The survey includes the medical representatives those who have at least 2 years of experience in the particular pharma company. The researcher contacted 250 samples (10 samples per company), and collected 238 filled questionnaires. Out of 238 questionnaires, it is found that 11 questionnaires were incomplete, so those questionnaires were not considered for the analysis. Therefore, the final sample size of the survey is 227. The pilot study was conducted with the sample of 30 medical representatives. The reliability and validity of the questionnaire is verified based on the results of pilot study.

Table 1 summarizes the reliability coefficient (i.e. Cronbach Alpha) of the various factors used in the work motivation scale of the questionnaire. From the above table it is found that all the factors of work motivation scale are having Cronbach alpha coefficient value more than 0.7, which means the work motivation scale in this research is reliable. In general, Cronbach alpha coefficient value between 0.70 – 0.80 is denoted as “Acceptable”, whereas 0.81 – 0.90 is mentioned as “Good”, and more than 0.90 represents “Excellent”.

### Results and Discussion

The data collected from the main study is entered, tabulated, and analyzed through IBM SPSS 22.0 software. The descriptive and inferential statistical tools are used for the current research.

### Table 1. Reliability Analysis

<table>
<thead>
<tr>
<th>S. No</th>
<th>Factors</th>
<th>Cronbach Alpha</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Earnings &amp; Benefits</td>
<td>0.904</td>
<td>Excellent</td>
</tr>
<tr>
<td>2</td>
<td>Working Conditions</td>
<td>0.813</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Coworker Relations</td>
<td>0.793</td>
<td>Acceptable</td>
</tr>
<tr>
<td>4</td>
<td>Supervisor Relations</td>
<td>0.746</td>
<td>Acceptable</td>
</tr>
<tr>
<td>5</td>
<td>Managing Others</td>
<td>0.835</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>Task Orientation</td>
<td>0.783</td>
<td>Acceptable</td>
</tr>
<tr>
<td>7</td>
<td>Mission Orientation</td>
<td>0.805</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>Success Orientation</td>
<td>0.859</td>
<td>Good</td>
</tr>
</tbody>
</table>

### Table 2: Profile of Sampled Medical Representatives

<table>
<thead>
<tr>
<th>S. No</th>
<th>Particulars</th>
<th>No. of Respondents</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to 25 Years</td>
<td>34</td>
<td>14.98%</td>
</tr>
<tr>
<td></td>
<td>25 – 35 Years</td>
<td>64</td>
<td>28.19%</td>
</tr>
<tr>
<td></td>
<td>36 – 45 Years</td>
<td>76</td>
<td>33.48%</td>
</tr>
<tr>
<td></td>
<td>Above 45 years</td>
<td>53</td>
<td>23.35%</td>
</tr>
<tr>
<td>2</td>
<td>Educational Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. Pharm (Diploma)</td>
<td>34</td>
<td>14.98%</td>
</tr>
<tr>
<td></td>
<td>B. Pharm (Undergraduate)</td>
<td>112</td>
<td>49.34%</td>
</tr>
<tr>
<td></td>
<td>M. Pharm (Post-graduate)</td>
<td>81</td>
<td>35.68%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Descriptives – Mean and Standard Deviation:

Table 3: Descriptives – Mean and Standard Deviation

<table>
<thead>
<tr>
<th>S. No</th>
<th>Factors</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Earnings &amp; Benefits</td>
<td>4.32</td>
<td>2.863</td>
</tr>
<tr>
<td>2</td>
<td>Working Conditions</td>
<td>4.27</td>
<td>1.454</td>
</tr>
<tr>
<td>3</td>
<td>Coworker Relations</td>
<td>3.87</td>
<td>1.083</td>
</tr>
<tr>
<td>4</td>
<td>Supervisor Relations</td>
<td>3.56</td>
<td>2.035</td>
</tr>
<tr>
<td>5</td>
<td>Managing Others</td>
<td>3.78</td>
<td>1.927</td>
</tr>
<tr>
<td>6</td>
<td>Task Orientation</td>
<td>4.04</td>
<td>0.833</td>
</tr>
<tr>
<td>7</td>
<td>Mission Orientation</td>
<td>3.94</td>
<td>0.944</td>
</tr>
<tr>
<td>8</td>
<td>Success Orientation</td>
<td>4.12</td>
<td>1.023</td>
</tr>
</tbody>
</table>

From the table 2, the below-mentioned inferences are drawn:

- The one-third (33.48%) of the sampled medical representatives are belong to the age group of 36-45 years, slightly higher than one-fourth (28.19%) of them are aged 25-35 years, slightly lesser than one-fourth (23.35%) of them are aged above 45 years, and few (14.98%) of them are aged up to 25 years.

- Around half (49.34%) of them are qualified in B.Pharm (Undergraduate degree), one-third (35.68%) of are qualified in M.Pharm (Post-graduate degree), few (14.98%) of them are qualified only in D.Pharm (Diploma).

- Out of 227 medical representatives surveyed in the research, significant portion (40.53%) of them are having 4-6 years of experience in the present organization, whereas 29.52% of them are having 6-8 years of experience, 18.50% of them are having above 8 years of experience, and only 11.45% of them are having 2-4 years of experience in the present Pharma company.

- Among 227 medical representatives surveyed in the current research, one-third (34.36%) of them are having 8-12 years of total experience in the Pharma industry, whereas 28.63% of them are having 4-8 years of experience, 20.70% of them are having up to 4 years of experience, and only 16.30% of them are having above 12 years of total experience in the Pharmaceutical industry.

Table 3 summarizes the results of descriptive statistical analysis with mean and standard deviation. From the table, it is found that the medical representatives are highly satisfied towards Earnings & Benefits offered by the Pharmaceutical companies with the highest mean score of 4.32 and standard deviation 2.863, meanwhile
least satisfaction is shown towards their supervisor’s relation because of the stress imposed by their supervisors to achieve the targets.

**Structural Equation Modeling (SEM) Approach:**
The second order CFA was executed through SEM approach using IBM AMOS 22.0 software. The figure 3 depicts the second order CFA of the conceptual model based on standardized regression coefficients. The below-mentioned model has 8 observed variables, 9 unobserved variables.

![Structural Equation Modeling Diagram](image)

Figure 2: SEM model based on standardized coefficients

For example, one unit of increase in earnings & benefits increases 0.956 unit of work motivation when other variables are constant. Similarly, all the other factors has significant positive effect on work motivation of medical representatives. The model fit summary of the CFA model is described in table 4.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Fitness Indices</th>
<th>Value</th>
<th>Suggested Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CMIN or Chi Square Value</td>
<td>3.457</td>
<td>Range from as high as 5.0 (Wheaton et al, 1977)(^{10}) to as low as 2.0 (Tabachnick and Fidell, 2007)(^{11}).</td>
</tr>
<tr>
<td>2.</td>
<td>P value</td>
<td>0.274</td>
<td>&gt; 0.05 (Hair et al, 1998)(^{12})</td>
</tr>
<tr>
<td>3.</td>
<td>GFI (Goodness of Fit Index)</td>
<td>0.935</td>
<td>&gt;0.90(Hair et al, 2006)(^{13})</td>
</tr>
<tr>
<td>4.</td>
<td>AGFI (adjusted Goodness of Fit Index)</td>
<td>0.912</td>
<td>&gt;0.90 (Daire et al. 2008)(^{14})</td>
</tr>
<tr>
<td>5.</td>
<td>CFI (Comparative Fit Index)</td>
<td>0.905</td>
<td>&gt; 0.90 (Hu and Bentler, 1998)(^{15})</td>
</tr>
</tbody>
</table>
The model fit summary of the conceptual model is shown in table 4. The p value of the model is 0.274, which is greater than 0.05 specifies to be good fit and CMIN value is 3.457 displays good fit. Henceforth from table, it is recognized that GFI, AGFI, CFI values are more than 0.90 which denotes excellent fit. Therefore projected value of TLI and NFI are above than 0.95 which signifies good fit and the value of RMR is 0.045 and RMSEA is 0.037 which is less than 0.08 which specifies perfect fit.

### Conclusion

In Indian business context, even in the technological world the employees plays a major role in achieving the better organizational performance. They are the backbones of the industry who runs the organization towards its goals. The Indian Pharma industry is a hyper competitive market with local and international players and it is so dynamic in research, design, manufacture, and deliver the appropriate drugs to the needy people whenever the new diseases are identified based on the guidelines of our Government of India and other international standards. The medical representatives play a significant role in taking the drugs to the target community with shortest span of time. The motivation of the medical representatives with appropriate measures ensures the performance of the Pharmaceutical companies. The findings of the study indicates that earnings & benefits given to the medical representatives has highest positive effect on work motivation of medical representatives, which is followed by working conditions, success orientation, task orientation, task orientation, mission orientation, coworker relations, managing others, and supervisor relations. The results of confirmatory factor analysis confirms that all the factors of the conceptual model has significant positive effect on work motivation of medical representatives working in selected pharma companies.

**Research Ethics Committee:** Authors of the papers have obtained the approval from Research ethics committee of their affiliated institutions.

**Conflict of Interest Statement:** There is no conflict of interest.

**Source of Funding:** Self.

**References**


Influence of Mastication Rate on Prandial Glycemia among Prediabetes: An Observation

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Abstract

Background: Thorough mastication has the potential to affect postprandial blood sugar levels (BSL) by improving digestibility and absorption of nutrients. Associations between mastication and glucose metabolism in diabetics have been shown in previous studies. However, the association between mastication and BSL in pre-diabetes has not been clarified. Our objective was to examine association between frequency of chewing and BSL in prediabetes population-based cohort.

Method: On attaining Institutions ethical committee clearance, considering all inclusion and exclusion criteria and after taking informed consent, we conducted a cross-sectional study in 95 prediabetic individuals. Subjects recruited to study received a fixed calorific load of 150 calories in form of 25 grams of groundnuts on two successive days. We decided to use groundnuts as substrate for our study as we hypothesized this would result in elevated cephalic phase insulin secretion, since it requires thorough mastication for deglutition and is rich in protein (26%), fat (49%) but little carbohydrate (16%), of which >50% is insoluble fiber. On Day 1 subjects were observed as they were chewing at their routine habituated rates without them being conscious that they are being observed while on Day 2 they were asked to chew each bolus forty times before swallowing. Postprandial BSL were estimated, all parameters and their obtained values were scrutinized on both days and data was statistically analyzed.

Results: On comparing the mean post prandial BSL between normal chewing versus 40 time chewing, statistically significant decrease was observed with respect to 40 chews per bolus (p < 0.000).

Conclusions: These findings support hypothesis that when in pre-diabetic individuals a simple yet effective method of thorough mastication will decrease postprandial BSL vis–a-vis faster chewing and swallowing.

Keywords: Prediabetes, mastication frequency, groundnuts, food, blood sugar.

Background

In India currently prevalence of diabetes has increased tenfold, from 1.2% to 12.1%, between 1971 and 2000. (¹) It was recently estimated that there are 61.3 million people with type 2 diabetes in India and this number is expected to increase to 101.2 million by 2030. Pre-diabetic individuals have a significant risk of progressing to overt diabetes over time, with as many
as 10% progressing to diabetes mellitus per year. Prediabetes comprises of either Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG) values. The American diabetes Association (ADA) currently defines IFG as fasting plasma glucose between 100 – 125mg/dL, and IGT as two-hour glucose levels of 140 to 199 mg/dL on the 75-g oral glucose tolerance test. Those with IGT are particularly at higher risk of developing overt diabetes and cardiovascular complications (2). For such individuals a variety of non-pharmacological strategies have been suggested such as increased aerobic exercise, reduced calorie intake and dietary modification. However, these measures are often poorly adhered to by patient population. Hence, there is a need for other simple yet sustainable and effective measures of blood sugar regulation in pre-diabetic population to prevent onset of diabetes. One such potentially useful measure can be ‘thorough mastication’. This study attempts to find out if thorough mastication has any effect on post prandial blood sugar levels - BSL in prediabetic individuals.

**Aim:** To evaluate effect of mastication on post prandial blood sugar levels in individuals with IFG and IGT.

**Materials and Method:** The study protocol was approved by local institutional research ethics committee and all study participants provided voluntary consent before being recruited to the study. It was a cross sectional study carried out in Tertiary Care Medical College affiliated Hospitals. Otherwise healthy individuals of age >18 years with impaired glucose tolerance (2 hours post prandial BSL) or IFG were included. Individuals with acute severe illnesses, hepatic or renal impairment, on medications which are known to alter glycemic levels, recent surgery, trauma or burns, pregnancy and edentulous individuals were excluded.

We designed a simple pre-test post-test quasi-experimental protocol for this study. 95 Subjects recruited to the study received a fixed calorific load of 150 calories in the form of 25 grams of groundnuts on Day 1 and Day 2 each. On Day 1, the subjects were asked to chew in their usual manner and the number of chews per bite was recorded. Subjects were observed as they chew habitually without their knowledge to avoid conscious self-imposed change in chewing frequency and pattern. On Day 2, the subjects were asked to chew each bolus forty times before swallowing. Blood sugar levels were taken on both days immediately prior to the intake of groundnuts and also 2 hours following the meal. Subjects were prohibited from taking any oral caloric consumption/other food bolus 3 hours before the start of the test on both days and also between the meal and post-prandial blood sugar test. They were also told not to engage in any strenuous physical activity and to be preferably at rest. Patients were allowed to drink water during the periods of fasting if required.

Data was collected and analyzed using Microsoft Excel and SPSS version 17. The strength of the association between the variables of interest was evaluated using Chi-square and Student-t tests. A two-tailed p-value of less than 0.05 was defined as statistically significant for all analysis.

**Results**

Our study enrolled total 95 subjects. We had 9 patients with IGT and 86 patients with IFG. Majority of subjects were in the age group of 31-40 years (28.4%). About 26% of the subjects were in the age group of 51-60 years, 24% were in the age group of 41-50 years 12% in the age group of above 60 years and 10% of them were in the age group less than 30 years. In our study, 47% of the subjects were females and 53% were males.

Subjects recruited to the study received a fixed calorific load of 150 calories in the form of 25 grams of groundnuts on Day 1 and Day 2. The average number of chews was 24 on day 1 .All the subjects chewed each bolus forty times before swallowing on Day 2.

### Table 1: Table depicting the Day 1 & Day 2 sugar values of the subjects

<table>
<thead>
<tr>
<th>N</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Mean difference</th>
<th>S.D of difference</th>
<th>Change (%)</th>
<th>t test, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Day 1</td>
<td>95</td>
<td>113.18</td>
<td>8.908</td>
<td>21.147</td>
<td>8.162</td>
<td>18.68</td>
<td>.000 HS</td>
</tr>
<tr>
<td>Post Day 1</td>
<td>95</td>
<td>134.33</td>
<td>8.998</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Day 2</td>
<td>95</td>
<td>115.02</td>
<td>8.913</td>
<td>12.358</td>
<td>7.302</td>
<td>10.74</td>
<td></td>
</tr>
<tr>
<td>Post Day 2</td>
<td>95</td>
<td>127.38</td>
<td>8.363</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
On day 1, there was a drop in BSL two hours after chewing (mean difference 21.147, %change – 18.62) which was statistically significant (p value of 0.000). On day 2, the mean BSL prior to intake of groundnuts was 115.02 and two hours after meal was 127.38. The mean difference was 12.358 with a percentage change of 10.74 % which was highly significant (p value of 0.000). All the subjects chewed each bolus forty times before swallowing (Table 1).

When we analyzed both Day 1 and Day 2, both the pre and post chewing values showed a highly significant correlation (Fig 1) with respect to post prandial BSL.

![Bar diagram](image)

**Fig 1: Bar diagram depicting the comparison between Day 1 and Day 2 mean BSL percentage change of the subjects**

When we analyzed the mean change in sugars age group wise and gender wise, we did not find significant correlation. While considering analysis based on categories of prediabetes following results were obtained.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post D1 - Pre D1</td>
<td>IGT 9</td>
<td>21.78</td>
<td>8.273</td>
<td>.809 NS</td>
</tr>
<tr>
<td></td>
<td>IFG 86</td>
<td>21.08</td>
<td>8.196</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 95</td>
<td>21.15</td>
<td>8.162</td>
<td></td>
</tr>
<tr>
<td>Post D2 - Pre D2</td>
<td>IGT 9</td>
<td>13.56</td>
<td>8.833</td>
<td>.608 NS</td>
</tr>
<tr>
<td></td>
<td>IFG 86</td>
<td>12.23</td>
<td>7.173</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 95</td>
<td>12.36</td>
<td>7.302</td>
<td></td>
</tr>
</tbody>
</table>
Mean change in sugar values (table 2 & figure 2) did not show statistically significant correlation when categories of prediabetes namely impaired glucose tolerance and impaired fasting glucose were separately analyzed.

**Discussion**

Our study demonstrates that thorough mastication of 40 chews per bite/morsel/bolus in comparison to routine habituated frequency of mastication in pre-diabetes, results in a statistically significant reduction of post-prandial blood glucose levels.

Although it has been hypothesized that thorough mastication can reduce post-prandial BSL by increasing the cephalic phase of insulin release, previous studies have failed to report consistent or reliable findings with regards to the physiological effects of mastication (Table 3).

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Substrate</th>
<th>Frequency of Chewing</th>
<th>2hr Ppbs</th>
<th>Glp-1</th>
<th>Post Mastication Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonoki (13)</td>
<td>Cross sectional</td>
<td>30</td>
<td>Regular meal</td>
<td>30</td>
<td>83.1 +/- 15.28</td>
<td>8.6 +/- 1.9</td>
<td>21.3 +/- 12</td>
</tr>
<tr>
<td>Zhu (15)</td>
<td>Cross sectional</td>
<td>20</td>
<td>Carrots</td>
<td>Normal</td>
<td>80 +/- 15.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Li (36)</td>
<td>Case control (obese &amp; lean)</td>
<td>30</td>
<td>2200KJ meal</td>
<td>15 &amp; 40</td>
<td>61 +/- 0.4</td>
<td>1278.6 +/- 219.3</td>
<td>5.0 +/- 0.2</td>
</tr>
<tr>
<td>Madhu (6)</td>
<td>Cross sectional</td>
<td>200</td>
<td>Ground nut</td>
<td>40</td>
<td>119.7 +/- 9.06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Read (26)</td>
<td>Cross sectional</td>
<td>160</td>
<td>Apple Sweet corn Rice Potato</td>
<td>Normal</td>
<td>8.3 mmol/l</td>
<td>6.3 mmol/l</td>
<td>-</td>
</tr>
<tr>
<td>Our study</td>
<td>Cross sectional</td>
<td>95</td>
<td>Ground nuts</td>
<td>40</td>
<td>127.38 +/- 8.363</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In one study, it was found that chewing 30 times per bite caused elevated plasma active GLP-1 concentrations, without affecting the concentrations of blood glucose or serum insulin levels in 10 normoglycaemic subjects but not in type 2 diabetic subjects (3). Another study, however, reported that postprandial BSL significantly decreased following thorough mastication of approximately 30 times per bite in 16 normoglycaemic individuals through potentiation of early-phase insulin secretion (4). The same study also showed that in 10 subjects predisposed to type 2 diabetes, thorough mastication did not potentiate early-phase insulin secretion and elicited higher postprandial
BSL. In a randomized crossover trial of 21 healthy males, it was demonstrated that plasma concentrations of glucose, insulin and GIP were higher with thorough mastication of 40 chews per portion in comparison to 15 chews per portion (5). Another study also showed that thorough mastication of 40 chews in both lean and obese subjects resulted in lower postprandial ghrelin concentrations and higher postprandial glucagon-like peptide 1 and cholecystokinin concentrations (6). Recently, a study in south India (7) demonstrated that thorough mastication of forty-chews improved the postprandial BSL in 86 normoglycaemic subjects but not in 14 dysglycemic subjects, the latter comprising of both type 2 diabetics and pre-diabetic individuals. The results from our study, which was sufficiently powered, shows with considerable statistical confidence that thorough mastication results in reduced post-prandial blood glucose levels in pre-diabetic individuals possibly indicating importance of increased frequency of chewing per morsel as a non-pharmacological intervention in preventing progression to dysglycemic.

However, it is important to note, that this phenomenon was observed in our study in subjects who consumed a substrate (i.e. groundnuts) that was low in carbohydrate content but rich in protein and fat. Results from previous studies suggest that the type of food ingested is important for determining the physiological effects of mastication (Table 3). A study in 1986 demonstrated that chewing a variety of foods including sweetcorn, white rice, diced apple and potato, led to elevated postprandial glucose levels, though the extent to which they rose differed according to the food ingested (8). Conversely, the peak glucose response and the areas under the blood glucose profiles in response to ingestion of these foods, were significantly reduced when the subject swallowed these foods whole instead of chewing them thoroughly. Another study showed significant correlations between the degree of substrate breakdown during mastication and the blood glycemic response for rice (9). The results from the study suggest that individual differences in mastication and masticated particle size distribution may be one of the causes for inter-individual differences in the glycemic response to rice. In a separate randomized, controlled, crossover trial on 15 healthy young subjects, rice chewed 15 times produced a total glycemic response (GR), peak GR and glycemic index significantly lower than when chewed 30 times (10). Groundnuts are readily available, require thorough mastication for deglutition and are rich in protein (26%) and fat (49%) but have a total carbohydrate content of only 16%, of which more than 50% is insoluble fiber. In comparison, 90% of the total dry weight and 87% of the total caloric content of rice is carbohydrate in the form of starch (11). Therefore, we decided to use groundnuts as the substrate for our study as we hypothesized this would result in elevated cephalic phase insulin secretion.

In turn this may result in better glycemic control and reduce progression to overt diabetes in pre-diabetic patients. Although poorly powered, previous studies have shown that higher rates of mastication may actually result in elevated post-prandial BSL when ingesting carbohydrate rich foods such as rice. Studies also show varying effects in diabetic individuals. Hence, we cannot extend our recommendation of thorough mastication to carbohydrate rich foods or in individuals with overt type 2 diabetes. It would be important to qualify the relationship between thorough mastication, carbohydrate rich foods and type 2 diabetes in well-designed future studies.

Our results are statistically robust, based on simple pre-test post-test quasi-experimental study design, rather than a randomized controlled trial (RCT). Hopefully the results of our study will encourage the development of future well-designed RCTs to further qualify the physiological effects of mastication in dysglycemic.

**Conclusion**

Chewing could increase the digestibility and absorption of carbohydrate in several ways; the reduction in particle size would enhance the delivery of food from the stomach to the small intestine the larger surface area of masticated food increases access to pancreatic enzymes; enhancement of salivation associated with chewing would increase digestion of food in the mouth and stomach.

Our study confirms the fact that chewing decreases the postprandial sugars significantly in patients with impaired glucose tolerance and impaired fasting glucose, and also differences may be seen in post-prandial blood sugar level depending on the type of food substrate.

**Implications:** Based on the findings from our study, we would recommend pre-diabetic individuals to employ the simple yet effective method of thorough mastication of approximately 40 chews per bite to lower post-prandial blood sugar levels.
Conflict of Interest: There is no conflict of interest.

Source of Fund: Self-funded.

References


Predictors of Job Satisfaction: How Satisfied are the Young Generation Doctors in Corporate Hospitals

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Abstract
Today corporate hospitals can be successful provided they ensure continuously the satisfaction of their doctors. Job satisfaction comprises the degree of an individual’s feelings towards and satisfaction with present job activities, the accomplishment and responsibilities as well as the degree of an individual’s satisfaction with all aspects that directly or indirectly related to the present job and job content. Hence job satisfaction is the consequence where as job engagement is the antecedents. Fully engaged doctors are more satisfied and will more likely to remain with the hospitals. Keeping in view the above, a thorough understanding of the factors associated with job engagement is much needed where job satisfaction will be playing a major role. Job switching and doctors turnover are becoming recent experience since the young generation doctors enter the corporate hospitals. The study explores the level of job satisfaction and also tries to find the relationship between the individual and job satisfaction related factors on the job satisfaction of young generation doctors working in corporate hospitals. A total of 210 doctors participated in the survey and the findings revealed factors found significantly affect the job satisfaction and the practical implication of the study has great importance to the corporate hospitals in developing their strategies to increase the job satisfaction among the new generation doctors entering the workforce.

Keywords: Job satisfaction, Job Engagement, Workforce, health care sectors.

Introduction

Many earlier studies have significantly contributed to the field of job satisfaction from many angles. Job satisfaction is an attitude towards work related conditions [1]. Job satisfaction was more of a response to a specific job or various aspects of the job. Here it would be appropriate to mention that people, who are fully engaged in job, derive a sense of satisfaction out of it. Many study showed has shown that job performance, absenteeism, turnover and employee relations are influenced by job satisfaction. It is also suggested by other empirical studies that the significant contributor to one’s job satisfaction is the nature of the job itself and it must be material to the individual. Another major factor behind the level of job satisfaction in the stress level associated with work. Job satisfaction is the opportunity for growth and promotion which the organization can afford to offer. A doctor have a strong sense of morality, tend to be patriotic, is willing to fight for freedom and value home and family as they had seen more hardships and disaster at an earlier age than the previous generations. It is suggested through empirical research that they need to be treated differently and organization has to prepare themselves at the time of entry in workforce. Factors that constitute Job satisfaction is similar to earlier generations. Generally people prefer flexibility in getting the work done. They prefer to have challenging career and they also want to grow with the challenges. Clear direction is needed from the employer side as they demand immediate feedback on performance. In the present generation doctors being techno savvy; they also expect organizations to be equipped with current technology. There will be poor outcome and low productivity when the basic

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requirements are not provided. Due to advancement in technology and the openness of some of the new and high tech organizations, employees prefer to conduct meetings via video conferencing. Organizations have started providing gymnasium and pool facility to promote active and healthy lifestyle as employees think highly of their work life balance. High job satisfier doctors have greater contribution towards patient care as well as increase productivity performance and more turn over in hospitals.

**Literature Review:** In the present global context it is necessary to understand motivations of present workforce to ensure their participation in ensuring patient satisfaction. It was found doctors derive satisfaction from their work and around two/third doctors are happy with their job and demand a greater increase in the salary will lead to a better professional life [2]. Doctors are dissatisfied in their work due to long hour of work and over loading of work and that can affect the patient care as well as quality health care delivery. Dissatisfaction in doctors was due to night shift duty more than 8 hours and working hours more than 9 hours. A proportion of doctors were dissatisfied due to the working hours as well as salary[3]. Satisfaction of Indian Doctors as well as other doctors from developed countries is almost same. But satisfaction level of Indian doctors are low in comparison top other developed countries [4]. Many doctors are satisfied with their job but many dissatisfied due to workplace and income.[5] Job satisfaction determinants are negatively correlated with the determinants of stress in doctors.[6]. In private practice doctors have more control over their job styles and are responsible for low levels of burnout.[7]. More working hours among doctors more is the stress and less is the job satisfaction [8]. There is a decrease in job satisfaction among doctors but no measurement has been done on the impact on patients [9]. Financial and non financial incentives, leadership, team work and proper coordination of resources are the factors influencing the job satisfaction among doctors. [10]. Opportunity of self development was the factor for the job satisfaction whereas others are organization, nature of work, promotion. Dissatisfaction among doctors are poor utilization of skills, poor promotion prospectus, low pay and allowance and organization policy.[11]. Doctors were found to be dissatisfied with number of working hours, salary and number of night shifts and thus leading to decreased job satisfaction[3][15].

**Research Objectives:**
1. To assess the level of job satisfaction among doctors in corporate hospitals
2. To determine the factors that contributes to job satisfaction among doctors working in corporate hospitals.

**Materials and Method**
Cross section study was conducted for the research period starting from January 2019 to August 2019 using an administered well designed questionnaire. 210 doctors participated in the data collection and randomly chosen from corporate hospitals. Doctors were chosen randomly irrespective of their department. Pilot testing was conducted on 30 doctors initially. Data analysis was done in SPSS package. Reliability of the questionnaire was found to be .675 Likert scale was used as 1 strongly agree to 5 strongly disagree. Factor analysis was done to find out the dimension. The KMO Value was found to be more than .5 which adequate for the factor analysis to be conducted on the data and was significant.

**Table 1: Demographic Characteristics**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Attributes</th>
<th>Job Satisfaction</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30-35 Years</td>
<td>63.3%</td>
<td>P&lt; .05</td>
</tr>
<tr>
<td>1</td>
<td>35-45 years</td>
<td>36.7%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>84.5%</td>
<td>P&lt; .05</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>65.2%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Married</td>
<td>74.5%</td>
<td>P&lt; .05</td>
</tr>
<tr>
<td>3</td>
<td>Unmarried</td>
<td>84.7%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Post. Graduation</td>
<td>75%</td>
<td>P&lt; .05</td>
</tr>
<tr>
<td>4</td>
<td>Graduation</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5-7 Years</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>More Than 7 Years</td>
<td>54%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Dimension of Job Satisfaction and reliability Testing**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Dimension</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational Level</td>
<td>.675</td>
</tr>
<tr>
<td>2</td>
<td>Year of Experience</td>
<td>.779</td>
</tr>
<tr>
<td>3</td>
<td>Maturity Level</td>
<td>.876</td>
</tr>
<tr>
<td>4</td>
<td>Salary</td>
<td>.567</td>
</tr>
<tr>
<td>5</td>
<td>Growth Prospects</td>
<td>.789</td>
</tr>
<tr>
<td>6</td>
<td>Job Satisfaction</td>
<td>.976</td>
</tr>
</tbody>
</table>
Regression analysis was conducted among the determinants educational level, maturity level, year of experience, salary and growth prospects were taken as independent variable and job satisfaction as dependent variable. $R^2 = .596$ and adjusted $R^2 = .538$. This explains 53% of the variance of the dependent variable is explained by the variance in the independent variable. The results are statistically significant at .000 level. The model was significant and all are found to be significant and $p< .001$

Table 3: Regression Model summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.596a</td>
<td>.538</td>
<td>.004</td>
<td>.497</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Educational level, Maturity Level, Year of Experience, Salary, Growth Prospects.

Table 4: Regression Coefficient

<table>
<thead>
<tr>
<th>Coefficientsa</th>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model</td>
<td>R</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>1</td>
<td>3.888</td>
<td>.475</td>
<td></td>
<td>8.189</td>
</tr>
<tr>
<td>Educational level</td>
<td>.048</td>
<td>.040</td>
<td>.107</td>
<td>1.195</td>
<td>.004</td>
</tr>
<tr>
<td>Maturity Level</td>
<td>.072</td>
<td>.075</td>
<td>.083</td>
<td>.950</td>
<td>.003</td>
</tr>
<tr>
<td>Year of Experience</td>
<td>.103</td>
<td>.065</td>
<td>.132</td>
<td>1.587</td>
<td>.005</td>
</tr>
<tr>
<td>Salary</td>
<td>.048</td>
<td>.066</td>
<td>.010</td>
<td>.120</td>
<td>.004</td>
</tr>
<tr>
<td>Growth Prospects</td>
<td>.060</td>
<td>.037</td>
<td>.144</td>
<td>1.611</td>
<td>.009</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Job Satisfaction

Conclusion

The study focused on job satisfaction among the doctors working in corporate hospitals and also to determine determinants for job satisfaction among doctors. Study found the factors are educational level, maturity level, year of experience, salary, growth prospects. As doctors grow older they can understand the organization better and their performance can be increased better for quality patient care. Doctor should be appreciated for their work in terms of rewards for recognition for better growth prospect which lead to more job satisfaction. Educational level, year of experience, maturity, salary and growth prospects are found to be statically significant on job satisfaction. Salary is also one of the main motivating factors which directly links with the job satisfaction for which the commitment to the organization and quality patient care delivery will be more.

Ethical Clearance: Not Required (It does not involve any experimental data collected from human as well as Animals. The data is collected from Doctors working in different corporate hospitals in Bhubaneswar which purely is their personal view or opinion which does not violate the ethical standards.)

Source of Funding: Self

Conflict of Interest: Nil.

References


Statistical Analysis of M-Mode Echocardiographic Normal Reference Values in South Indian Adults

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Abstract

Background: Normal values for echocardiographic measurements are derived from American Society of echocardiography and European Society of Cardiology/European Association of Cardio-Vascular Imaging and their publications. Indians have smaller cardiac chamber dimensions than the Europeans. However, it has been long felt that reference range from western data cannot be fully applied in our scenario.

Aim: The objective of this study was to develop age and gender-specific normative reference range values for echocardiography measurements.

Methodology: This was a retrospective cross-sectional single-center study conducted on 111 healthy Indian adults who were selected out of the 336 patients aged from 18–76 years, who visited the cardiac medical check-up unit in a tertiary hospital. Echocardiograms were done in participants free of cardiovascular diseases, hypertension, diabetes, high blood pressure or other clinical evident disorders. M-mode Echocardiography in the left parasternal long-axis view was used to measure aorta, left atrium, left ventricle in systole and diastole, right ventricle, interventricular septum, and posterior wall thickness. The 95% reference range of the echocardiographic parameters calculated as a mean±2 “standard deviation for overall and genders specific”.

Results: This study provides a set of data with reference ranges for normal M-mode parameters according to age and gender. Around 58 males and 53 females were classified into the age group from 18-76 years as exclusive class intervals. Age group above of 38 years Indians had higher volume in all the echocardiographic measurements are observed in this study. On examining all our healthy participants, we found that the reference range of most echocardiographic parameters is a highly statistically significant difference as compared with those used in western studies.

Conclusion: The normal reference values for echocardiographic measurements derived from this study could be used for future reference in our local population.

Keywords: Echocardiography normative data; M-mode parameters; Normal reference values; South Indian adults.

Introduction

Echocardiography is the most widely used technique across the globe for the assessment of cardiac chamber dimensions and volumes.¹ In order to detect changes in the structure and function of the heart produced by disease, it is important to determine accurately the effect of normal growth and development on echocardiographic measurements of...
chamber size, thickness, and function. The values for echocardiographic measurements have been presented in several guidelines and statements. The most recent was a joint recommendation for chamber quantification by the European Association of Cardiovascular Imaging (EACVI) and the American Society of Echocardiography (ASE) which had been previously endorsed by several societies, namely the International Alliance Partners of the ASE, Canadian Society of Echocardiography, Indian Academy of Echocardiography, Indonesian Society of Echocardiography, and the Japanese Society of Echocardiography. The interpretation of quantitative data derived from echocardiography is based on comparisons with the predefined age and gender-specific normal reference values. Unfortunately, no reference values are currently available for Indian adults and therefore western data only is used as a reference for echocardiographic interpretations in Indians. Few previous studies have shown that this may be inappropriate as Indians have smaller cardiac chamber dimensions than the western populations and may also have important differences in ventricular functional parameters. The normal reference ranges for echocardiography study aims to obtain a set of normal values for cardiac chamber geometry and function in a cohort of healthy individuals over a widerange of ages (18–76 years) using echocardiographic techniques.

Method

Study design and patient population: This study was performed on 111 apparently healthy adults were selected out of the 336 patients, who visited the cardiac medical check-up unit in a tertiary hospital. A total of 58 male and 53 female echocardiograms were done. Patients who had any cardiovascular disease and their basic echocardiography study was any Congenital, valvular (except trivial regurgitation), Cardiomyopathy (Dilated, Ischaemic, Hypertrophic, infiltrative or restrictive), Ischaemic wall motion abnormalities, Arrhythmias, Diastolic abnormalities, and abnormal systolic left ventricular function were excluded as these could have influenced their echocardiography data. Height in centimeters and weight in kilograms were measured and used to estimate Body Mass Index (BMI) in kg/m², Body Surface Area (BSA) in m² and their ages ranged from 18 to 76 years are considered. The study was approved by the Institutional Ethics committee and informed consent was obtained by all of them.

Echocardiographic Examination: Echocardiographic examinations were performed by an experienced echo technologist using Philips Epiq 7C echocardiography system, Koninklijke Philips, And over, MA, USA, with an X5-1 transducer. Measurements on the echocardiogram were obtained according to the recommendation of the American Society of Echocardiography (ASE) guidelines and Comprehensive Trans-Thoracic Echocardiography examination guidelines by the Indian Academy of Echocardiography. All studies were done with patients lying in the left lateral decubitus position and breathing quietly. M-mode Echocardiography in left parasternal long-axis view was used to measure aorta, left atrium, interventricular septum, and posterior wall thickness, left ventricle in systole and diastole, and the right ventricle. Left ventricular end-diastolic volume (LVEDV), Left ventricular end-systolic volume (LVESV) and Left ventricular Ejection Fraction (LVEF) were measured using Biplane Simpson and two-dimensionally derived dimensions from the parasternal long-axis view. From the papillary muscle level after confirming a true short-axis view that was perpendicular to the centre of the true long axis of the Left Ventricle (LV), measurements for the LV posterior wall thickness at end-diastole (PWd) and interventricular septum at end-diastole (IVSd), LV fractional shorting (FS) was assessed, in addition to, LV ejection fraction (LVEF) which was assessed using the Teichholz method.

Statistical Method

Data were tested for normal distribution with the Kolmogorov-Smirnov test. Continuous variables was expressed as Mean±SD and 25th – 75th Percentile according to data distribution. The coefficient of variation of each assessed parameter was also determined in terms of percentage. To test the difference between the means of male and female were analyzed for statistical significance with the unpaired t-test and examine the mean difference between the sample and ASE/EACVI normal values by using a one-sample t-test. Correlating body surface area to echocardiography measurements and analyze the degree of relationship between continuous variables with age for both genders were performed with Karl Pearson’s correlation coefficient. A probability value p < 0.05 was considered statistically significant and p-value < 0.0001 was considered highly significant. The 95% reference range of the echocardioographic parameters calculated as a mean±2 standard deviation for total and genders. All statistical analyses were carried out using Statistical Package for the Social Sciences (IBM SPSS Statistics 22.0).
Results and Discussion

This study provides a set of data with reference ranges for normal M-mode parameters according to age and gender.\textsuperscript{13,14} A few previous studies have shown that Indians have smaller cardiac chamber dimensions than the Europeans.\textsuperscript{4} Clinicians are using reference range for echocardiographic values from ASE and EACVI recommended measurements and we have tried to compare our results with them, it has been found that average height, weight, BMI and BSA are less in Indians and the reference range of most echocardiographic parameters are highly statistically significant difference as compared with those used in the western studies. In clinical practice, it has been long felt that reference range from western data cannot be fully applied in our scenario.

Descriptive Statistics were used to present the baseline clinical characteristics of the whole cohort are displayed in Table 1. There were no significant differences in age between men and women their mean age for male 46.8±12.5 years and for female was 46.8 9±12.49 years. Males were heavier than females 66.1±12.2 versus 62.9±10.9 kg, taller than females 166.3±6.9 versus 154.3±5.4 cm (t=10.09, p< 0.0001) and consequently had a larger BSA of 1.7±0.2 versus 1.6±0.1 m\(^2\) (t=3.41, p<0.0001). However, they showed a significant difference in BMI (p=0.004) at a 5% level of significance using the independent t-test. The systolic and diastolic blood pressure were similar in men and women, there were highly statistically significant difference regarding Height, BMI, and BSA; however, males generally had significantly larger values compared to females.

Table 1: Baseline clinical characteristics of the individual studied stratified

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total Mean±SD</th>
<th>25\textsuperscript{th}–75\textsuperscript{th} Percentile</th>
<th>Lower and Upper 95% CI</th>
<th>Male Mean±SD</th>
<th>Male Mean±SD</th>
<th>Female</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>46.8 ± 12.5</td>
<td>40-55</td>
<td>44.51 – 49.2</td>
<td>46.83 ± 12.56</td>
<td>46.8 9± 12.49</td>
<td>-0.03</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.5 ± 8.6</td>
<td>154-168</td>
<td>158.9 – 162.2</td>
<td>166.3 ± 6.9</td>
<td>154.3 ± 5.4</td>
<td>10.09</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>64.6 ± 11.6</td>
<td>58-68</td>
<td>62.4 – 66.7</td>
<td>66.1 ± 12.2</td>
<td>62.9 ± 10.9</td>
<td>1.43</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m(^2))</td>
<td>25.2 ± 4.7</td>
<td>21.9-28.0</td>
<td>24.2 – 26.1</td>
<td>23.9 ± 4.4</td>
<td>26.5 ± 4.7</td>
<td>-2.91</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>BSA (m(^2))</td>
<td>1.7 ± 0.2</td>
<td>1.57-1.74</td>
<td>1.66 – 1.72</td>
<td>1.7 ± 0.2</td>
<td>1.6 ± 0.1</td>
<td>3.41</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>SBP mmHg</td>
<td>120.8±12.1</td>
<td>110-130</td>
<td>118.5 – 123.1</td>
<td>121.0 ± 12.4</td>
<td>120.5 ± 11.8</td>
<td>0.2</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>DBP mmHg</td>
<td>78.9 ± 7.5</td>
<td>80-80</td>
<td>77.5 – 80.3</td>
<td>78.5 ± 7.14</td>
<td>79.3 ± 7.9</td>
<td>-0.59</td>
<td>0.55</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: M-mode Echocardiographic measurements according to gender

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total Mean±SD</th>
<th>1st Quartile</th>
<th>2nd Quartile</th>
<th>3rd Quartile</th>
<th>Lower and Upper 95% CI</th>
<th>C.V. (%)</th>
<th>Skewness</th>
<th>Male Mean±SD</th>
<th>Male Mean±SD</th>
<th>Female Mean±SD</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO (mm)</td>
<td>26.6 ± 2.9</td>
<td>24</td>
<td>27</td>
<td>29</td>
<td>26.0 – 27.2</td>
<td>10.9</td>
<td>.132</td>
<td>26.6 ± 2.9</td>
<td>26.6 ± 3.0</td>
<td>0.03</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>LA (mm)</td>
<td>29.9 ± 3.8</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>29.2 – 30.6</td>
<td>12.71</td>
<td>.085</td>
<td>30.9 ± 3.8</td>
<td>28.9 ± 3.5</td>
<td>2.85</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>RV (mm)</td>
<td>19.9 ± 2.9</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>19.4 – 20.5</td>
<td>14.57</td>
<td>-.031</td>
<td>20.2 ± 2.9</td>
<td>19.6 ± 3.1</td>
<td>1.03</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>L V ID(_d) (mm)</td>
<td>43.9 ± 4.8</td>
<td>41</td>
<td>44</td>
<td>47</td>
<td>43.1 – 44.8</td>
<td>10.93</td>
<td>.632</td>
<td>44.9 ± 5.0</td>
<td>42.8 ± 4.4</td>
<td>2.37</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>L V ID(_s) (mm)</td>
<td>27.9 ± 4.2</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>27.1 – 28.6</td>
<td>15.05</td>
<td>.245</td>
<td>29.0 ± 4.3</td>
<td>26.6 ± 3.7</td>
<td>3.18</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>IVS(_d) (mm)</td>
<td>8.6 ± 1.2</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>12.9 – 13.7</td>
<td>13.95</td>
<td>-.056</td>
<td>8.7 ± 1.2</td>
<td>8.6 ± 1.1</td>
<td>0.61</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>IVS(_S) (mm)</td>
<td>13.3 ± 2.1</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>8.4 – 8.88</td>
<td>15.79</td>
<td>.249</td>
<td>13.3 ± 2.2</td>
<td>13.4 ± 2.1</td>
<td>-0.20</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>LVPW(_d) (mm)</td>
<td>8.6 ± 1.3</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>12.7 – 13.6</td>
<td>15.12</td>
<td>-.105</td>
<td>8.7 ± 1.3</td>
<td>8.6 ± 1.3</td>
<td>0.30</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>LVPW(_s) (mm)</td>
<td>13.2 ± 2.1</td>
<td>12</td>
<td>13</td>
<td>15</td>
<td>12.8 – 13.6</td>
<td>15.91</td>
<td>.423</td>
<td>13.4 ± 2.2</td>
<td>13.1 ± 2.1</td>
<td>0.74</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>EDV (Ml)</td>
<td>90.8 ± 24.6</td>
<td>74</td>
<td>87</td>
<td>105</td>
<td>86.2 – 95.5</td>
<td>27.09</td>
<td>.979</td>
<td>97.0 ± 27.6</td>
<td>84.1 ± 91.1</td>
<td>2.83</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>ESV (Ml)</td>
<td>30.9 ± 11.6</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>28.7 – 33.1</td>
<td>37.54</td>
<td>.908</td>
<td>34.1 ± 12.5</td>
<td>27.4 ± 9.4</td>
<td>3.16</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>SV (Ml)</td>
<td>58.6 ± 16.2</td>
<td>46</td>
<td>56</td>
<td>69</td>
<td>55.6 – 61.7</td>
<td>27.65</td>
<td>.791</td>
<td>60.8 ± 16.8</td>
<td>56.3 ± 15.2</td>
<td>1.49</td>
<td>0.137</td>
<td></td>
</tr>
<tr>
<td>EF (%)</td>
<td>61.4 ± 2.8</td>
<td>60</td>
<td>62</td>
<td>64</td>
<td>60.8 – 61.9</td>
<td>4.56</td>
<td>-721</td>
<td>61.5 ± 3.1</td>
<td>61.3 ± 2.5</td>
<td>0.41</td>
<td>0.686</td>
<td></td>
</tr>
<tr>
<td>FS (%)</td>
<td>31.5 ± 2.4</td>
<td>30</td>
<td>32</td>
<td>32</td>
<td>31.0 – 31.9</td>
<td>7.62</td>
<td>-.346</td>
<td>31.6 ± 2.4</td>
<td>31.3 ± 2.4</td>
<td>0.69</td>
<td>0.488</td>
<td></td>
</tr>
</tbody>
</table>

The M-mode echocardiographic measurements are presented according to gender, in table 2. Using the widely applied Mean±2SD rule, we propose the normal values for M-Mode echocardiographic measurements for both genders and total. The dimension of the LA (t=2.85, p=0.005), LVID_d (t=2.37, p=0.02), LVID_S (t=3.18, p=0.002), EDV (t=2.83, p=0.005) and ESV (t=3.16, p=0.002) were significantly higher in men. There was no statistically significant difference in AO (p=0.97), RV (p=0.31), IVS_d (p=0.54), IVS_s (p=0.84), LVPW_d (p=0.72), LVPW_s (p=0.46), SV (p=0.14), EF (p=0.68), and FS (p=0.48) using independent t test at 5% level of significance. Data were tested for distribution normality with skewness, all the values lie between -1 to +1. The Quartiles of the echoparameters are presented in table 2. Coefficient of variation of each assessed parameter were also determined, such has the EF, FS, AO and LVID_d had a low coefficient of variation.

### Table 3: Correlating body surface area to echocardiography measurements

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Our data</th>
<th>EACVI</th>
<th>t</th>
<th>p-value</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO (mm)</td>
<td>0.184</td>
<td>0.18</td>
<td>0.9</td>
<td>0.37</td>
<td>1.0</td>
</tr>
<tr>
<td>LA (mm)</td>
<td>0.380</td>
<td>0.44</td>
<td>-1.8</td>
<td>&lt; 0.0001</td>
<td>-2.0</td>
</tr>
<tr>
<td>RV (mm)</td>
<td>0.353</td>
<td>0.31</td>
<td>-4.7</td>
<td>&lt; 0.0001</td>
<td>-4.2</td>
</tr>
<tr>
<td>LVID_d (mm)</td>
<td>0.292</td>
<td>0.30</td>
<td>2.6</td>
<td>0.01</td>
<td>1.2</td>
</tr>
<tr>
<td>LVID_s (mm)</td>
<td>0.241</td>
<td>0.17</td>
<td>-6.9</td>
<td>&lt; 0.0001</td>
<td>-3.9</td>
</tr>
<tr>
<td>IVS_d (mm)</td>
<td>0.382</td>
<td>0.38</td>
<td>0.2</td>
<td>0.87</td>
<td>0.2</td>
</tr>
<tr>
<td>IVS_S (mm)</td>
<td>0.236</td>
<td>0.22</td>
<td>6.2</td>
<td>&lt; 0.0001</td>
<td>4.4</td>
</tr>
<tr>
<td>LVPW_d (mm)</td>
<td>0.422</td>
<td>0.42</td>
<td>0.2</td>
<td>0.42</td>
<td>0.2</td>
</tr>
<tr>
<td>LVPW_s (mm)</td>
<td>0.152</td>
<td>0.16</td>
<td>6.2</td>
<td>&lt; 0.0001</td>
<td>4.4</td>
</tr>
</tbody>
</table>

*α = 0.05**, α = 0.01

Table 3 was analyzed using Pearson’s correlation coefficient (r). A probability value p < 0.05 was considered statistically significant and p value < 0.0001 was considered highly significant. A highly significant positive correlation existed between BSA and each LA (r=0.380, p< 0.0001), RV (r=0.353, p< 0.0001), IVS_d (r= 0.382, p< 0.0001), LVPW_d (r=0.422, p< 0.0001) and there is no significant difference in AO (r=0.184, p =0.054), LVPW_s (r=0.152, p=0.110). This study demonstrated a week negative correlation between body surface area and EF (r=-0.077, p=0.421) also with FS (r=-0.113, p=0.237) was observed.

### Table 4: Comparison between baseline clinical characteristics and EACVI measurements.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Our data</th>
<th>EACVI</th>
<th>t</th>
<th>p-value</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>46.8</td>
<td>45.8</td>
<td>0.9</td>
<td>0.37</td>
<td>1.0</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.5</td>
<td>170.2</td>
<td>-11.8</td>
<td>&lt; 0.0001</td>
<td>-9.7</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>64.6</td>
<td>69.8</td>
<td>-4.7</td>
<td>&lt; 0.0001</td>
<td>-5.2</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>25.2</td>
<td>24.2</td>
<td>2.6</td>
<td>0.01</td>
<td>1.2</td>
</tr>
<tr>
<td>BSA (m2)</td>
<td>1.7</td>
<td>1.8</td>
<td>-6.9</td>
<td>&lt; 0.0001</td>
<td>-1.1</td>
</tr>
<tr>
<td>SBP mmHg</td>
<td>120.8</td>
<td>120.6</td>
<td>0.2</td>
<td>0.87</td>
<td>0.2</td>
</tr>
<tr>
<td>DBP mmHg</td>
<td>78.9</td>
<td>74.5</td>
<td>6.2</td>
<td>&lt; 0.0001</td>
<td>4.4</td>
</tr>
</tbody>
</table>

The mean age of the study subjects was 46.8(years). Average height, weight, BMI, BSA, SBP and DSP were 160.5 cm, 64.6 kg, 25.2 kg/m2, 1.7 m2, 120.8 mmHg, 78.9 mmHg respectively. All these parameters are compared with the mean of EACVI using a one-sample t-test assuming that the means of samples from a population with a finite variance approach a normal distribution regardless of the distribution of the population. In this
study, it was shown that there was highly statistical significance difference in Hight (p< 0.0001), Weight (p< 0.0001), BMI(p< 0.0001), BSA (p< 0.0001) and DBP (p< 0.0001) and no statistical significance difference in age (p=0.37) and SBP(p=0.87) compared to EACVI measurements and mean difference is more in height (-9.7), weight (-4.7) and BSA (-0.1).

### Table 5: Normal reference values for echocardiographic measurements in comparison to ASE

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Male(n=58) Mean Range</th>
<th>Female(n=53) Mean Range</th>
<th>p-value</th>
<th>t</th>
<th>Male(n=58) Mean Difference</th>
<th>Female(n=53) Mean Difference</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO</td>
<td>26.6 25.8-27.4 31</td>
<td>26.6 25.8-27.4 28</td>
<td>&lt;0.0001</td>
<td>-3.4</td>
<td>0.37</td>
<td>-4.4</td>
<td>-3.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LA</td>
<td>30.9 29.9-31.9 35</td>
<td>28.9 27.9-29.8 33</td>
<td>&lt;0.0001</td>
<td>-3.1</td>
<td>0.87</td>
<td>-4.1</td>
<td>-3.4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>RV</td>
<td>20.2 19.4-20.9 21</td>
<td>19.6 18.8-20.5 20</td>
<td>&lt;0.0001</td>
<td>-2.4</td>
<td>0.37</td>
<td>-2.1</td>
<td>-0.9</td>
<td>0.374</td>
</tr>
<tr>
<td>LVID_d</td>
<td>44.9 43.6-46.3 50</td>
<td>42.8 41.6-44.1 45</td>
<td>&lt;0.0001</td>
<td>-2.7</td>
<td>0.001</td>
<td>-2.2</td>
<td>-2.7</td>
<td>0.001</td>
</tr>
<tr>
<td>LVID_s</td>
<td>29 27.9-30.2 32</td>
<td>26.6 25.6-27.6 28</td>
<td>&lt;0.0001</td>
<td>-2.1</td>
<td>0.009</td>
<td>-1.4</td>
<td>-2.1</td>
<td>0.009</td>
</tr>
<tr>
<td>IVS_d</td>
<td>8.7 8.4-9.0 8.9</td>
<td>8.6 8.3-8.9 8.5</td>
<td>&lt;0.0001</td>
<td>-0.5</td>
<td>0.604</td>
<td>0.1</td>
<td>-0.5</td>
<td>0.604</td>
</tr>
<tr>
<td>LVPW_d</td>
<td>8.7 8.3-9.0 8.8</td>
<td>8.6 8.2-8.9 8.4</td>
<td>&lt;0.0001</td>
<td>-0.5</td>
<td>0.318</td>
<td>0.2</td>
<td>-0.5</td>
<td>0.318</td>
</tr>
<tr>
<td>ESV</td>
<td>57 57.1-57.3 70</td>
<td>56.3 52.1-60.5 48</td>
<td>&lt;0.0001</td>
<td>-0.5</td>
<td>0.001</td>
<td>8.3</td>
<td>-0.5</td>
<td>0.001</td>
</tr>
<tr>
<td>EDV</td>
<td>61.5 60.7-62.3 62</td>
<td>61.3 60.6-61.9 64</td>
<td>&lt;0.0001</td>
<td>-0.5</td>
<td>0.001</td>
<td>8.3</td>
<td>-0.5</td>
<td>0.001</td>
</tr>
<tr>
<td>FS</td>
<td>31.6 31.0-32.3 37</td>
<td>31.3 30.7-31.9 36</td>
<td>&lt;0.0001</td>
<td>-1.4</td>
<td>0.001</td>
<td>-4.6</td>
<td>-1.4</td>
<td>0.001</td>
</tr>
</tbody>
</table>

We measured several parameters of M-mode echocardiography according to the American Society of Echocardiography (ASE) reference values. On examining all our healthy participants, we found that there was highly significant difference regarding AO (p< 0.0001), LA(p< 0.0001), LVID_d (p< 0.0001) and FS (p< 0.0001) in both genders. Males generally had significantly larger reference values compared to females.

**Conclusion**

The means and range for the M-mode measurements were smaller than the ASE-recommended normal values and also there was a highly statistically significant difference in both genders. On examining all our healthy participants, we found that males generally had significantly larger reference values compared to females.

**Conflict of Interest:** No

**Ethical Clearance:** Taken from JSS Medical college institutional ethical committee

**Source of Funding:** Self

**References**

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Effects of Circuit Training Combined with Different Neuromuscular Activities on Muscular Endurance and Body Composition of School Girls

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Abstract

**Background:** Due to the lack of physical activity now a day’s many youngsters are having health issues to do their regular activities. Muscular endurance and proper body composition are important to enable the person to carry out different type of day to day activities and sport activities all over the life time. The sport training is the way to develop one’s health and physical fitness to live a healthy.

**Purpose:** To identify the 12 weeks training effects of circuit training combined with different neuromuscular activities on muscular endurance and body composition of school girls.

**Method:** This is an intervention study carried out to compare effects of 4 groups. Group 1 (n=15), who trained circuit training (CT), group 2(n=15), who trained circuit training combined with resistance band (CT-RB), group 3(n=15), who trained circuit training combined with skipping rope (CT-SR) and group-4(n=15) control group (CG). The pre and post test data was collected for the muscular endurance and body composition.

**Results:** The difference between pre and post test was significant (p< 0.05) in the intervention groups and insignificant (p>0.01) in control group.

**Conclusion:** The circuit training combined with resistance band and skipping rope produced greater improvement on muscular endurance and reduced percentage of body composition

**Keywords:** Circuit training, Resistance band, Skipping Rope, Muscular endurance, Intervention.

Introduction

Dramatic physiological and psychological changes occur in childhood and adolescence period. This is a critical period of life. The lifestyle, healthy and unhealthy behaviors are develops in this stage. These may influence health behaviors in adult stage. The detailed reviews have conversed about the associations between physical activities and its consequences on health in childhood and adolescence.\textsuperscript{1-6}

Now a day’s fitness is considered as most important health indicators in childhood.\textsuperscript{7} The concept of physical fitness has since evolved to include morphological and metabolic components.\textsuperscript{8} Thus, in the previous decades a number of countries have been promoting physical fitness development among young people in different mode.\textsuperscript{9} In many situation, schools have been measured the best setting in which children with small fitness levels can be recognized and a healthy lifestyle can be carry out.\textsuperscript{7} It is acknowledged that preparation of long-term fitness programme is one of the most excellent ways to improve fitness components.\textsuperscript{10} However in the Physical Education setting these programme cannot lost the entire course or a large part of it since many curricular contents should be developed in a school year.\textsuperscript{11} Therefore, in the physical education setting we require to find short-term programme that could be also helpful for the growth of physical fitness. An excellent methodology that meets these criteria could be the circuit training.\textsuperscript{12-14} This training efficiently reduces the
time devoted to training while allowing and sufficient training volume to be achieved. Furthermore, it allows a higher motor engagement time. Adding together, this methodology has multilevel effects on fitness, particularly in beginners.

Circuit training is often erroneously portrayed as an intensive and stressful form of exercise, with a drill sergeant type in the middle of a circuit bellowing orders at weary recruits. Circuit training is a very versatile and adaptable mode of training that requires the performance of a series of carefully selected exercises. The use of resistance bands and cords as a form of exercise is becoming increasingly popular. In this study, the resistance band and skipping rope training have chosen as a neuromuscular activity.

Resistance band and cords are an effective complement or alternative to any strength and power training workout. Like other strength training exercises, these bands and cords can provide strength gains in both muscle and bones by providing resistance. Rope jumping is one of only a few inexpensive, highly portable and easily learned fitness and sports training exercises that require the precise coordination of several muscle groups.

Method

Participants: Sixty healthy school girls children, 12-14 years old (13.10+0.38 years; body mass

45.29+10.45 kg; body height 1.40+0.03 m; body mass

index 18.35+2.90 kg/m\(^2\)) from ADW Higher Secondary School participated in this study. Children and their legal guardians were fully informed about all the features of the study and were required to sign an informed consent form. The Departmental Research Committee of the Department of Physical Education, Alagappa University approved the study protocol.

**Study Design:** The sixty school girls were divided into three experimental and one control group. The experimental group 1, 2 and 3 were performed circuit training, circuit training combined with resistance band and circuit training combined with skipping rope respectively. The subjects performed their training interventions for the period of 12 weeks. The control group did not entertain any specific type of activity.

Data Collection: The muscular endurance was tested by sit ups test; this is a standardized test for assessing the muscular endurance. The body composition was tested by BMI calculation. The data on muscular endurance and body composition was collected from the participants before and after the training interventions.

Statistics: The analysis of variance was used to analyze the pre and post test development in the groups. The analysis of covariance was used to find the adjusted post test mean differences among the groups. The pair wise comparisons were made by Scheffe’s Post Hoc test.

**Results**

Muscular Endurance:

**Table 1: Showing the analysis of co-variance on the parameter of muscular endurance (Measures in Counts)**

<table>
<thead>
<tr>
<th></th>
<th>CT</th>
<th>CT-RB</th>
<th>CT-SR</th>
<th>CG</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test (M±SD)</td>
<td>11.26±0.79</td>
<td>11.0±0.92</td>
<td>11.2±0.94</td>
<td>11.13±0.91</td>
<td>0.24</td>
<td>0.87</td>
</tr>
<tr>
<td>Post test (M±SD)</td>
<td>12.73±0.59</td>
<td>14.66±0.72</td>
<td>14.86±0.74</td>
<td>10.53±0.51</td>
<td>144.6*</td>
<td>0.00</td>
</tr>
<tr>
<td>Adjusted post test Mean</td>
<td>12.71</td>
<td>14.69</td>
<td>14.85</td>
<td>10.53</td>
<td>155.5*</td>
<td>0.00</td>
</tr>
</tbody>
</table>

CT-Circuit training, CT-RB- Circuit training combined with resistance band, CT-SR- Circuit training combined with skipping rope, CG-Control group, M= Mean, SD=Standard Deviation; *=Significant, p=Significance level from one way analysis of covariance, Significant at p< 0.01, Insignificant at p>0.05

The table-1 shows the statistical end results of pre, post and adjusted post test on muscular endurance of different groups. The results proved that, the pre test mean values show the insignificant (F=0.24, p>0.05) effect on muscular endurance among the groups. Further, the results show that post and adjusted post test show significant differences (Post test F=144.6, p< 0.05 and Adjusted Post test F=155.5, p< 0.05) on muscular endurance among the groups. Finally, the analysis shows that there was a significant positive improvement on muscular endurance of difference groups.
The table 2 shows the pair wise comparisons of Scheffe’s Post Hoc test.

### Table 2: Pair wise comparisons muscular endurance

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Differences</th>
<th>Scheffe’s (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT and CT-RB</td>
<td>1.98*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT and CT-SR</td>
<td>2.14*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT and CG</td>
<td>2.17*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT-RB and CT-SR</td>
<td>0.15</td>
<td>1.000</td>
</tr>
<tr>
<td>CT-RB and CG</td>
<td>4.61*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT-SR and CG</td>
<td>4.31*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The table 2 shows the pair wise comparisons on muscular endurance of different groups.

- The results proved that there was a significant differences were found in CT and CT-RB, CT and CT-SR, CT and CG, CT-RB and CG, CT-SR and CG.
- Insignificant difference was found between CT-RB and CT-SR.

### Body Composition:

Table 3: Showing the analysis of co-variance on the parameter of body composition (Measures in Percentage)

<table>
<thead>
<tr>
<th></th>
<th>CT</th>
<th>CT-RB</th>
<th>CT-SR</th>
<th>CG</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test (M±SD)</td>
<td>24.05±0.49</td>
<td>24.03±0.45</td>
<td>24.03±0.49</td>
<td>24.02±0.45</td>
<td>0.006</td>
<td>0.99</td>
</tr>
<tr>
<td>Post test (M±SD)</td>
<td>23.81±0.43</td>
<td>23.50±0.17</td>
<td>23.13±0.07</td>
<td>24.2±0.44</td>
<td>29.47*</td>
<td>0.00</td>
</tr>
<tr>
<td>Adjusted post test</td>
<td>23.81</td>
<td>23.51</td>
<td>23.13</td>
<td>24.2</td>
<td>42.22*</td>
<td>0.00</td>
</tr>
</tbody>
</table>

CT-Circuit training, CT-RB- Circuit training combined with resistance band, CT-SR- Circuit training combined with skipping rope, CG-Control group, M= Mean, SD=Standard Deviation; *=Significant, p=Significance level from one way analysis of covariance, Significant at p< 0.01, Insignificant at p>0.05

The table-3 shows the statistical end results of pre, post and adjusted post test on body composition of different groups. The results proved that, the pre test mean values show the insignificant (F=0.006, p>0.05) effect on body composition among the groups. Further, the results show that post and adjusted post test show significant differences (Post test F=29.47, p< 0.05 and Adjusted Post test F=42.22, p< 0.05) on body composition among the groups. Finally, the analysis shows that there was a significant positive alteration on body composition of difference groups.

The table-4 shows the pair wise comparisons of Scheffe’s Post Hoc test.

### Table 4: Pair wise comparisons body composition

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Differences</th>
<th>Scheffe’s (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT and CT-RB</td>
<td>0.3*</td>
<td>0.019</td>
</tr>
<tr>
<td>CT and CT-SR</td>
<td>0.68*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT and CG</td>
<td>0.38*</td>
<td>0.001</td>
</tr>
<tr>
<td>CT-RB and CT-SR</td>
<td>0.37*</td>
<td>0.002</td>
</tr>
<tr>
<td>CT-RB and CG</td>
<td>0.69*</td>
<td>0.000</td>
</tr>
<tr>
<td>CT-SR and CG</td>
<td>1.1*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The table-4 shows the pair wise comparisons on body composition of different groups.

The results proved that there was a significant differences were found in CT and CT-RB, CT and CT-SR, CT and CG, CT-RB and CT-SR, CT-RB and CG, CT-SR and CG.

### Discussions

In this study, circuit training combined with different neuromuscular activities for 12 weeks have significantly improved the capacity of muscular endurance and decreased the percentage of body composition. The training produced relative effect between the study groups. The muscular endurance was better improved in circuit training combined with resistance band and circuit training with skipping rope training than the other training group. The body composition was better altered in the circuit training with skipping rope training than the other training groups.

We confirmed that, twelve weeks of circuit training combined with different neuromuscular activities (i.e.,
resistance band and skipping rope) significantly improved the muscular endurance compared to the control group. The percentage of improvement on muscular endurance for circuit training was 10.03%, circuit training combined with resistance band was 33.27% and circuit training combined with skipping rope training was 32.67%. From the results CT-RB and CT-SR produced more or less same effect on muscular endurance than CT. Both the trainings are suitable for the improvement of muscular endurance. The earlier studies on muscular strength and endurance reveals that 12 weeks of combined exercise or 8 weeks of high intensity circuit training improve the muscular endurance, grip and back strength in obese women. Abdominal muscular endurance and cardiovascular endurance in school children were developed due to the circuit training program. The circuit training alone develops the muscular strength and power better than combined training of resistance and endurance training. We think that the improvement is due to the different type of circuit exercises and neuromuscular activities applied with the time, duration, intensity and recovery. Findings of this study indicate that the circuit training with neuromuscular activities for the period of 12 weeks improves the muscular endurance. The circuit training with different neuromuscular activities is useful for the development of muscular endurance in school going students.

We established that, twelve weeks of circuit training combined with different neuromuscular activities (i.e., resistance band and skipping rope) significantly decreased the body composition compared to the control group. The percentage of improvement on body composition for circuit training was 1.0%, circuit training combined with resistance band was 2.2% and circuit training combined with skipping rope training was 3.7%. From the results CT-SR greatly decreased the body composition than the CT-RB and CT. The previous study findings are in line with the findings of the present study. The positive effects of circuit strength training on body composition parameters were observed. The moderate intensity of circuit resistance training increases lean body mass, bone mineral density and reduces body fat percentage. The circuit weight training and aerobic exercise for the period of 12 weeks resulted in positive effects on body composition. In the present study, the alteration of body composition was due to the gradual increase of intensity of exercise, frequency, repetition and rest of circuit exercises and neuromuscular activities.

Conclusion

In this study, results showed that the circuit training with the combinations of neuromuscular activities conveyed positive effects on the improvement of muscular endurance and reduction of body composition. It improves the health fitness components and helped in the prevention of lifestyle diseases in school students.

The present training protocols very much beneficial for school going children for the anatomical adaptation. Once children well developed in the anatomical adaptations, it leads to the better improvement of health and skill related components of physical fitness. Future studies may be attempted in this area with other training parameters.

Conflict of Interest: Nil


Ethical Clearance: The Departmental Research Committee of the Department of Physical Education, Alagappa University approved the study protocol.

References

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Comparative Evaluation of Mechanical Properties of Ceramic Reinforced Glass Ionomer Cement and Type IX GIC: An Invitro Study

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Abstract

Background and Objectives: Dental caries is one of the most common problem encountered in pediatric patients. Despite modern advances in prevention of dental caries, many teeth are still lost prematurely leading to loss of function, esthetics, arch length and arch symmetry. Various restorative materials are available for the treatment of dental caries. Physical and mechanical tests were applied to analyze the structural designs of restorative materials. Various researches have been carried out in search of an ideal restorative material. Hence, the present in-vitro study was done to evaluate and compare the mechanical properties (compressive strength, flexural strength and knoop microhardness) of Ceramic Reinforced Glass Ionomer Cement (Amalgomer CR) and Type IX GIC.

Results: The study showed a statistically significant difference in the compressive strength, flexural strength and knoop microhardness of ceramic reinforced glass ionomer cement (Amalgomer CR) and is superior when compared to Type IX GIC.

Conclusion: The study concluded that the mechanical properties (compressive strength, flexural strength and knoop microhardness) of ceramic reinforced glass ionomer cement (Amalgomer CR) is superior to Type IX GIC.

Keywords: Compressive strength, Flexural strength, Knoop Microhardness, Glass ionomer cement, Amalgomer CR.

Introduction

An ideal restorative material requires minimal cavity preparation, have adequate strength and wear properties, be easy to place with a certain amount of adhesion to tooth structure and not be moisture sensitive during placement and setting.¹ Glass ionomer cement (GIC) seems to meet most of these requirements along with particular advantages like ability to leach fluoride, coefficient of thermal expansion similar to tooth, chemical bonding to enamel and dentin, insolubility in oral fluids at intraoral temperatures, excellent biocompatibility, better esthetics and low moisture sensitivity making it highly appropriate for use in children.²

Physical and mechanical tests were applied to analyze the structural designs of restorative materials. From studies of physical and mechanical behavior, shortcomings of structures and materials were observed. To rectify those shortcomings, the process...
of improvement began with the addition of modifiers and studies on various chemical combinations were initiated.\textsuperscript{3}

Although GICs were used as the restorative cements in dentistry, they have disadvantages too. Lack of sufficient strength and toughness limited conventional GIC’s use in stress bearing areas.\textsuperscript{4} Hence for further improvisation in the mechanical properties, a variety of modifiers have been added to conventional GICs and one such material is Amalgomer, which offers the benefits of GIC combined with the strength of amalgam due to ceramic reinforcement in the glass ionomer cement.\textsuperscript{4,5} This tooth-coloured product is proposed by the manufacturer to combine the high strength of a metallic restorative and the esthetics and other advantages of glass ionomers.\textsuperscript{6}

In this context, the present study was designed to evaluate and compare the mechanical properties which includes compressive strength, flexural strength and knoop microhardness of Ceramic Reinforced Glass Ionomer Cement (Amalgomer CR) and Type IX GIC.

**Materials and Method**

72 specimens were be made by using custom made plexi-glass moulds of different dimensions(Figure 1) according to ISO Standard Specifications(ISO 9917). The mechanical properties of the specimens were evaluated in Raghavendra Spectro Metallurgical Laboratory, Bangalore.

**Fig 1: Custom made plexi-glass moulds**

The materials were manipulated according to manufacturer’s instructions and before placing onto the moulds, the walls were coated with petroleum jelly. The mixed cement was then placed by keeping a matrix strip above and below the moulds to achieve a finished surface. After setting, the specimens were removed from the mould and excess was trimmed using Bard Parker blade(#11) and polished with 1200 grit paper. Then the specimens were stored in distilled water at room temperature for 24 hour prior to testing.

In both the groups (Figure 2 & 3);

12 cylindrical specimens of (4 x 6mm) dimension were used to test compressive strength.

12 bar-shaped specimens of (25 x 2 x 2mm) dimension were used to test flexural strength.

12 rectangular specimens of (8 x 4mm) dimension were used to test knoop microhardness.

**Assessment of Compressive Strength:** 12 cylindrical specimens from each group were placed between the plates of Universal Testing Machine (Model PC-2000, Electronic Tensometer). A compressive load was applied along the long axis at a crosshead speed of 5mm/min until the test specimen fracture. The maximum load applied to fracture the specimen was recorded.

**Assessment of Flexural Strength:** 12 bar-shaped specimens from each group were subjected to 3-point bending test on Universal Testing Machine (Model PC-2000, Electronic Tensometer) at a crosshead speed of 5mm/min. The maximum load applied to fracture the specimen was recorded.

**Assessment of Knoop Microhardness:** 12 rectangular specimens from each group were subjected to micro-indentation hardness test in Microhardness Tester (Matsuzawa, Japan/MMT-X7A), where a diamond-intender was pressed onto the surface of the specimens under a load of 100g with a 10sec dwell time. After the load was removed, measurements of the major axis of the diamond marked by the intender on the surface of test specimens were made and used for determining the knoop microhardness.

The values obtained were tabulated and fed in Statistical Package for Social Sciences software (SPSS version 23) for statistical analysis.

**Specimens:**

**Fig 2: Specimens of Amalgomer CR**
Findings: Table 1 shows the mean and standard deviations of the mechanical properties of Amalgomer CR and Type IX GIC.

Table 1: Mean Compressive Strength, Flexural Strength and Knoop Microhardness of Amalgomer CR and Type IX GIC

<table>
<thead>
<tr>
<th>Parameters Tested</th>
<th>Materials</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>T</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength</td>
<td>Amalgomer CR</td>
<td>12</td>
<td>140.1534</td>
<td>1.47761</td>
<td>13.258</td>
<td>0.000 (HS)</td>
</tr>
<tr>
<td></td>
<td>Type IX GIC</td>
<td>12</td>
<td>101.5079</td>
<td>9.98895</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexural strength</td>
<td>Amalgomer CR</td>
<td>12</td>
<td>53.2904</td>
<td>2.55654</td>
<td>26.538</td>
<td>0.004 (HS)</td>
</tr>
<tr>
<td></td>
<td>Type IX GIC</td>
<td>12</td>
<td>31.7092</td>
<td>1.18312</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knoop microhardness</td>
<td>Amalgomer CR</td>
<td>12</td>
<td>101.4000</td>
<td>2.44838</td>
<td>45.109</td>
<td>0.003 (HS)</td>
</tr>
<tr>
<td></td>
<td>Type IX GIC</td>
<td>12</td>
<td>67.7333</td>
<td>0.83048</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p value ≤ 0.05 is Significant, NS – Not Significant, HS – Highly Significant, T - Student T Test, N – Number of Specimens Tested

Discussion

The efficiency of the restorative material to withstand the functional forces is an important requirement for its longevity. Among the mechanical properties, compressive strength and flexural strength are the widely used properties in evaluating the clinical performance of the restorative materials.

Compressive strength is often used as a measure to evaluate the ability of the material to withstand the masticatory force. Flexural strength is used to evaluate the strength of the material and the amount of distortion expected under bending stress. The specimens were subjected to 3-point bending test because it is considered as a representation of the clinical situation as the forces exerted by the opposing cusp. Microhardness can be defined as the resistance of a material to indentation or penetration. Surface hardness tests appears to be appropriate for evaluating the degradation and durability of dental materials.

Various restorative materials have been used since years to preserve the lost tooth structure and maintain form, function and esthetics. Dental amalgam has served as an excellent and versatile restorative material for many years. However, it has many drawbacks like lack of esthetics and the unavoidable use of mercury. This lead to the search of more improved materials and the most commonly used restorative material is GIC because of their fluoride release, biocompatibility and ease of use. However, some deficiencies like moisture sensitivity, short working time, long setting and maturation time, low fracture toughness and poor wear resistance have limited their use to areas which are not subjected to high masticatory stresses.

The physical and mechanical properties of GICs were further improved when a resin portion was added to the original GIC which yielded a hybrid material, i.e., resin modified glass ionomer cement (RMGIC) which was developed to overcome the problems of moisture sensitivity and low initial mechanical strength.
that were typical for conventional glass ionomers and have the advantage of longer working time, less sensitivity to water during setting.\textsuperscript{16,17}

A new generation of glass ionomer, GC Fuji IX, was developed especially for Geriatric and Pediatric patients in late 1990s. It is said to possess high strength, wear resistance, chemical adhesion to tooth, fluoride release, radiopacity, and less sensitivity to saliva.\textsuperscript{18} Last few decades have witnessed efforts increasingly directed towards modifications of the older materials with the addition of various modifiers which were proven to be beneficial.\textsuperscript{4} One such modification made was the incorporation of ceramic particles to GIC. According to Williams et al reinforced materials were significantly stronger than other materials.\textsuperscript{19}

In this context, the present study was done to evaluate and compare the mechanical properties of ceramic reinforced glass ionomer cement (Amalgomer CR) and Type IX GIC by fabricating specimens where were then subjected to subsequent mechanical testing.

The specimens made in the study, failed to have a smooth surface even after placing the mylar strip. It could be due to the irregular surface of the fabricated customized mould. Finishing and polishing of restorative materials always pose a difficulty because particles and matrix differ in hardness and thus cannot be abraded uniformly.\textsuperscript{20,21} For a finishing system to be effective, the cutting particles should be harder than the filler materials. Otherwise, the polishing agent will only remove the matrix and leave the particles protruding from the surface.\textsuperscript{21} GICs’ surface hardness can be affected by the polishing process because it involves polishing of the glass particles and abrasion of the matrix which inturn can compromise the mechanical properties.\textsuperscript{22} Considering this, only gross finishing of the specimens were done.

Once the material is set, they were removed from the mould and immersed in distilled water for 24 hours. Mckenzie et al reported that the physico-mechanical properties of conventional and resin-modified GICs were not significantly different comparing storage in water or saliva upto 1 year. Therefore, water was considered as an acceptable storage medium for the in-vitro analysis of GIC’s properties.\textsuperscript{23} The specimens were then subjected to mechanical testing in the laboratory.

From the results obtained, the mean compressive strength and flexural strength of Amalgomer CR was found to be higher than Type IX GIC which was statistically significant with a p-value less than 0.05. This increase was attributed to the ceramic reinforcement where the ceramic filler in the powder component would react partially with the matrix and forms an altered polysalt matrix thereby enhancing the all round strength of the cement.\textsuperscript{4,5}

The knoop microhardness of Amalgomer CR was higher than Type IX GIC, with a p-value less than 0.05, this increase in microhardness could also be a result of the ceramic reinforcement and due to the improvization inmicronization and treatment of the main glass components, fluoro alumino silico phosphate glass and polyalkenoic acids.\textsuperscript{1} Hence from the present study it was shown that the mechanical properties of Ceramic Reinforced Glass Ionomer Cement (Amalgomer CR) is statistically significant than Type IX GIC with a p-value less than 0.05.

Within the limitations of the present study, Ceramic Reinforced Glass Ionomer Cement (Amalgomer CR) showed superior mechanical properties in terms of compressive strength, flexural strength and knoop microhardness owing to the homogeneous incorporation of ceramic particles in the glass component which further reinforces the material with high strength, lasting durability and high tolerance to occlusal load thereby ensuring it as a restorative material with promising results to be used in pediatric dentistry.

**Conclusion**

The study concludes that mechanical properties of Ceramic Reinforced Glass Ionomer Cement (Amalgomer CR) is superior to Type IX GIC. However, further in-vivo research with more parameters are needed to evaluate the efficiency of ceramic reinforced glass ionomer cement in real environmental circumstances.

**Conflict of Interest:** There is no conflict of interest in the research.

**Funding:** This study has not been funded by any organization.

**Ethical Clearance:** All the clinical procedures were carried out following the protocols approved by the Ethics and Review Committee of Sri Siddhartha Dental College and Hospital, Tumkur (IEC 02/2017).
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Anemia among Pregnant Women and its Socio-Demographic and Reproductive Correlates: A Community Based Study

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Abstract

Background: The health consequences of anemia during pregnancy are well documented. The prevalence of anemia among antenatal women is still very high in India and it varies from region to region. Therefore a study was undertaken to assess the relationship between anemia and the contributory socio-demographic and reproductive factors.

Objectives: To study the prevalence of anemia and its contributory socio-demographic and reproductive factors among pregnant women

Method: A cross sectional study was conducted among 400 pregnant women above 18 years and beyond 12 weeks of amenorrhea in the field practice area of a private medical college for a period of one year. Hemoglobin was estimated by strip method using “Color scale test kit”. A predesigned and pretested questionnaire was used to interview the women regarding their socio-demographic and reproductive details. Data was analysed using SPSS ver. 18

Results: Among the 400 pregnant women, 264 (66%) were anemic out of which 32%, 30% and 4% were mildly, moderately and severely anemic. Anemia decreased with age and literacy level. The odds of anemia was 1.69 times more in Muslims as compared to Hindus. Anemia was not associated with any of the reproductive correlates.

Conclusion: Overall prevalence of anemia was high among the women. This calls for an urgent need of imparting health education about anemia. Also all pregnant women should not only be registered as their pregnancy is confirmed but also ensured adequate intake of iron and folic acid supplementation during pregnancy and postnatal period.

Keywords: Anemia, prevalence, socio-demographic, reproductive, factors.

Introduction

Worldwide anemia in pregnancy is a burning issue as it has a detrimental effect on the health of both the mother as well as child. Women during pregnancy are more vulnerable for anemia not only because of the synergistic effects of physiological increase in plasma volume (hemodilution) but also because of increased demand and poor bioavailability of iron in the food, predisposed by social factors like preferential feed for men, women eating last with whatever left, being
deprived of good food, workload of household chores, and other cultural practices \(^{(1,2)}\).

Several studies have shown that almost 40% of maternal deaths in India is indirectly contributed by anemia because of early marriage, rapid succession of pregnancies at closer intervals and loss of blood in each delivery and chronic blood loss due to hookworm infestation and malaria. \(^{(3,4)}\)

The burden of anemia among antenatal women is still very high in India and it differs from region to region. \(^{(5-12)}\) Therefore an attempt has been made to study the relationship between anemia and socio-demographic and reproductive factors contributing to it, to meet the challenge of protecting maternal and neonatal health.

**Aims & Objectives:** To study the prevalence of anemia and its contributory socio-demographic and reproductive factors among pregnant women

**Method**

A community based cross-sectional study was carried out among pregnant women in the field practice area of a private medical college in Davangere, Karnataka.

Inclusion criteria: Pregnant women aged above 18 years and beyond 12 weeks of amenorrhea who were willing to participate in the study were included.

Exclusion criteria: Pregnant women with systemic illness and bleeding disorders, who were non-cooperative, absent on the days of visit or consuming iron and folic acid (IFA) tablets in the past three months were excluded from the study.

**Ethical Clearance:** Ethical Clearance was obtained from the Institutional Ethics Committee.

**Sample Size:** Considering that the prevalence of anemia among pregnant women in India varies from 60-80% (average = 70%), we calculated the sample size using the formula \(n = \frac{4pq}{d^2}\) where, \(n = \text{sample size}, p = \text{prevalence of anemia}, q = 100 - p = 100-70 = 30, d = \text{admissible error} (10 \% \text{of} \text{p}) \text{therefore,} \ \text{n} = 171.4.\) It was rounded up to 210 for urban and 190 for rural pregnant women. Thus the total sample size came up to 400.

**Consent:** Written informed consent was obtained before interviewing the pregnant women.

**Sampling technique** Purposive sampling was employed for the study.

Data Collection tool: All the eligible women were briefed regarding the purpose of the study and were assured of confidentiality and anonymity of information. A predesigned, pretested, semi structured questionnaire was administered to interview the recruited women and data regarding socio-demographic characteristics and reproductive history was taken. Hemoglobin level among the study group was estimated by using “Color Scale for Hemoglobin” device. It is a simple and effective medical device for the accurate estimation of Haemoglobin levels in blood. It comprises a small card with six shades of red that represent Haemoglobin levels at 4, 6, 8, 10, 12 & 14 g/dl respectively. A drop of blood is placed on the test strip provided. After waiting for about 30 seconds the colour of the blood spot is matched immediately against one of the hues on the scale.\(^{13}\)Severity of anemia was classified into four grades, i.e Mild: 10-10.9 g/dl, Moderate: 7-9.9g/dl, Severe:7-4g/dl and very severe :< 4g/dl

**Data analysis:** The data was compiled and analyzed using Statistical Package for Social Sciences (SPSS 18) software. Results were expressed in frequency and percentages. Statistical tests like chi square and Fischer’s exact test were used to assess significance of categorical data. Associations were confirmed using logistic regression and it was expressed using odds ratio with 95% Confidence interval

**Results**

A total of 400 antenatal women were recruited into the study. Their age varied from 18 to 37 years, their mean age being 23.27 ± 3.226 years. Majority of the women were less than 25 years of age (80%) and were predominantly Hindus (49.5%). Most of the study participants were homemakers (85.5%) and almost half of them studied up to secondary school (49.5%). More than half of the women were residing in a joint family (53%) and majority of them were consuming a non vegetarian diet (78%).

The study population was almost equally distributed with respect to the gravida status. Nearly half of them were nulliparous (46.5%). More than half of them had an interval of more than two years between their deliveries (57%). Almost 10% of the women underwent abortions.

Out of 400 pregnant women 264(66%) were anemic. Among them 32% and 30% had mild and moderate anemia respectively. Very few of them had severe anemia(4%) (Fig. 1).
Figure 1: Showing severity of anemia among pregnant women, N = 400

Majority (68%) of women aged less than 25 years were found to be anemic and this was highly significant (p < 0.05). More than three fourth of the Muslim women (77%) were found to be anemic and this difference was highly significant (p < 0.001). Anemia was insignificantly higher in homemakers and agricultural laborers as compared to employed women. The proportion of anemic women significantly decreased as the literacy status increased. Majority of the non-vegetarians (70%) were anemic and this difference was not significant. Anemia insignificantly increased with parity and number of abortions (Table 1).

Table 1: Socio-demographic and reproductive factors associated with anemia

<table>
<thead>
<tr>
<th>Sociodemographic and Reproductive Variables</th>
<th>No Anemia (136) n (%)</th>
<th>Anemia (264) n (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Age (Years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25</td>
<td>101 (31.5)</td>
<td>219 (68.4)</td>
<td>&lt; 0.05*</td>
</tr>
<tr>
<td>25-30</td>
<td>26 (38)</td>
<td>43 (62)</td>
<td></td>
</tr>
<tr>
<td>&gt; 30</td>
<td>9 (82)</td>
<td>2 (18)</td>
<td></td>
</tr>
<tr>
<td>2 Religion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hindu</td>
<td>108 (39)</td>
<td>170 (61)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>muslim</td>
<td>28 (23)</td>
<td>94 (77)</td>
<td></td>
</tr>
<tr>
<td>3 Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>homemaker</td>
<td>141 (41)</td>
<td>200 (59)</td>
<td>0.106</td>
</tr>
<tr>
<td>employed</td>
<td>17 (53)</td>
<td>15 (47)</td>
<td></td>
</tr>
<tr>
<td>agricultural laborer</td>
<td>7 (26)</td>
<td>20 (74)</td>
<td></td>
</tr>
<tr>
<td>4 literacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low</td>
<td>11 (14)</td>
<td>65 (86)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>middle</td>
<td>69 (35)</td>
<td>129 (65)</td>
<td></td>
</tr>
<tr>
<td>high</td>
<td>56 (45)</td>
<td>70 (44)</td>
<td></td>
</tr>
<tr>
<td>5 Type of family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nuclear</td>
<td>34 (30)</td>
<td>78 (70)</td>
<td>0.57</td>
</tr>
<tr>
<td>joint</td>
<td>77 (36)</td>
<td>136 (64)</td>
<td></td>
</tr>
<tr>
<td>Three generation</td>
<td>25 (33)</td>
<td>50 (67)</td>
<td></td>
</tr>
<tr>
<td>6 dietary pattern</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vegetarian</td>
<td>42 (48)</td>
<td>45 (52)</td>
<td>0.152</td>
</tr>
<tr>
<td>non-vegetarian</td>
<td>94 (30)</td>
<td>219 (70)</td>
<td></td>
</tr>
<tr>
<td>7 gravida</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>primigravida</td>
<td>70 (37)</td>
<td>116 (63)</td>
<td>0.152</td>
</tr>
<tr>
<td>multigravida</td>
<td>66 (31)</td>
<td>148 (69)</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Sociodemographic and Reproductive Variables</th>
<th>No Anemia (136) n (%)</th>
<th>Anemia (264) n (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>para 0</td>
<td>70(37)</td>
<td>116 (63)</td>
<td>0.51</td>
</tr>
<tr>
<td>para 1</td>
<td>48(32)</td>
<td>103 (68)</td>
<td></td>
</tr>
<tr>
<td>para 2</td>
<td>13(29)</td>
<td>31(71)</td>
<td></td>
</tr>
<tr>
<td>more than 3</td>
<td>5(26)</td>
<td>14(74)</td>
<td></td>
</tr>
<tr>
<td>2 birth interval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>less than 2</td>
<td>23(25)</td>
<td>68 (75)</td>
<td>0.13</td>
</tr>
<tr>
<td>more than 2</td>
<td>43(35)</td>
<td>80 (65)</td>
<td></td>
</tr>
<tr>
<td>3 abortion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nil</td>
<td>124(34)</td>
<td>237 (66)</td>
<td>0.42</td>
</tr>
<tr>
<td>1</td>
<td>11(35)</td>
<td>20 (65)</td>
<td></td>
</tr>
<tr>
<td>2 or more</td>
<td>1(14)</td>
<td>7 (86)</td>
<td></td>
</tr>
</tbody>
</table>

On applying logistic regression, it was seen that as age and literacy level increased anemia decreased. As compared to Hindus the odds of anemia was 1.69 times more in Muslims (Table 3)

Table 2: Study of factors affecting anemia using logistic regression model

<table>
<thead>
<tr>
<th>Factors</th>
<th>Odd’s ratio</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age (Years):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25-30</td>
<td>0.87</td>
<td>0.495-1.528</td>
<td>0.627</td>
</tr>
<tr>
<td>&gt;30</td>
<td>0.15</td>
<td>0.32-0.716</td>
<td>0.17</td>
</tr>
<tr>
<td>2. Literacy level:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Middle</td>
<td>0.334</td>
<td>0.165-0.679</td>
<td>0.002</td>
</tr>
<tr>
<td>High</td>
<td>0.273</td>
<td>0.129-0.580</td>
<td>0.001</td>
</tr>
<tr>
<td>3. Religion:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Muslim</td>
<td>1.69</td>
<td>1.002-2.848</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Discussion

In the present study out of 400 pregnant women 264 (66%) were anemic. Similar findings were observed in other parts of Karnataka as well as in a study conducted in West Bengal (67.8%).\(^{5,6,7,8}\)Comparatively lower proportion of women were anemic in studies conducted in Andaman and Nicobar islands(50.9%) and Southern Punjab (55.2%).\(^{9,10}\) Greater proportion of pregnant women were anemic in the studies conducted in Assam (86.88%) and Solapur(92.38%).\(^{11,12}\) Our findings were almost analogous to the those conducted in Africa (47-62%) and much higher than those in Sri Lanka(16.6%), Indonesia (40.7%) and Nepal (37%).

In our study out of the 66% women having anemia 32%,30% and 4% women had mild, moderate and severe anemia respectively. Almost Similar findings were seen in studies conducted in Kolar, Mysuru, Andaman & Nicobar islands and Jaipur. The proportion of mild anemia was higher in studies conducted by Bisoi S in West Bengal (67.8%). Whereas the proportion of moderate anemia was greater in studies conducted by Taseer et al in Southern Punjab (60.14%) and Biswas M et al (77%)in Assam. The proportion of severe anemia was comparatively higher in a study conducted by Chowdhary HA et. al (11%).\(^{14,15,16,17}\)

In the present study 68% of women aged less than 25 years were found to be anemic and this was highly significant. This hints at the poor dietary intake of iron of these women during childhood and the increased requirements during pregnancy further worsened
anemia. The study findings of HA Chowdhary et al were almost alike. In a study conducted by Bisoi D et al (61.8%) and Kefiyalew et. al (34.6%) the relationship between age and anemia was not significant. In our study it was seen that there was inverse relationship between age and anemia. Contradictory findings were seen in studies conducted by Suryanarayana et.al and Okube OT et al.

In our study 77% of Muslim women were found to be anemic and this difference was highly significant (p < 0.001). The odds of anemia was 1.69 times more in Muslim women as compared to Hindus. Whereas in studies conducted by Bisoi D 80.6% of Muslim women were anemic but this relationship was not significant. Whereas in a study conducted by Okube OT the proportion of anemia was non significantly high in Christians (57.5%).

In our study the proportion of anemia was non significantly more in agricultural labourers (74%) and homemakers (59%). Analogous findings were seen in studies conducted by Lestari S et al and HA Chowdhary et al where 42.6% and 37% of homemakers were anemic. Contradictory findings were seen in studies conducted by Okube OT where anemia was significantly more in employed women as compared to homemakers.

In our study it was seen that as literacy status increased anemia decreased. This may be because literacy has an impact on the utilization of antenatal services as well as following good practices during the antenatal period. These findings were in line with the studies conducted by Bisoi D and Chowdhury HA et al. Contradictory findings were seen in studies conducted by Vindhya et al., Okube OT et al and Kefiyalew F et al where anemia was insignificantly associated with literacy status.

In the present study 70% of women residing in nuclear families were anemic and this relationship was not significant. On the contrary in a study conducted by Bisoi D et al 78.5% of women residing in joint families were significantly anemic. Whereas in a study conducted by Ahmed N et al 76.7% of women residing in nuclear families were found to be significantly anemic.

In the present study 69% of multigravida women were insignificantly anemic. Whereas in a study conducted by Suryanarayana et al anemia significantly increased with gravida status. In a study conducted by Bisoi D et al anemia increased with gravida status and this relationship was not significant.

In our study anemia insignificantly increased with parity. These findings are conflicting with those of Lestari S et al where anemia significantly increased with parity.

In our study women with lesser birth interval were found to be more anemic and this relationship was not significant. Similar findings were found in studies conducted by Lestari S et al and Suryanarayana Et al. Pardoxical findings were seen in a study conducted by Bisoi S where birth interval of lesser than two years was significantly associated with anemia.

In the present study 86% of women with more than two abortions were insignificantly anemic. Ambiguous findings were seen in a study conducted by Ahmed N where the proportion of anemia significantly increased with the number of abortions.

Conclusion

The overall prevalence of anemia was very high among the pregnant women. Anemia had an inverse relationship with age and literacy level. The odds of anemia was 1.69 times more in Muslim women as compared to Hindus.

Recommendations: Intensive health education should be imparted to all pregnant women about the importance of anemia and its outcomes. They should be encouraged to improve their dietary habits with special emphasis on the consumption of foods rich in iron and folic acid. Also all pregnant women should not only be registered as their pregnancy is confirmed but also given iron and folic acid supplementation of required dose and duration during pregnancy and postnatal period. Strict enforcement of 12 by 12 initiative among school girls for their safe motherhood and reproductive health

Limitations: The social correlates like occupation of husband and socioeconomic status were not studied because most of the women were homemakers and did not know the income of their husbands. This was only a quantitative study. Further qualitative studies should be planned to explore the root cause of anemia.

Conflict of Interest: Nil

Source of Funding: Nil
References


Awareness of Knowledge of Saliva as a Diagnostic Tool

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Abstract

Aim: Awareness of knowledge of saliva as a Diagnostic tool.

Objective: This survey is done to see the importance & awareness of Saliva tests in India. It was the survey asking about people’s opinion of saliva test and their views about this test in future.

Method and Material: Questionnaire of 14 questions ask to 130 people in Dy Patil dental college from 19-50 years of age.

Reason: To know if this saliva test has a scope of being popular and accurate as blood or urine test in future.

Conclusion: Saliva testing is not that popular, as this study proved that only 51% knew about it. People aren’t aware about the use of saliva test and they aren’t sure about its accuracy level. It should also be reached out to large part of the community by various platforms. The more the research about saliva testing better it will be.

Keywords: Saliva, Diagnostic uses, Awareness, Survey.

Introduction

Over the past 10 years, the use of saliva as a diagnostic fluid has gained attention and has become a translational research success story.

Saliva has the potential to become a first-line diagnostic sample of choice owing to the advancements in detection technologies coupled with combinations of biomolecules with clinical relevance.

Saliva is a unique fluid, and interest in it as a diagnostic medium has advanced exponentially in the last 10 years.¹

There are so many advantages of Saliva that the test is now trending.

Saliva can be used as a diagnostic specimen not only to obtain information more inexpensively and efficiently but also to provide information not readily available from serum testing or other test.²

From genetics to infections and collecting is saliva to accuracy so many papers and reviews have been done on saliva as a diagnostic tool.³

People from all around the world are searching still and spreading the message about saliva testing about its pro and cons.

That’s where this survey comes into the role on assessing the knowledge on saliva being used as a diagnostic tool.

Method and data collection: The survey was conducted with 14 compulsory questions asked to age groups of 18-50 from DY patil dental college Mumbai.

The questions were regarding their knowledge and experience on saliva testing. The questions were based upon opinions, and the future of the test comparing the pros and cons of the urine and blood test.

Saliva test, is not popular as blood or urine test. This survey helped them know that saliva testing is also one way for know that this test is also trending.
The options in the survey was yes and no for most of the questions and for others were maybe option too.

**Result**

The result of the survey was that saliva test, should be more popular and spread. Not many know about the test. Only 6 people out of 130 people have taken the test. Many people feel that more research should be done about it. They aren’t sure about how accurate the results would be and what scope it has for future. Most of the people are curious to know more about the test.

**Discussion**

Diagnostic Saliva test is becoming popular as it can be collected with ease, safety cost effective and non invasive diagnostic approach. Danial Malamud has said that increasingly saliva is used to monitor antibodies (virus and bacteria) drugs is misuse and steroid hormones. He feels the test have already taken a long road in the world of diagnosis e.g some molecules like antibodies, unconjugated steroid hormones, & certain drug techniques are sufficiently to to reflect blood concentrations of the blood accurately.[4]

With a salivary specimen, one can collect multiple specimens from the same individual at the optimum times for diagnostic information. This is of particular value for steroid hormones because many have diurnal or monthly variations. Saliva can be collected in remote sites by unskilled personnel and, with certain collection devices, is stable at ambient temperatures for several weeks.[5]

We believe that this will soon be followed by application of highly informative salivary biomarkers to other high-impact systemic disorders because saliva is composed of various molecules that are filtered, processed, and secreted from salivary gland.[6]

Moreover, as an example An enzyme-linked immunosorbent assay (ELISA) for detection of feline leukemia virus (FeLV) p27 in saliva was tested for its accuracy and sensitivity in diagnosing FeLV infections. Saliva and serum samples from 564 clinical cases were tested with a 99.2% specificity. The overall accuracy of the saliva ELISA reactive to the serum ELISA was 97.9%.[7]

Despite advances in the use of saliva for HIV detection. The advantages of using saliva can be fully realized if it is used in simple but reliable nonlaboratory assay is. One is a preference for less invasive specimen collection techniques (e.g., by use of saliva). It has now been shown that antibodies to HIV from the oral cavity can be detected with a sensitivity and specificity that are essentially identical to those of tests with serum.[5,6,7,8,9,10,11,12]

**Conclusion**

Saliva Testing is only known to 51% from 130 people in the survey. Therefore, 90% people haven’t even taken it. Only 6 from 130 people have taken a saliva test which concludes that it’s not as popular in India as other countries. People haven’t been much aware of this through any means of communication. 92% of the people feel that it will be helpful in the research about genetics (DNA RNA exosomes) They do believe that the test may or may not be accurate and helpful as blood and urine test. Experience of Xerostomia (dry mouth) and excessive salivation was also asked in the questionnaire but they are unaware about if it happened with them like they faced it or not. This the conclusion is Saliva test is not as popular as it should have been people are still unaware about it.

**Ethical Approval:** Taken from institutional ethical committee.

**Source of Funding:** Self-funded

**Conflicts of Interest:** Nil

**References**


Public Health and Environmental Protection Linkages in Law and Practice

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¹Ph.D Research Scholar, ²Prof. (Guide), Amity Law School, Amity University NOIDA, Uttar Pradesh

Abstract

The field of environmental health and protection and the entire field of public health have repeatedly found themselves isolated from one another, unable to articulate the definition, mission, and goals of public health and the essential role for environmental health and protection in the provision of a healthy ecological and human environment. Environmental agencies often forget that they, too, are public health agencies; public health agencies that have had environmental health functions have divided and abdicated their environmental responsibilities, considering these to be “regulatory” rather than public health. This article reviews the history of environmental health and protection, its involvement within the field of public health, its eventual separation from other public health programs with resulting benefits and consequences, and what the future may hold for environmental health and protection activities as well as for the broader scope of public health of which these activities are a part.

Keywords: Environmental health, Protection, Public Health, Ecology.

Introduction

The world is beginning to acknowledge its natural physical limitations, the relationship between ecological well-being and economic success, and the link between the survival of all nonhuman species and the survival of our own. As this awareness increases, so does the respect for the importance of environmental health and protection activities and for the need to balance development with the environment on both a local and a global scale. Yet even as the importance of environmental protection becomes more clear, the field of environmental health and protection, and indeed the entire field of public health, have repeatedly found themselves isolated from one another, unable to articulate the definition, mission and goals of public health and the essential role for environmental health and protection in the provision of a healthy ecological and human environment. Environmental agencies often forget that they, too, are public health agencies; public health agencies that have had environmental health functions have divided and abdicated their environmental responsibilities, considering these to be “regulatory” rather than public health. Both environmental health and protection agencies and other public health organizations have forgotten how each can enhance and make more effective their combined efforts aimed at creating a healthy public and a quality environment. Since environmental health was one of the very earliest of organized public health activities, how did the field of public health get itself into such a muddle that it no longer recognizes environmental health as a public health activity? This article reviews the history of environmental health and protection, its involvement within the field of public health, its eventual separation from other public health programs with resulting benefits and consequences, and what the future may hold for environmental health and protection activities as well as for the broader scope of public health of which these activities are a part.

Definition of Public Health and Environmental Protection: First, it may be useful to define public health and environmental health and protection. Winslow published his definition of public health in 1923 in The Evolution and Significance of the Public Health Campaign,

“Public health is not a concrete intellectual discipline, but a field of social activity. It includes applications of chemistry and bacteriology, of engineering and statistics, of physiology and pathology and epidemiology, and in some measure of sociology, and it builds upon these
basic sciences a comprehensive program of community service”.

To these today we might add psychology and health education, but public health still remains, as Winslow described it, a program of community service in the improvement of the public’s health.

On the continuum of health services is the organized group of activities known as environmental health and protection. The following definition has been widely used after its review and endorsement by numerous professionals in the field and its publication in the *Journal of Environmental Health* in 1993.

Environmental health and protection refers to protection against environmental factors that may adversely impact human health or the ecological balances essential to long term human health and environmental quality, whether in the natural or human-made environment. These factors include but are not limited to air, food and water contaminants, radiation, toxic chemicals, wastes, disease vectors, safety hazards and habitat alterations.

Today, many professionals in public and environmental health confuse their mission and activities with the titles of the agencies or programs within which they are organized, forgetting that many agencies without the word “health” in their titles are performing public health functions. To assess how this current state of affairs evolved, it is necessary to look at the history of environmental health and protection and its relationship to the rest of the field of public health.

**History and Evolution of Public Health and Environmental Protection:** Environmental health and protection services were some of the earliest public health activities on record. Written mention of the impact of the environment on health dates to Biblical times, with the pronouncements of Leviticus on food safety and quarantine. Winslow describes the awareness of the importance of sewerage, the protection of a public water supply, the regular disposal of wastes, and the effectiveness of isolation and quarantine as long ago as in Rome and in thirteenth century England. Yet he refers to this period as the “Dark Ages of Public Health,” for there was not complete understanding of the mechanisms of disease transmission, nor a policy or methodology for the organized provision of services to protect the public health.

Such a policy developed along with the social reforms of the 1700s and 1800s in England, followed by Massachusetts. Reformers such as Edwin Chadwick in England in the 1840s made the connection between income, living conditions, and health. In London in the 1850s, John Snow traced outbreaks of cholera in populations to their common drinking water source. The 1871 Report of the Royal Sanitary Commission listed 11 essential health activities, most of which were environmental in nature, including “the supply of wholesome and sufficient water for drinking and washing, the prevention of the pollution of water, the provision of sewerage and utilization of sewerage, the healthiness of dwellings, the removal of nuisances and refuse, the inspection of food. Lemuel Shattuck, a social reformer in Boston, published his *Report of the Massachusetts Sanitary Commission* in 1850, calling for similar organized activities on the part of government, a report that led to the founding of the first State Board of Health in Massachusetts in 1869.

There were those among the public health specialists and reformers of the day who envisioned protection of the public health as not only a state but a federal responsibility. They also believed in the importance of strengthening the impact of the combined disciplines within the field of public health through an organized voluntary association of those working daily on public health issues. In 1872, there were established boards of health in only three states and the District of Columbia. Thus, Stephen Smith, an appointed commissioner of the New York City Metropolitan Health Board, invited a group of six men in April, 1872, to discuss the idea of setting up such a professional organization. The result was the first meeting of the American Public Health Association (APHA) in Cincinnati, Ohio, in 1873, with Dr. Smith presiding as President. This professional organization was to be responsible for supporting much of the public health legislation over the next century, and through the concerted efforts of its members in many states was influential in the establishment of boards of health and public health agencies throughout the United States. In fact, at the end of the nineteenth century, 25 years later, full-time health departments existed in 40 states.

Numerous public health gains were made during the decades to follow, including the adoption of local and state public health regulations, an increase in the number of children vaccinated against communicable disease,
widespread provision of water and sewer services, adoption of food protection legislation, housing reforms, protective measures against insects and rodents, and the proliferation of public health laws and programs that made the most significant improvement in history in human morbidity and mortality rates. Mullan’s *Plagues and Politics; The Story of the United States Public Health Service*, provides a history of excellence in leadership and innovative programs that have served as the foundation for many of the programs found nationally today. One such example is that of Dr. Leslie Lumsden, a Public Health Service physician assigned to the State of Washington to reduce the epidemics of typhoid fever, who made it his personal quest to “abolish every insanitary privy, privy vault, cess pool and septic tank in the city and replace those in non sewered areas by sanitary privies” (20). To the environmental protection and hygiene services provided by government were added the personal health services of immunizations and prenatal care, forming the basis of programs for many current local health departments. The above texts provide invaluable historical background on the development of the field of public health over the past century in the United States.

**Provisions Related to Public Health and Environment:** Most human rights treaties were drafted and adopted before environmental protection became a matter of international concern. As a result, there are few references to environmental matters in international human rights instruments, although the rights to life and to health are certainly included and some formulations of the latter right make reference to environmental issues.

The *International Covenant on Economic, Social and Cultural Rights* (16 Dec. 1966), guarantees the right to safe and healthy working conditions (art. 7 b) and the right of children and young person’s to be free from work harmful to their health (art. 10-3). The right to health contained in article 12 of the Covenant expressly calls on states parties to take steps for “the improvement of all aspects of environmental and industrial hygiene and “the prevention, treatment and control of epidemic, endemic, occupational, and other diseases.”

The *Convention on the Rights of the Child* (New York, November 20, 1989) refers to aspects of environmental protection in respect to the child’s right to health. Article 24 provides that States Parties shall take appropriate measures to combat disease and malnutrition through the provision of adequate nutritious foods and clean drinking water, taking into consideration the dangers and risks of environmental pollution. (Art. 24(2)(c). Information and education is to be provided to all segments of society on hygiene and environmental sanitation. (Art. 24(2)(e).

**ILO Convention No. 169 concerning Indigenous and Tribal Peoples in Independent Countries:** (Geneva, June 27, 1989) contains numerous references to the lands, resources, and environment of indigenous peoples (e.g., arts. 2, 6, 7, 15). Part II of the Convention addresses land issues, including the rights of the peoples concerned to the natural resources pertaining to their lands.

Further, governments are to ensure adequate health services are available or provide resources to indigenous groups so that they may enjoy the highest attainable standard of physical and mental Health, (Art. 25(1)), Article 30 requires that governments make known to the peoples concerned their rights and duties.

Two regional human rights treaties contain specific provisions on the right to environment.

The approach of each differs, with the African Charter linking the environment to development, while the American Convention Protocol speaks of a healthy environment.

**The African Charter on Human and Peoples Rights,** (Banjul June 26, 1991) contains both a right to health and a right to environment. Article 16 of the African Charter guarantees to every Individual the right to enjoy the best attainable state of physical and mental health while Article 24 states that all peoples shall have the right to a general satisfactory environment favorable to their development, The distinction between an individual and a people’s right is not made clear.

**The Additional Protocol to the American Convention on Human Rights in the area of Economic, Social and Cultural Rights:** Contains both a right to health and a right to environment, drafted in more detail than in other human rights instruments, Article 10 provides:

1. Everyone shall have the right to health, understood...
to mean the enjoyment of the highest level of physical, mental and social well-being.

2. In order to ensure the exercise of the right to health, the States Parties agree to recognize health as a public good and, particularly, to adopt the following measures to ensure that right:

(a) Primary health care, that is, essential health care made available to all individuals and families in the community;

(b) Extension of the benefits of health services to all individuals subject to the State’s jurisdiction;

(c) Universal immunization against the principal infectious diseases;

(d) Prevention and treatment of endemic, occupational and other diseases;

(e) Education of the population on the prevention and treatment of health problems, and

(f) Satisfaction of the health needs of the highest risk groups and of those whose poverty makes them the most vulnerable.

Article 11 is entitled: Right to a healthy environment. It proclaims:

1. Everyone shall have the right to live in a healthy environment and to have access to basic public services.

2. The States Parties shall promote the protection, preservation and improvement of the environment.

Indian Constitution discuss the Protection of health, Article 48 A ensures that State shall endeavor free environment for good health.

Conclusion

If there were two key themes for the future of environmental health, they would be, focusing on a science-based mission of protecting the public health and the greater ecological system of which we are a part and creating partnerships and linkages with others to insure a healthy environment. Evans, a past President of the American Public Health Association, spoke these words in his 1995 presidential address, “We need partnerships because we don’t have the resources to be successful working in isolation, because working in partnership forces us to define our role and demonstrate our value, because partners hold us accountable for relevant deliverables, and because all of us are smarter than any of us. Partnerships create an interface, a plane in which different disciplines and talents, ideologies, lifestyles, and cultures come together in a way that creates energy, unleashes imagination, and results in mutually beneficial change, Public health leaders must be potent agents of change which must be sustainable and beneficial to society.

In order to lead, professionals in environmental health and protection must be clear on their mission, and advocate for organizing major aspects of environmental health and protection activities together so that the public health world view is maintained. It is the responsibility of environmental health and protection leaders to seek out and support training to enhance the competencies of their staff, and to create dialogue with local educational institutions to strengthen the theory/practice link.

As the separation from other public health functions continues, public health professionals on both sides need to redouble their efforts to keep the linkages strong between all public health functions, especially in light of the drive towards managed care that may promise to provide health care but threatens to replace the vital importance of public health and prevention in the mind of the public.

Ethical Clearance: Taken from Departmental Research Committee to Amity Law School, Amity University Noida, Uttar Pradesh.

Source of Funding: Self

Conflict of Interest: Nil

References


GC/MS Analysis of Bioactive Compounds in Aqueous Extract of Cynodon Dactylon

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Abstract

Cynodon dactylon or Arugampul is considered as a sanctified grass in Tamil Nadu, India and used in religious offerings. Its health and nutritional benefits are well documented but very little about its bioactive compounds. Objective of the present study is to determine the bioactive compounds present in the aqueous extract of Cynodon dactylon, using GC/MS as a tool. Hot aqueous extract of Cynodon dactylon was analyzed for its bioactive compounds using gas chromatograph of JEOL GC MATE II and mass spectrometer of quadruple double focusing mass analyzer. Eight bioactive compounds were detected from hot aqueous extract of Cynodon dactylon through GC-MS analysis. The compounds were Alanine, 9,12-Octadecadienoic acid (ZZ), n-Hexadecanoic acid, Oleic acid, Oxiraneoctanoic acid, 3-octly-, methyl ester, trans-, Phytol, Coumarine, 3-(2,4 -dinitrophenyl), 2-Cyclohexen-3,6-diol-1one, 2-tetradecanoyl-.

Keywords: Cynodon dactylon, Arugampul, Bermuda grass, GC/MS Analysis, Bioactive Compounds.

Introduction

Plants are being used as the resources of nutrition and medicines since the beginning of the mankind. Each species of plants produces a mixture secondary metabolites or bioactive compounds. Humans use this property of the plants to make herbal medicines, flavoring substances or recreational drugs. Herbal drugs are effective, affordable and less toxic.¹ Researchers use various types of method/techniques for the metabolite profiling of medicinal plants, but in the recent past gas chromatography mass spectrometry (GC/MS) based metabolite profiling got more acceptance due to its reliability and sensitivity than other method.²

Cynodon dactylon or Bermuda grass is seen in moderate climate all over the world between south and north latitudes. C.dactylon is a stoloniferous, hardy perennial grass, very much variable with long rapid growing, rooting at nodes, forming a dense tuft on the top of the soil. The runners of this plant are usually 2cm long, 0.2-0.6cm broad, flat and convolute. Inflorescence appears on culms 150mm to 1m tall, consisting of 2-12 spikes arranged star like at apex of stem; spikes 25-100mm long with numerous spikelet, arranged in 2 rows on one side of spike.³

C. dactylon is widely used for traditional medical practice in India.⁴ Crude extract of this plant is used for treatment of cancer⁵ obesity, diabetic⁶ gastric ulcers⁷ etc. There are also evidence for its Antihyperlipedemic⁸, Hepatoprotective⁹, Antimicrobial¹⁰ and Antiatherosclerotic¹¹ properties of this plant. But there were a very few documents regarding secondary metabolite profile of C. dactylon. Hence the GC/MS analysis has been done.

Materials and Method

Plant material and extract: C.dactylon plants were collected from the campus of Sri Lakshmi Narayana Institute of Medical Sciences Puducherry. The plant was identified and certified by Dr. R.Sridharan, M.D(S), Nodal officer, Siddha and Consultant Phyto-Medicine, Government of Puducherry.

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Collected plants were washed thoroughly with tap water, rinsed with distilled water and air dried in a shady place. Dried plants were pulverized in to fine powder with a grinding machine. To make the aqueous extract, 100gm of plant powder was mixed with 1000ml of distilled water and heated till boiling temperature. The mixture was filtered using Whatmans no 1 filter paper.

**GC MS analysis:** The extract from *C. dactylon* plant was analyzed with JEOL GCmate II GC/MS system (JEOL USA, Inc.), which includes quadruple double focusing mass analyzer. The Column used was HP 5Ms capillary (0.10 – 1.00 µm film thickness) composed of (5%-Phenyl)-methylpolysiloxane. High pure Helium at a flow rate of 1ml/min was used as the carrier gas. The inlet temperature was maintained as 250°C. The oven temperature was programmed initially 50 to 250 @ 10 deg/min. The MS transfer line was maintained at a temperature of 250°C. Mas spectra was analyzed using electron impact ionization at 70eV and data was evaluated using total ion count (TIC) for compound identification and quantification. The spectrums of the components were compared with the database of spectrum of known components stored in the GC/MS library.

**Result and Discussion**

Bioactive compounds from hot aqueous extract of *C. dactylon* was analyzed through gas chromatography–mass spectrometry and compared with the GC/MS library to identify the chemical compounds. Eight peaks were detected in the GC/MS chromatogram (fig-1).

As per the GC/MS library the detected compounds where as follows:

1. First peak was obtained at retention time of 14.9 and the compound was Alanine,
2. Second peak was at 16 and the compound was 9,12-octadecadienoic acid(zz),
3. Third peak was at 16.55 and the compound was n-Hexadecanoic acid,
4. Fourth at 17.48 and the compound was Oleic acid,
5. Fifth at 18.28 and the compound was Oxiraneoctanoic acid,3-octyl- ,methyl ester,trans-,
6. Sixth peak was at 20.05 and the compound was Phytol,
7. Seventh at 21.15 and the compound was Coumarine,3-(2,4-Dinitrophenyl),
8. Eighth peak was at retention time of 23.67 and the compound was 2-Cyclohexen-3/6diol-1-one,2-tetradecanoyl.

These compounds were tabulated with their molecular weight and structural formula in table 1.

Eight different types of bioactive compound were obtained in the GC-MS analysis from the hot aqueous extract of *C.dactylon*. The first peak was obtained at retention time of 14.9 and the compound was Alanine, which is a flavoring agent, antioxidant, cancer preventive, oxidant and it also act as a catalyze in regulating hormonal action. The second compound 9, 12-octadecadienoic acid(zz) was Linoleic acid, is an anti-inflammatory substance, hypocholesterolemic, cancer preventive, hepatoprotective. The third compound - n-Hexadecanoic acid is Palmitic acid by nature which is Antioxidant, Hypcholesterolemic, Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic, 5-Alpha reductase inhibitor. Oleic acid is an anti-inflammatory, anti-androgenic cancer preventive, dermatitigenic hypocholesterolemic, Phytol is an Anticancer Antioxidant Anti-inflammatory Diuretic. n-Hexadecanoic acid is an Antioxidant, Hypcholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor. Oxiraneoctanoic acid, 3-octyl-,methyl ester, trans, Coumarine, 3-(2,4-Dinitrophenyl), 2-Cyclohexen-3/6diol-1-one, 2-tetradecanoyl for these compound the bioactive was not reported but the activity was reported based on main compound (oxiraneoctanoic acid and coumarine).
Figure 1: GC-MS Chromatogram showing retention time of active compound in hot aqua extract of Cynodon dactylon

Table 1: Showing compound obtained from hot aqua extract of Cynodon dactylon

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Retention Time</th>
<th>Peak Area %</th>
<th>Name of the compound</th>
<th>Chemical structure</th>
<th>Molecular formula</th>
<th>Molecular weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>14.9</td>
<td>14.1</td>
<td>Alanine</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₃H₇NO₂</td>
<td>89</td>
</tr>
<tr>
<td>ii.</td>
<td>16</td>
<td>87.6</td>
<td>9,12-octadecadienoic acid(zz)</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₁₈H₃₂O₂</td>
<td>280</td>
</tr>
<tr>
<td>iii.</td>
<td>16.55</td>
<td>17.3</td>
<td>n-Hexadecanoic acid</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₁₆H₃₄O₂</td>
<td>256</td>
</tr>
<tr>
<td>iv.</td>
<td>17.48</td>
<td>70.5</td>
<td>Oleic acid</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₁₈H₃₄O₂</td>
<td>282</td>
</tr>
<tr>
<td>v.</td>
<td>18.28</td>
<td>23</td>
<td>Oxiraneoctanoic acid, 3-octyl-, methyl ester, trans-</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₁₉H₃₈O₃</td>
<td>312</td>
</tr>
<tr>
<td>vi.</td>
<td>20.05</td>
<td>18.3</td>
<td>Phytol</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>C₂₀H₄₀O</td>
<td>296</td>
</tr>
</tbody>
</table>
Table 2: Showing compound nature and activity obtained from hot aqua extract of Cynodon dactylon

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Retention Time</th>
<th>Name of the compound</th>
<th>Compound nature</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>14.9</td>
<td>Alanine</td>
<td>Flavoring Agent</td>
<td>Antioxidant, Cancer preventive, Oxidant</td>
</tr>
<tr>
<td>ii</td>
<td>16</td>
<td>9,12-octadecadienoic acid (zz)</td>
<td>Linoleic acid</td>
<td>Antiinflammatory, Hypocholesterolemic, Cancer preventive, Hepatoprotective, Nematicide, Insectifuge, Antihistaminic, Antieczemic, Antiacne, 5-Alpha reductase inhibitor, Antiandrogenic, Antiarthritic, Anticoronary, Insectifuge</td>
</tr>
<tr>
<td>iii</td>
<td>16.55</td>
<td>n-Hexadecanoic acid</td>
<td>Palmitic acid</td>
<td>Antioxidant, Hypocholesterolemic Nematicide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic, 5-Alpha reductase inhibitor</td>
</tr>
<tr>
<td>iv</td>
<td>17.48</td>
<td>Oleic acid</td>
<td>Mono unsaturated fatty acid</td>
<td>Antiinflammatory, Antiandrogenic Cancer preventive, Dermatitisgenic Hypocholesterolemic, 5-Alpha reductase inhibitor, Anemiagenic Insectifuge, Flavor</td>
</tr>
<tr>
<td>v</td>
<td>18.28</td>
<td>Oxiraneoctanoic acid, 3-octyl-, methyl ester, trans</td>
<td>Coronaric acid</td>
<td>Antiinflammatory</td>
</tr>
<tr>
<td>vi</td>
<td>20.05</td>
<td>Phytol</td>
<td>Diterpene</td>
<td>Anticancer Antioxidant Antiinflammatory Diuretic</td>
</tr>
<tr>
<td>vii</td>
<td>21.15</td>
<td>Coumarine, 3-(2,4-Dinitrophenyl)</td>
<td>Benzopyrone</td>
<td>Anticancer Antioxidant Antiinflammatory</td>
</tr>
<tr>
<td>viii</td>
<td>23.67</td>
<td>2-Cyclohexen-3/6diol-1-one, 2-tetradecanoyl</td>
<td>Fatty acid</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

Source: Dr. Duke’s: Phytochemical and Ethnobotanical Databases

**Conclusion**

The GC-MS analysis of the hot aqua extract of *Cynodon dactylon* shows 8 compounds in these 3 compounds bioactivity is not still reported further research has to be done in order to identify bioactivity and function in related to human.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not Applicable

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**Reference**


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Climate Change, Public Health and Implementation of Sustainable Development Goals in India-Issues and Challenges

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Abstract

“The Sustainable Development Goals (SDGs) are broad sets of common goals for fair and sustainable health from local to international community. The aim is to end poverty, protect the planet and ensure that all people enjoy peace and prosperity, now and in the future. The goals embody an agenda that is scientifically strong, and widely in-built planned to figure upon the progress recognized by the Millennium Development Goals (MDGs). There is a need for structure wide strategic planning to integrate the economic, social and environmental dimensions into policy and actions. In the era of climate change we need to understand the difference between the MDGs and the SDGs, their implementation and nature of universality and the systems thinking that is needed to deliver the vision. The danger is that individual goals may be prioritized without an understanding of the potential positive interactions between goals. There is an increasing understanding that sustainable development needs a paradigm shift in our understanding of the interaction between the real economy and quality of life. There would be many social, environmental and economic benefits in changing our current model.

The paper basically will focus on: 1) the importance of sustainable developmental goals in the era of climate change in India; 2) Need to develop systems understanding of what supports a healthy environment and the issues & challenges thereof.”

Keywords: Climate Change, sustainable development, public health, implementation, sustainable development goals.

Introduction

“Climate Change which is a long-term change in earth’s climate due to natural, mechanical and anthropological processes which results in emission of greenhouse gases like CO₂, methane, etc. leading to global warming and changing climatic patterns. Shifting of seasons, increasing global temperatures, rising sea levels, changing agricultural patterns have resulted in frequent disasters like landslides, tsunamis, drought, famine, population migration and major health hazards not just for us but also for our children and grandchildren”.¹In view of the serious consequences that “global warming poses for humanity and other life forms, including a rise in a sea levels, an increase in global average air and ocean temperatures, widespread melting of snow and ice, the problem of climate change requires both short term and long term cooperative action by members of the international community to prevent dangerous anthropogenic interference with the climate system inter alia, by reducing concentrations of greenhouse gases within an internationally agreed time framework”².

“Development is a perpetual process enabling humans to expand and realize their potentialities to achieve a greater, better fuller state of living. Utilization of natural resources forms the very basis of sustenance of human life, while nature has only limited regeneration capacity”.³The human civilizations and its development

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have been largely dependent on land, water, air and climate which have influenced the evolution of all life forms on earth. From pre-historic times to the present, humankind continues to drive their life and substance on earth in the changing seasons, atmosphere and climate”. It is said that “Earth does not belong to Man but Man belongs to the Earth”. However, mankind has always tried to control and exploit Earth for its own benefits without even blinking once. Increasing world population and the ever-increasing desire of human beings to raise their standard of living has led to technological innovations of all kinds. These innovations have made life more comfortable but at the cost of increased demands for food, air, water, minerals, and energy but at the same time adverse effect on human health”. This article argues that in the era of Climate change that threatens human well-being, not just locally but globally in the present as well as in future. This paper explores such laws, programs and policies of India addressing the public health measures due to climate change in the changing paradigm. To analyze the role of Sustainable Development Goals in mitigating public health issues nationally and globally and what are the issues and challenges in effective implementation of SDG’s towards securing public health.

**Material and Method**

This research is purely doctrinal in nature. Researchers have used both Primary and secondary sources available for this research like Gazettes of India, Acts, Books, Journals, UN website and Newspaper etc.

**Sustainable Development and Public Health Measures:** “The Sustainable Development Goals (SDGs) also called as the ‘Universal Agreement’ with an objective to end poverty, protect the planet habitable, and ensure that all people enjoy peace and prosperity, now and in the future. The Goals were adopted by all member states of United Nations officially in 2015, for the period 2016–30 to address the irresistible pragmatic and scientific evidence that the world needs a fundamentally more sustainable approach. The goals provide a well consulted framework that is sufficiently scientifically robust, politically acceptable, and publicly intuitive. The goals provide us with our best chance of ensuring the necessary collaboration and alignment as we implement global approaches to securing a fair, healthy and prosperous future for ourselves, our children and grandchildren”. Although the 17 goals are supported by targets and indicators- the key learning is that all the goals are intimately interconnected—"a failure to appreciate this will perpetuate an approach which will be non-aligned at best and highly ineffective at worst. Secondly, despite the intuitive nature of interventions that deliver both immediate and long-term ‘co-benefits’ (such as sustainable transport and food systems, or better access to green space), there is a worrying lack of generalizable, quantifiable evidence on the levels of benefit that appeals to policy makers, scientists or practitioners. This inhibits our vision and courage to act in those areas where we should be more specific about health, social and economic benefits. At a global level, we should use the SDGs to highlight the inter-linkage between goals and champion the specific and collaborative actions that create multiple and beneficial outcomes for shared purpose.”

The Sustainable Development Goals are formally the goals of the United Nations’ ‘Transforming our world; the 2030 Agenda for Sustainable Development’, an agenda which sets out the vision, principles and commitments to a fairer and more sustainable world for all. “The Millennium Development Goals (MDGs) were in place from 2000 to 2015 and consisted of eight international development goals. The first three goals covered poverty, education and gender equality; the next three goals addressed ‘health outcomes’ covering child mortality, maternal health and ‘HIV/AIDS, malaria and other diseases. The remaining two goals addressed environmental sustainability and global partnership for development. These eight MDGs were supported by a total of 21 individual targets. The MDGs, although a move in the right direction, were subject to certain criticisms. One was that there was insufficient analysis to justify why these goals were selected as priorities and insufficient information available to be able to compare performance, especially in tackling inequalities within countries”. Nevertheless, “based on data compiled by the Inter-Agency and Expert Group on MDG indicators”, the UN could demonstrate considerable success on some goals, “especially on reducing extreme poverty, reducing both child and maternal mortality, increasing access for people living with HIV to antiretroviral treatment and reducing new HIV infections. However, the report recognized that ‘progress has been uneven across regions and countries’ in the implementation of the MDGs”.
The UN resolution refers to “five ‘areas of critical importance’; sometimes known as the 5 ‘P’s, these are People, Planet, Prosperity, Peace and Partnerships (see Table 1). The goals were launched with the strap-line of ‘Ensuring that no-one is left behind’ with its implication that development and levelling up will be the keys to progress by 2030. How this aspiration is reconciled with maintaining ecosystems and tackling climate change will be a challenge in itself. However, the SDGs do have a clear goal on climate action (Goal 13), which has been strengthened subsequently by the Paris Agreement of the 21st Conference of Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC)”.

Table 1: Summary of the UN’s 17 Sustainable Development Goals, linked to the five Areas of Critical Importance (5P’s)

<table>
<thead>
<tr>
<th>People</th>
<th>• No Poverty (Goal 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Zero Hunger (Goal 2)</td>
</tr>
<tr>
<td></td>
<td>• Good Health and Well-being (Goal 3)</td>
</tr>
<tr>
<td></td>
<td>• Quality Education (Goal 4)</td>
</tr>
<tr>
<td></td>
<td>• Gender Equality (Goal 5)</td>
</tr>
<tr>
<td></td>
<td>• Clean Water and Sanitation (Goal 6)</td>
</tr>
<tr>
<td>Planet</td>
<td>• Climate Action (Goal 13)</td>
</tr>
<tr>
<td></td>
<td>• Life below Water (Goal 14)</td>
</tr>
<tr>
<td></td>
<td>• Life on Land (Goal 15)</td>
</tr>
<tr>
<td>Prosperity</td>
<td>• Affordable Clean Energy (Goal 7)</td>
</tr>
<tr>
<td></td>
<td>• Decent Work and Economic Development (Goal 8)</td>
</tr>
<tr>
<td></td>
<td>• Industry, Innovation and Infrastructure (Goal 9)</td>
</tr>
<tr>
<td></td>
<td>• Reduce Inequalities (Goal 10)</td>
</tr>
<tr>
<td></td>
<td>• Sustainable Cities and Communities (Goal 11)</td>
</tr>
<tr>
<td></td>
<td>• Responsible consumption and production (Goal 12)</td>
</tr>
<tr>
<td>Peace and</td>
<td>• Peace, Justice and Strong Institutions (Goal 16)</td>
</tr>
<tr>
<td>partnerships</td>
<td>• Partnerships for the Goals (Goal 17)</td>
</tr>
</tbody>
</table>

Areas of Concern-Impact of Climate Change on Human Health: According to the United Nations Industrial Development Organization (UNIDO), “climate change is likely to have a greater impact on India compared to other countries similarly positioned, on account of the unique combination of its geography, diverse population characteristics and extremely high carbon-related energy dependence”. Climate change is bound to affect the basic requirements for maintaining health- clean air and water, sufficient food, adequate shelter, and freedom from disease given the already high level of poverty, low nutritional levels and poor public health infrastructure in the country. Our personal health may seem to relate mostly to prudent behavior, heredity, occupation, local environmental exposures, and health care access, but sustained population health requires the life supporting “services” of the biosphere. Populations of all animal species depend on supplies of food and water, freedom from excess infectious disease, and the physical safety and comfort conferred by climatic stability. A changing climate is likely to affect all these conditions and hence have a powerful impact on human health and well-being.

Intergovernmental Panel on Climate Change in its fifth Assessment report concluded that “Climate Change is projected to increase threats to human health. Climate Change can affect human health directly (e.g., impacts of thermal stress, death/injury in floods and storms) and indirectly through changes in the ranges of disease vectors, water-borne pathogens, water quality, air quality and food availability. Global climate change is therefore, a newer challenge to ongoing efforts to protect human health”.

Issues and Challenges: Climate change in the global era refers to the statistical variations in the properties of climate system such as change in global temperatures which has drastically altered the distribution and quality of natural resources thereby adversely affecting the livelihood security of the people. The major issues and challenges faced in effective implementation of SDG’s in the global era of climate change are:

1. Adverse impact on crops and quality thereof;
2. Availability and quality of both surface and ground water;
3. Impact on livelihoods, food security and economy;
4. Inadequate drainage resulting in stagnant water and many water-borne diseases;
5. Rising temperatures, “changing patterns of rainfall and more frequent droughts and floods are projected to decrease crop yields causing shortages of food supplies which in result leads to severe malnutrition and under nutrition;”
6. Increasing “traffic and exhaust as well as industrial emissions are raising concentrations of SO2, NO2, O3 and suspended particles resulting into human health hazards;”
7. Unstable population increase is one of the major issue leading to disparity in terms of resource consumption;

**Conclusion and Suggestions**

“From this research what I found is that the greatest long-term danger to human health from climate change will be the disruption of natural ecosystems, which provide an array of services that ultimately support human health. More assessments of the impacts of climate change on health in different tropical zones e.g. Plains, deserts, foothills, hilly and coastal areas are required. In the era of globalization and climate change, to achieve and implement Sustainable Development Goals (SDG’s) related to public health we need focus on – (i) reliable and comprehensive assessments of risks to public health and dissemination of such information; (ii) improving health educational and institutional capacity in urban and rural environment management; (iii) improved efficiency of the water supply management; (iv) establishing of early warning systems and evacuation plans in case of emergency.”

Above all, protection of health from climate change and implementation of Sustainable Developmental Goals should be prioritize and must be a part of a basic preventive approach towards public health. Every generation in history has to faced global challenges. “We Are the First Generation that Can End Poverty, the Last that Can End Climate Change”.

**Conflict of Interest:** Ashwani Pant and Dr. Santosh Kumar declare that they have no conflict of interest.

**Source of Funding:** No funding for this research.

**Ethical Approval:** The study does not require the approval of Institutional Ethics Committee. As the study is the combination of socio-legal issue. No field study is done for this research.

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5. Deepika Kachhal, Saving the Mother Earth, YOJNA- A Development Monthly, December 2015,5.
Effectiveness of Mind Mapping as an Active Learning Tool among MBBS Phase-1 Students in Biochemistry

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Abstract

Introduction: Mind mapping, an active learning tool facilitates student learning but remains underutilized in medicine. The present study was conducted with aim of assessing the effectiveness of mind maps as an active learning tool to augment learning in biochemistry and perception of students and faculty of the same.

Methodology: Present cross-sectional study included phase-I medical students (n=140) from BLDEA Shri B M patil medical college. Participants were randomized into study and control group by using computer generated random numbers and intervened by use of mind mapping and conventional assignments respectively. Student performance was measured using multiple choice questions with a maximum score of 25. Feedback was collected from the students as well as the faculty was analyzed.

Results: The mean scores in pre and post test of study group -I and control group-I were (12.19, 12.75) (12.14, 11.73) respectively. After Cross over, the mean scores in the pre and post tests of the study (II) and control groups (II) were (14.98, 16.10) and (14.7, 15.96) respectively. Data was analyzed and compared by Wilcoxon signed rank test and were statistically insignificant in the group –I but highly significant in group-II. Student feedback on mind maps had high positive ratings for longer retention (90%; n=126) and better time management (70%, n=98). The staff perceived that mind maps are helpful when applied for large information as in the medical curriculum (87%) and made students responsible for individualized learning.

Conclusion: Our study concludes that learning to learn becomes more important when there is larger information to be retained as well as analyzed as in medical curriculum and can be effective in making learning abstract concepts as in medical biochemistry more enjoyable and helps integrate basic concepts with other specialties.

It also facilitates lateral thinking and longer retention of concepts which would further help them manage time and to fare better in examinations.

Keywords: Mind maps, Active learning, Medical Biochemistry, lateral thinking, conceptual integration.

Introduction

Medical universities offer anatomy, physiology and clinical biochemistry in the first year of the medical course. Most of the teaching-learning happens through the traditional mode through didactic lectures, tutorials and practicals1. This has been the predominant mode of teaching since the inception of universities. Traditional lecturing defined as “…continuous exposition by the teacher” basically infers that the student activity is limited to taking down the points put across by the lecturer or may be limited to asking desultory and random clarifications or questions to the instructor2. This teacher centric or “teaching by telling approach” is now being challenged by a more student centric mode of instruction which is more benefitting to the construction...
of understanding by the students. The concepts in biochemistry effectively help in understanding the basis of diseases and also in interpreting various investigations requested for the diagnosis or prognosis of the patients but Practicing physicians as well as most of the medical students do consider that learning biochemistry is irrelevant and does little to help their daily practice of medicine. Medical biochemistry should incorporate students’ previously learned knowledge with medical applications and fill in the gaps with new knowledge. This can be achieved by Active learning method which compel the students to do tasks that help indeep learning, to think about what they are doing and also assimilate the information. Active learning is best defined as any instructional method that engages students in the learning process. It strives to involve students in the learning process more directly than in other method and it incriminates them in an activity besides just passive listening. It is the need of the hour to make a paradigm shift from the conventional teacher centered approach to an active, student centric learning experience which will promote reflection, knowledge constructing, inquiry, analytic and critical thinking capacity of the learners. The notion of employing mind maps as an active learning tool will prove to be an ingenious technique to promote student learning. The above method exploits the presentation form of radiant thinking and the inspiration for this strategy hypostatized from the notebooks of Leonardo da Vinci. With the application of mind mapping to learning, ability of student for logical analysis is enhanced. Integration of the left brain capacity in rationalizing and creativity, art and memory endowed with the right brain can be maximized. Adult learners stand for enormous benefit in using Mind maps but remains underutilized in medical education. The magnitude of information that medical students are assumed to master is voluminous and the present need to make the process of teaching-learning evidence based prompted this study.

**Aim:** To document the effectiveness of mind mapping in learning biochemistry among the first year medical students.

**Objectives:**

1. To assess the attitudes of students and faculty regarding mind mapping as an active learning tool using a feedback questionnaire.
2. To assess the effectiveness of mind mapping to augment the students’ learning in biochemistry.

**Methodology:** The present cross sectional study was carried out in BLD (deemed to be university) Shri B M Patil medical college hospital and research centre, Vijayapur over a period of one and half month from August to September 2018. This activity was approved by the university’s institutional review board (IRB) and bears the clearance no: BLDE (DU)/IEC/328/2018-19.

The MBBS phase I (140) students were randomized into study group (I) and control group (I) by using the computer generated random numbers. Both the groups were tested for the chosen topics before their exposure to the learning method by a pre test on MCQs (Multiple Choice Questions) for the chosen topics for a maximum score of 25. This activity was developed as a complementary to the small group teaching activity done during the semester.

The study group (I) was exposed to a detailed 40 minute session of hands on information regarding the origin of mind mapping. They were also trained to construct them for important concepts using characters, symbols, lines, colors, numbers, pictures and keywords for the chosen topics. The idea that mind maps support critical thinking, deep learning, and is creative was also stressed upon before the planned activity was encouraged. In order for the students to demonstrate their understanding of the concepts in a particular topic, assignments for constructing mind maps were administered to the study group (I). The study group (I) was asked to construct mind maps according to Buzan’s guidelines: the minds’ radiation of thought is reflected by the branches of the mind map, key words are used to represent ideas; color is used to highlight and emphasize them. Related thoughts are in the same color creating clarity to enhance recall; and images, symbols and codes are used to highlight ideas and stimulate the mind to make connections. The control group (I) were given the conventional assignments of practicing the topics in a question – answer format to complete.

Students maintained reflective journals to register the process of constructing their mind maps on the very same day and to contemplate on the benefits of it. At the end of the assignments both the groups were observed by a post test comprising MCQs for a maximum score of 25. The scores were tabulated for all the students on their performance before and after the intervention. To test the effectiveness a crossover of the groups was done, after the cross over, the study group (I) formed the control.
group (II) and the previous control group (I) was the study group (II) for the second set of selected topics. The entire process of intervention was repeated and the pre and post test scores for both the groups were tabulated and compared for statistical significance. At the end of study, a feedback was obtained from the students and faculty regarding the perception of mind mapping as a learning tool in biochemistry. The questionnaires were reconstructed for this study based on the available literature and were validated before use. The students’ questionnaire consisted of nine questions rated on a Likert scale with five response categories, strongly agree to strongly disagree to capture the intensity of their feelings for a given item.

Results

The study participants (n=140) were between the ages of 17 to 20 years. When inquired, approximately all the participants have had past college experiences predicated in a traditional passive learning style, while ten percent (n=15) students expressed their familiarity with mind maps and its usage but to a limited extent.

The mean and SD of the scores in the pre and post test of both groups (I) and group (II) were compared by Wilcoxon signed rank test as the distribution was not normal. The mean scores of the study group (I) after the mind mapping activity (12.75) were comparatively more than their mean scores in the pretest (12.19) though statistically insignificant, whereas the mean scores of the students in the control group (I) who had exposure to the conventional small group teaching (11.73) were lower than that scored in pretest (12.14), and also statistically insignificant. After the Crossover, the mean scores of the study group (II) after the mind mapping activity (16.10) were comparatively more than their mean scores in the pretest (14.98) and highly significant. whereas the mean scores of the students in the control group (II) who had exposure to the conventional small group teaching (15.96) was also higher than pretest mean score (12.14) and statistically significant.

| Table 1: Mean and SD of Pre and post test scores of each group (I) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Pre Test (I)    |                  | Post Test (I)   |                  | Wilcoxon Matched |
|                  | Mean | SD    | Mean | SD    | Pair Test |
| Study (I)        | 12.19 | 2.558 | 12.75 | 2.119 | P=0.136 NS |
| Control (I)      | 12.14 | 2.940 | 11.73 | 1.934 | P=0.359 NS |

NS: Not significant; significance at 5% level of significance (p< 0.05)

| Table 2: Mean and SD of Pre and post test scores of each group (II) after crossover. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Pre Test        |                  | Post Test       |                  | Wilcoxon Matched |
|                  | Mean     | SD    | Mean     | SD    | Pair Test |
| Study            | 14.98    | 2.287 | 16.10    | 2.001 | P=0.0023 HS |
| Control          | 14.77    | 1.77  | 15.96    | 1.681 | P=0.0003 HS |

HS: Highly significant; significance at 5% level of significance (p< 0.05)

Figure 1: Comparison of Mean score of Pre and post test of each group (I).
Figure 2: Comparison of Mean score of Pre and post test of each group(II) after crossover.

Figure 3: Student feedback on the mind mapping activity

Figure 4: Staff feedback on the mind mapping activity
Ninety-two percent (129) of all students agreed that mind mapping requires increased attention and is equally enjoyable even when they applied it for topics which they previously detested. The staff also stated that the students made meaningful use of the activity. Ninety percent (126) of the participants also related that the concepts were retained much longer with the use of their mind map ideas. Seventy percent (98) of the study group felt that mind mapping was good for effective time management, around ten percent (14) disagreed. Seventy five percent (7) of the staff found that the students were motivated for construction of mind maps which made them responsible for individualized learning. Eighty seven percent staff (8) also felt that mind mapping helps specially when applied for large information and should be encouraged as a learning tool. Analysis by results suggests that mind mapping is an effective learning strategy in the population studied.

Discussion

All the MBBS phase I participants implemented mind mapping as an active learning strategy to achieve their specific learning objectives. Some students were anxious of building their own mind maps, and others required an extra week to construct the mind maps.

Buzan\textsuperscript{18} in his seminal work identified that radiant or central thinking is promoted by the use of mind map and it enhanced the multiplicity of the brain. The students opined that the present activity of mind mapping the biochemistry concepts helped them to explore the concept in detail and also its key associations in a standardized, colorful and also in a logical manner. They also found themselves exploring and understanding the concepts of a particular topic. Picton C\textsuperscript{19} also found that the students’ ability to describe their critical thinking process and graphic representation of the concepts was enhanced by reflection which was agreed by our study participants. The staff favorably perceived that students made meaningful use of the mind mapping activity in learning biochemistry concepts. A study by Davies also confirms that learning is facilitated when the information is actively processed, visually and pictorially as in mind mapping of the concepts\textsuperscript{20}. Students have also expressed that mind mapping encouraged team building with their peers, was interesting, stimulating, and also promoted their learning\textsuperscript{21}. Students expressed that mind mapping the concepts taught during lectures were comparatively more enjoyable (Sixty five percent) and particularly beneficial to integrate the subject concepts with other specialties and were also retained longer which would further help them to fare better in examinations and manage their time well. The staff also observed that the study group did not lose interest while deliberating the biochemistry concepts and shared their experiences about the mind mapping activity with enthusiasm. All the students built different mind maps on same concept which made each mind map different and some had better clarity. The reason for this could be multifactorial as participants were novice and inexperienced in constructing mindmaps.

Conclusion

Our findings are in line with many studies\textsuperscript{16,18,22} corroborate the fact that the Mind maps help students remember information, as they individualize the information and create a mental picture which is easier for the mind to reflect and recall but some have documented both positive as well as negative out comes\textsuperscript{22}. Furthermore, mind maps are observed to be effective in creating learning environments which makes the students desirous to learn and recreate the information which is helpful for the learning process\textsuperscript{23}. In view of the aforementioned benefits, there is a need for teachers to include the briefing of the mind map technique so that the students have a meaningful learning than just dispense the information memorized and this is corroborated by conducting such qualitative studies.

Acknowledgment: We would like to thank all the students and the faculty at the medical biochemistry department of BLDEA (deemed to be university) SBMPMC for their active participation.

Conflict of Interest: None.

Funding: Self funded.

The ethical clearance for the study was taken from the institutional ethical clearance committee of BLD (deemed to be university) Shri B M.Patil medical college, hospital and research centre, vijayapura on 21\textsuperscript{st} December 2018 and bears the clearance number, BLDE (DU)/IEC/328/2018-19.

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Health and National Competitiveness:
An Empirical Analysis of the BRICS Nations

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Abstract
The rapid growth of the total health expenditure (THE) is an issue of major concern in most of the countries. Total health expenditure is defined as the sum of both public and private health spending in consideration of the ratio of total population of the country. This paper offers an integrated view of the relationships between health spending, productivity and its effects on gross domestic product. This paper aims to investigate an empirical association between healthcare expenditure out of Gross Domestic Product (GDP) for the BRICS Nations. Data on health expenditure and GDP for the period from 2000 to 2018 from World Bank and WHO was used to analyse the relationship between health expenditure as a percentage share of GDP and GDP of the BRICS countries are used. The data was segregated into two sections and analysed for two decades. The study reveals that in both the decades the total health expenditure as a percentage share of GDP has a direct proportional relationship with GDP for the BRICS nations, except for Brazil in the second decade where an inversely proportional relationship between the two variables is observed.

Keywords: Total Health Expenditure, BRICS Nations, GDP.

Introduction
Health has been considered as one of the remarkable elements that results in the increase in Gross Domestic Product (GDP) for a country. The total government spending, as a share of GDP, can be different according to the country’s priorities which depend on capacity to pay and fiscal constraints of a financial year.1

Atilgan, et al (2017), tried to investigate whether growth and health expenditure are co-integrated or not and found that health expenditure and economic growth have a dynamic causal relationship. Similarly, Bedir (2016) also explained the relationship between economic growth and health care expenditure in emerging markets of Europe and Middle East African and Asian countries. In the study, human accumulation was considered to be very crucial for growth of a country and in order to be to raise capital accumulation, healthcare expenditure was found to be quite influential. Economic growth in a country led to an increase in the healthcare expenditure proportion in outcome of the country, which causes GDP to increase. Again, Halici et al (2016) also found a positive relationship between government spending on health and economic growth which indicates that public health expenditures plays an important role in the determination of economic

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growth. Ozturk and Topcu (2014) employed a panel data analysis in order to investigate health and growth in G8 countries. Their findings strongly suggest that there exists a one-way causality between health expenditures and economic growth. On one hand, health expenditures affect economic growth in the short-run and on the other hand economic growth affects health expenditures in the long-run.

The paper has four sections. Section one introduces the subject matter while the second section discusses the methodology. The third section deals with the findings and discussion and the fourth section concludes the paper.

**Method**

The objective of this paper is sought to be fulfilled through the analysis of the secondary data collected from World Bank and WHO. The unit of the study comprises of the BRICS countries. Data on health expenditure and GDP for the period from 2000 to 2018 from World Bank and WHO was used to analyse the relationship between health expenditure as a percentage share of GDP and GDP of the BRICS countries are used. The data was segregated into two sections and analysed for two decades. However there is a limitation of the study as the data of health expenditure as percentage share of GDP was not available for the years 2017 and 2018. The data is analysed and presented in the form of tables and figures.

**Findings and Discussion:** For the present study data on the variables GDP and Health Expenditure as a percentage share of GDP in BRICS Countries for 2000-2010 in the first section and for the years 2011-2018 are presented in tabular and diagrammatic form. The data is analysed and discussed for the same.

**Analysis for Decade 1:**

**Table 1: GDP (in trillion Dollars) & Total Health Expenditure (THE) as a percentage share of GDP in BRICS Countries for 2000-2010**

<table>
<thead>
<tr>
<th>Year</th>
<th>Brazil GDP</th>
<th>THE as % share of GDP</th>
<th>Russian Federation GDP</th>
<th>THE as % share of GDP</th>
<th>India GDP</th>
<th>THE as % share of GDP</th>
<th>China GDP</th>
<th>THE as % share of GDP</th>
<th>South Africa GDP</th>
<th>THE as % share of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0.66</td>
<td>6.56</td>
<td>0.26</td>
<td>5.01</td>
<td>0.47</td>
<td>4.03</td>
<td>1.21</td>
<td>4.47</td>
<td>0.14</td>
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</tr>
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<td>2001</td>
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<td>0.31</td>
<td>5.23</td>
<td>0.49</td>
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</tr>
<tr>
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<td>1.47</td>
<td>4.34</td>
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<td>2006</td>
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<td>3.88</td>
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<td>2009</td>
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<td>6.09</td>
<td>4.21</td>
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</table>

Source: World Bank and WHO Database

From Table 1 and Figure 1 it is seen that in terms of GDP China has dominated the 1st decade followed by Brazil. The GDP of China has increased from around 1.21 trillion US dollars in 2000 to around 6.09 trillion dollars US dollars in 2010. The growth throughout the decade of 2000-2010 for China has increased at least by 6 times. However during the same period the total health expenditure as a percentage share of GDP in China has remained more or less constant at around 4%.

Similarly in terms of total health expenditure as a percentage share of GDP Brazil has dominated the scenario and the total health expenditure has increased from 6 to 9 percent, which is evident from table 1 and figure 2. It is followed by South Africa with a total health expenditure pegged at around 7 percent.
From figure 1 it is seen that the growth in GDP shows an upward trend for Brazil, Russian Federation, India and China, with China showing a significant increase with 6.09 trillion dollars US dollars in 2010. However the growth of GDP for South Africa has been stable throughout the decade.

From figure 2 the total health expenditure as a percentage share of GDP has increased for Brazil from around 6 to 9 percent; but for India the total health expenditure as a percentage share of GDP has fallen from around 4 percent to 3 percent. Again for Russian Federation, China and South Africa the total health expenditure as a percentage share of GDP has remained stable at around 5 percent, 4 percent and 7 percent respectively.

Thus from the analysis of Table 1, Figure 1 and Figure 2 it can be concluded that there exists a direct proportional relationship between the total health expenditure as a percentage share of GDP and GDP.
Analysis for Decade 2: It can be seen from table 2 that the data for Total Health Expenditure (THE) as a percentage share of GDP in BRICS Countries for the years 2017 and 2018 is not available.

Table 2: GDP (in trillion Dollars) & Total Health Expenditure (THE) as a percentage share of GDP in BRICS Countries for 2011-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Brazil</th>
<th>Russia</th>
<th>India</th>
<th>China</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP</td>
<td>THE as % share of GDP</td>
<td>GDP</td>
<td>THE as % share of GDP</td>
<td>GDP</td>
</tr>
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<td>2011</td>
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<td>NA</td>
<td>2.73</td>
</tr>
</tbody>
</table>

Source: World Bank and WHO Database

From Table 2 and Figure 3 it is seen that in terms of GDP China has dominated the 2nd decade as well followed by India showing a staggering upward trend. The GDP of China has increased from around 7.55 trillion US dollars in 2011 to 13.61 trillion dollars US dollars in 2018. The growth throughout the decade of 2011-2018 for China has increased significantly.

Similarly in terms of total health expenditure as a percentage share of GDP for the period of 2011-2018 has been dominated Brazil and the total health expenditure has increased from 9 to 11 percent, which is evident from table 2 and figure 4. It is followed by South Africa with total health expenditure at around 7-8 percent.

![Figure 3: GDP (in trillion Dollars) in BRICS Countries for 2011-2018](source)

Source: World Bank Database

It is evident from figure 3 that China has dominated the second decade in terms of GDP. It is followed by India with a staggering and nominal growth in GDP at around 3-3.5 trillion USD. The GDP of Brazil during this decade has been fluctuating and indicates a falling trend towards end of the decade. Similar is the story for the Russian Federation in the 2nd Decade. For South Africa the GDP growth has been fluctuating and pegged at around 1 billion USD.
In the second decade the total health expenditure as a percentage share of GDP has increased for Brazil from around 9 to 11 followed by South Africa where the total health expenditure as a percentage share of GDP is between 7-8 percent. Again for Russian Federation and China the total health expenditure as a percentage share of GDP has remained stable at around 4-5 percent, respectively. But for India the total health expenditure as a percentage share of GDP has been stable at 3 percent.

Thus from the analysis of Table 2, Figure 3 and Figure 4 it can be concluded that there exists a direct proportional relationship between the total health expenditure as a percentage share of GDP and GDP for rest of the BRICS nations except for Brazil. For Brazil the GDP is showing falling trend but the total health expenditure as a percentage share of GDP is increasing, indicating an inversely proportional relationship between the two.

Thus there has been a change in the composition especially for Brazil in a matter of decade. However from the analysis of the data in both the decades it is seen that the total health expenditure as a percentage share of GDP has a direct proportional relationship with GDP for the BRICS nations, except for Brazil in the second decade where an inversely proportional relationship between the two variables is observed. Another point worth noting in the analysis is that in both the decades China is leading in terms of GDP in a significant manner. However, for the total health expenditure as a percentage share of GDP it has been constant around 3-4 percent in both the decades. As such China cannot be termed as a direct indicator to express the relationship between total health expenditure and GDP, not at least in percentage terms. However in real terms for China it can be asserted that as GDP increases the health expenditure also increases i.e. with greater increase in GDP the health expenditure although in percentage terms remained more or less the same, but in real terms total health expenditure’s share in China’s GDP has increased.

Conclusion

There are several arguments that contributes contribute to the idea that health is of substantial importance for growth and productivity. Better health is a labour-augmenting factor that increases the level of individual productivity in terms of healthier individuals and longer expectancy of life. Health Capital theory states a longer life span encourages people to acquire better education which in turn results in more productive people. Thus, it is of utmost importance that there should be expenditures on health as it enhances the individual productivity and in turn promotes growth. Expenditure on health triggers and enhances technological progress in the health sector which in turn promotes productivity of the masses. Thus, both health spending and technological progress acts as a potential source of progress and development by contributing towards
GDP. As a share of GDP, total spending on health care has risen steadily over the past two decades of the BRICS nations. Although increased health spending is expected to positively influence aggregate productivity and growth, evidence on this link is somewhat inconclusive. But a conventional explanation for the rising share of health spending in GDP can be this that in knowledge-based economies human capital is the main driver of productivity and growth. As such health can be considered as an important factor for economic outcomes and carries manifold policy implications.

**Ethical Clarence:** It is review article based on secondary data on GDP and THE collected from World Bank and WHO Database

**Source of Fund:** Self.

**Conflict of Interest:** Nil

**References:**


Developing Health Awareness among the Rural-Urban Fringe Students in the ESL Classroom through Language Activities

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Abstract
The Rural-Urban Fringe (RUF) students are not just poor in English language skills but also they lack in their awareness about health, when compared to the privileged group. The low economic background, poor hygiene and congested living spaces together pose a great threat to their health. The purpose of this research is to create health awareness through language activities in the ESL classroom, among the RUF students of Chennai through teacher intervention in teaching methodology and materials. A set of five language activities titled, Drugs and dosages, Importance of hygiene, Danger in smoking, An act of first aid and Danger in dogs was designed and conducted to create health awareness along with enhancing English language skills. A preliminary survey on their general health was conducted to measure the awareness of the students before the program and a post survey was conducted to find the health awareness which the activities created. The continuous performance of the students through regular monitoring and unstructured interview with students clearly proved that health awareness is a must for the RUF students and it can be created successfully through language activities.

Keywords: Health awareness, Rural-Urban Fringe, Language activities, English as Second Language (ESL), Teacher intervention.

Introduction

“To keep the body in good health is a duty… otherwise we shall not be able to keep the mind strong and clear” says Goutama Buddha (¹). The purpose of education is to make the mind strong and clear, but when the need arises to educate on physical health as well, one should not refuse.

The World Cities Report in 2016 says that the slum dwelling population in the third world countries increased from 688 million to 880 million, which is a quarter of the world’s total urban population. It also states that health is a subject of concern especially for people residing in the slum areas of any state or in any country (²). As the urban space expands every day, it gives rise to a new area of living called Rural-Urban Fringe (RUF). The RUF area is defined as the “… structural units (which) include slums and squatter-settlements, built-up dwellings without any proper plan, mixed land uses, areas of agricultural production usurped by lot of industrial units, dispersed location of settlements suffering from urban facilities” (³). It is an area which has a mixed population of rural and urban living within or around the urban area without being economically part of it, and the students from this area are called R-U Fringe students.

The R-U fringe students do not just struggle in English language skills but they also lack in health awareness compared to urban students. Illiteracy of parents, low economic background, studying in regional medium schools and lack of exposure do not just make them linguistically challenged, but also poor hygiene and congested living space are a threat to their health conditions as well. As an ordinary teacher one may not be able to change the family background, economic status, atmosphere and living space or change the curriculum or teaching materials but certainly health awareness can be created through teacher’s intervention in teaching materials. According to Johnston, “English language teaching (ELT) is not merely a matter of training students in a particular set of skills. Rather, the occupation of ELT is profoundly imbued with values…” (⁴) Therefore a set of five language activities was designed titled drugs...
and dosages, importance of hygiene, danger in smoking, an act of first aid and danger in dogs which could be used to develop English language skills and also create health awareness.

This research is the result of the need found among the ESL (English as Second Language) learners of RUF in Chennai, India. The students of these areas are mostly first generation learners and from an economically and socially backward class, awareness about general health and hygiene was found to be lacking compared to urban students. According to Mukherjee, “for any country to develop, it is very essential to target the slum areas which prevail in a vast number and hinder the progress of any nation.” (5)

Creating and using of language activities with health awareness serves dual purpose, which is teaching English and also creating health awareness. It also saves time, energy and effort. Often providing health awareness separately may not be possible, but when it is integrated with language teaching, the students learn a language and also acquire the awareness needed about health.

These activities were conducted in the English classes for 27 tertiary level students for two weeks of time at Hindustan Institute of Technology and Science, Chennai. A primary survey was conducted to find the health awareness and the interest to learn. A post survey was conducted to find the awareness created through the activities. The students’ participation and unstructured interview with students was also considered to study the result.

**Activity 1: Drugs and Dosage.**

The purpose of this activity is to develop intensive reading and create awareness about drugs such as dosage, expiry date, storage information etc.

Instruction: Read the label on a medicine bottle (Fig. 1) and answer the following questions.
Activity 2: Importance of hygiene.

The purpose of this activity is to teach dialogue writing and to create awareness about hygiene.

A. Watch the video ‘A story of Cholera’(6) and fill in the blanks with the right prepositions given. (Prepositions can be repeated)

(after, on, into, from, at, before, through, for, in, by, about, with, to, with, from, throughout)

The Story of Cholera(7)

This is the story of how cholera changed my village.

Tiny germs of cholera – too small to see – spread ……… the river. So small, yet so dangerous.

Without realizing, women carried cholera home ……… the water. Flies carried cholera ……… their feet. Unwashed hands spread it too.

We swallowed cholera germs ……… our water, ……… our food, and ……… our fingers.

It happened so fast. By morning, my father was very sick.

He had diarrhea that looked like gray water and poured out of him. I was so scared.

I went for help.

I never rode so fast.

One look ……… my father and the nurse knew it was cholera. He needed fluids right away. She didn’t have a ready-made packet ……… ORS so we made a special drink to help him.

First we made the water safe – we filtered it ………. cloth and boiled it ……… one minute.

Then we mixed ½ teaspoon of salt and 6 teaspoons of sugar ……… one liter of this safe water. It tasted like tears – not too salty.

I worried my father would die before my eyes. But he soon felt a little stronger. The nurse explained to me that not everyone who swallows cholera germs gets sick like my father, but they can still spread the disease.

Now I needed to take safe water to my village and teach them how to protect themselves from cholera.

I saw a girl carrying water. I told her she could make the water safe ……… adding chlorine drops and waiting half an hour.

There was a man ……….. to eat with unclean hands. I told him to always wash his hands with soap and safe water ……… going to the toilet. Only ……… clean hands could he eat safely.

I saw villagers spreading cholera ……….. our river. I told them we needed to dig latrines far ……….. the river, ……… least 30 meters away. This was important ……….. keep our village clean.

I found a mother preparing unsafe food. I told her: first we must wash our hands ……… soap and safe water. Then we had to wash and peel the food. Cook it and always eat it hot and protect it ……… flies.

I spread the word ……… my village and ran to find my father. I was so happy to see he was better.

Our village became healthy. Now we filter and boil our water to make sure it is safe. We always use latrines, and always wash our hands after.

Food is safe ……… flies, washed and peeled and cooked.

And, we always wash our hands ……… cooking and eating.

We made our village safe from cholera. Spread the word. Your village can be safe too.

B. Write a sentence each using the following prepositions to differentiate each of its meanings.

Example:

among - between

Answer: among – a cow stood among the trees.

between – Anne’s shop is between the library and a restaurant.)

a.  in- at
b. through- to
c. for-from
d. about-throughout

C. Discuss the following with your partner.
   a. How did the father fell sick?
   b. How did the nurse prepare the special drink?
   c. what did the boy do to stop cholera spreading in his village further?

D. List down some of the things people do in your neighborhood that are unhygienic.

   Activity 3: The Danger in Smoking

   The purpose of this activity is to develop writing and create awareness about smoking.

   Materials: How do cigarettes affect the body?

   Instruction: Watch the video and answer the following questions.

A. Discuss the following questions with your partner and write down the answers.
   a. How exactly do cigarettes harm the smoker?
   b. Define active and passive smoking.
   c. Is passive smoking as dangerous as active smoking?
   c. Why do you think people usually smoke cigarettes?

B. Discuss with your partner and map the benefits of quitting smoking in the time frame given (Fig. 2 & 3).

   I. Time Frame 20 min to 1 month.
   - Heart rate and blood pressure begins to return to normal
   - Carbon monoxide levels stabilize increasing the blood’s oxygen-carrying
   - Heart attack risk begins to decrease as blood pressure and heart rates normalize
   - The nerve endings responsible for smell and taste start to recover
   - Lungs become healthier

   II. Time frame: 9 months to 15 years.
   - The delicate hair-like cilia in the airways and lungs restored improving resistance
   - Heart disease risk plummets to half as blood vessel function improves
   - The chance of a clot forming dramatically declines, and the risk of stroke continues to reduce
   - The chances of developing fatal lung cancer go down by 50%,
   - The likelihood of developing coronary heart disease is essentially the same as that of a non-smoker.

   Activity 4: An Act of First Aid

   The purpose of this activity is to develop speaking skills situations through role plays and make students aware of the first aid treatment for common accidents.

   Students were divided in a group of five and each team was given a situation and a reference about the first aid procedures. After learning and practicing the situation they had to enact a skit. The situations given are in Tab. 1.
### Table 1: First Aid Situations

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Situation</th>
<th>Link To Refer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Imagine you are travelling on a bike with a friend. You see someone on the road hit by a speeding vehicle fighting for his life. You have called the ambulance but they will take minimum 20 minutes to arrive. What will you do to save the victim?</td>
<td>First aid for road accidents <a href="http://www.ctp.gov.in/RSFirstAid.htm">http://www.ctp.gov.in/RSFirstAid.htm</a></td>
</tr>
<tr>
<td>2</td>
<td>Imagine you are travelling by train and a passenger has a cardiac arrest. What would you do to save him?</td>
<td>Hands only CPR - <a href="https://www.nhs.uk/conditions/first-aid/cpr/">https://www.nhs.uk/conditions/first-aid/cpr/</a></td>
</tr>
<tr>
<td>3</td>
<td>Imagine you have visited the beach and you see someone drowning. What would you do to save him?</td>
<td>First aid during drowning <a href="https://www.webmd.com/first-aid/drowning-treatment">https://www.webmd.com/first-aid/drowning-treatment</a></td>
</tr>
<tr>
<td>4</td>
<td>Imagine someone swallows something, it is stuck in his throat and he is choking. What would you do to save him?</td>
<td>First aid for choking <a href="https://www.mayoclinic.org/first-aid/first-aid-choking/basics/art-20056637">https://www.mayoclinic.org/first-aid/first-aid-choking/basics/art-20056637</a></td>
</tr>
</tbody>
</table>

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**Activity 5: The Danger in Dogs.**

The purpose of this activity is to teach paragraph writing and to create awareness about rabies.

1. Observe the picture given ‘Symptoms of Rabies’ *(fig. 4)* and write a paying attention to all the details given.

Figure 4: Symptoms of rabies
Findings: According to the questionnaire administered initially, it was found that 62% of the students were not taught about health and hygiene by their family members. 73% of students reported that no awareness programme of any kind about health and hygiene were conducted in their residential area. Only 37% students had awareness programmes organized in their schools out of which only 19% had attended those programmes. It was also found the nearly 60% of the students were not interested to read any content on health or hygiene. However, 73% of students expressed their interest to learn about health and hygiene in English class room.

Initially, some students who expressed their interest to learn about health in English classroom in their questionnaire were not excited during the classes. They were quite hesitant to participate in the activities. It was found that the reason for their disinterest was not the materials provided or learning about health but shyness, lack of confidence, fear of making mistakes and fear of teacher made them inactive in the classroom. It was also found that use of audio-video materials increased the curiosity of the students and also momentary benefits such as marks, words and gestures of appreciation, fun in group and challenges made the students much interested.

The post-survey questionnaire brought a lot of light on how the students have benefited from this programme. 86% of the students said that the materials that were used were highly useful to learn about health and 81% said they wish to have similar programmes regularly. 68% of students said that they never read any labels on the drugs and now they knew the importance of reading them. 48% were not aware of unhygienic things that were commonly practiced in their area until they watched the video about cholera. 85% of students reported that they hadn’t known the complete details of danger in smoking cigarettes though they knew it was dangerous and they have learnt its danger in detail. Through all the students wanted to help the accident victims, 82% did not knew how to help different kinds of victims until they participated in an act of first aid. Surprisingly, it was also found that 28% of students never knew dogs could bring life threatening disease. Above all, 91% of the students had recommended health awareness in English class to other students.

It was also found, by bridging the gap between the contents of the study materials and real life experience, learner motivation can be enhanced. By turning the learner’s attention more to the reading part of real life (advertisement, prescription, newspaper, film posters etc.), reading becomes an integral part of life. By bridging the gap between casual reading and purposeful (academic) reading, the speed of reading can be enhanced. By linking reading with speaking (as in tasks which ask students to discuss something), oral proficiency gets enriched.

Conclusion

These five activities focusing on health awareness not just provided an opportunity for students to develop their English language skills through participation but also became aware of health. The preliminary survey clearly suggested that there is a need for health awareness programmes and the post survey clearly proved that health awareness based language teaching can empower students and it is the need of the hour.

Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

Source of Funding: Self

Ethical Approval: The article does not contain any studies with human participants or animal performed by any of the authors.

Reference


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¹Professor, ²Research Scholar, Faculty of Law, Aligarh Muslim University, Aligarh (U.P., India)

Abstract

Ever since the passing of the Jammu & Kashmir Consumer Protection Act, 1987, the doctor-patient’s relationship came under critical scrutiny, controversy and litigation. The inadequacy of consumer protections laws results in unavoidable contingency, spiralling cost shifting and inordinate health care complexities. It examines health care services as a matter of consumer rights under Consumer Protection Act, 1986, Jammu and Kashmir Consumer Protection Act, 1987 and Consumer Protection Act, 2019. It makes consumers to navigate between hope and despair for access to health care. The paper is driven to analytical study of the inadequacy of consumer laws in dealing effectively deficiency of medical service, insufficiency of health care services, lack of medical professionalism and negligence a case study of Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar is undertaken by encompassing a legislative survey of consumer laws in inculcating Consumer Right Awareness (CRA) and toning of structural governance of grievance redressal mechanism. The gap between the precept and practice of consumer justice and compensation in health care services is identified for adoption of a robust infrastructural and schematic revamping.

Keywords: Health Care Services, Consumer Right Awareness, Grievance Redressal Mechanism, Consumer Justice and Compensation.

Introduction

The health care facilities to the people of the erstwhile state of Jammu and Kashmir (J & K) is marred by constraints of financial resources, difficult topography and terrain, poor road connectivity, low presence of private sector, low accessibility and affordability by underprivileged segments of the population. There has been a gradual decay in the health services of J & K over the last three decades. The state is under shadows of infectious diseases like tuberculosis, RTI, UTI diarrhea disease.¹ There is growing shadow of chronic diseases like hypertension, coronary artery disease, cancers, and diabetes. Factually speaking there are 3,807 health care institutions in the state which is considered the highest number of hospitals in the country. The annual budget for the health sector in J & K is Rs. 2,423-crore. The per capita spending under plan, non-plan and centrally sponsored schemes is estimated at Rs. 1,931 crore.² According to the State’s Economic Survey Report, 2017, there were 4,433 government health institutions in J & K at the primary, secondary and tertiary levels with 6,674 doctors.³ The paper examines the efficacy of J & K Consumer Protection Act, 1987 to give effect to Consumer Protection Act, 1986 to take care of consumer right awareness among patients for robust health care services in Union Territories of J & K under Jammu and Kashmir Reorganisation Act, 2019.

Materials and Method

The material and method applied for the study include analytical method of legal research by undertaking the legislative survey and scrutiny of consumer laws at central and state levels. These laws are studied under Parsonian Effect theory in the context of health care services.⁴ The comparative consumer law study of Consumer Protection Act, 1986, J &
1987 and 1986 forms the basis of 1986, 7 1986, 5 2019 is based on established canons of statutory interpretation. The material and method partakes an empirical framework of SKIMS, Srinagar a premier medical institution in J & K state. The case study is based on Consumer Right Awareness (CRA) under four major parameters which include consumer right awareness, redressal against medical negligence, and recourse to deficiency of medical service and compensation and consumer justice.

Findings

It is important to note that the both Consumer Protection Act,1986, J & K Consumer Protection Act,1987 and Consumer Protection Act, 2019 are public welfare legislation and has been designed to avoid procedural technicalities, delays, and requirement of court fees to protect consumers availing medical facilities and health care services. It contains three-tier consumer disputes redressal system at the District, State and National levels along with Central Consumer Appellate Authority (CCAA) including right to health and environment.

Central Consumer Protection Act, 1986: The Consumer Protection Act,1986 forms the basis of J & K Consumer Protection Act, 1987 therefore a perusal of this law in brief is imperative. The Act seeks to promote and protect the interest of consumers against deficiencies and defects in goods or services. It also seeks to secure the rights of a consumer against unfair trade practices, which may be practiced by manufacturers and traders. The Act applies to all goods and services unless specifically exempted by the Union Government and covers all sectors, whether private, public, or cooperative. It ordains simple, speedy and inexpensive machinery for redressal of consumer’s grievances, the marketing of goods and services to consumers, as well as the relationships, transactions and agreements between the consumers and the producers, suppliers, distributors, importers, retailers, service providers and intermediaries of those goods and services. The application of Consumer Protection Act,1986 to health services derives life breath and sustenance from Supreme Court ruling in Indian Medical Association v. V.P. Shantha. In this case the question raised was whether the treatment provided by medical practitioners to their patients would constitute “service” under the meaning of the Act and whether patients would be treated as ‘consumers’ under the same Consumer Protection Act,1986 The court noted that the issues arising in the complaints against medical negligence can be speedily disposed of by the procedure being followed by consumer disputes redressal agencies. Thus the Consumer Protection Act, 1986 is pioneering law in protection of consumer from the standpoint of health, environment and consumer justice.\(10\)

J & K Consumer Protection Act, 1987: The J & K Consumer Protection Act,1987 aims to provide effective safeguards to the consumers against defective goods, deficient services and unfair trade practices. The Act provides speedy redressal to consumer complainants by setting up of a District Consumer Redressal Forum and State Commission having jurisdiction to claim of Rs. 10 lakhs and Rs. 30 lakhs respectively. The State Commission will be vested with appropriate appellate and revisional powers. It shall apply to all goods and services except those which are specially exempted by notification by the state government did not specifically exempted health care services provided by government hospitals. It seems profitable to refer section 2(1)(0) as under:

“Service” means service of any description which is made available to potential users and includes the provision of facilities in connection with banking, financing, insurance, transport, processing, supply of electrical or other energy, board or lodging or both, entertainment, amusement or the purveying news or other information, under a contract of personal service.

The necessary penal and punitive provisions have been incorporated for effective redressal of unfair trade practices, defect in the goods, and deficiency of services. The Consumer Commissions are authorized to impose penalties on trader or person against whom complaint is made if he fails to comply with the order of the redressal agency.

J & K Government Doctors (Relaxation of Restrictions on Private Practice) Rules, 1987: It will be appropriate to see the application of J & K Consumer Protection Act, 1987 and J & K Government Doctors (Relaxation of Restrictions on Private Practice) Rules, 1987 in holistic perspective in regard to doctor patient relationship and health care services. This is also important to see this law in the context of penalty or punishment may involve imprisonment for a period not more than 3 years or a fine or both. The complaint mechanism by a consumer voluntary organization, registered society, company and state government will also be scrutinised in pragmatic discourse. Therefore,

### Discussions

The study of health care services under consumer protection laws of J & K health institutions is an empirical study of SKIMS with 900 bedded tertiary care hospital and undergraduate medical college with intake capacity of 100 students. According to survey there are total 1648 health institutions in J & K State.\(^{13}\)

**Selection of Area of Study:** SKIMS being premier medical institution in India, it provides additional services including prevention, treatment, rehabilitation, obstetrics, substance abuse, health education, and screening for cancers and other diseases.\(^{14}\)

### Consumer Right Awareness & Health Care Services

By this analogy persons who are rendered free service are “beneficiaries” and as such come within the definition of “consumer” under the *J & K Consumer Protection Act, 1987* and *J & K Government Doctors (Relaxation of Restrictions on Private Practice) Rules, 1987*. Located in Soura area of Srinagar, this is the largest medical Institute under *Sher-i-Kashmir Institute of Medical Sciences, (Grant of Degrees) Act, 1983*.\(^{15}\) The *J & K Consumer Protection Act, 1987* is not applicable to government hospitals because of free medical care services to patients. But the medical services rendered by doctors and hospitals falls within the ambit of a “service” as defined in Section 2(1) (o) of the Act.

<table>
<thead>
<tr>
<th>Health Institution in Kashmir</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Hospital</td>
<td>10</td>
</tr>
<tr>
<td>General Hospital</td>
<td>2</td>
</tr>
<tr>
<td>Sub District Hospital</td>
<td>50</td>
</tr>
<tr>
<td>Emergency Hospital</td>
<td>2</td>
</tr>
<tr>
<td>Primary Health Centre</td>
<td>325</td>
</tr>
<tr>
<td>Allopathic Dispensary</td>
<td>125</td>
</tr>
<tr>
<td>Urban Health Centre</td>
<td>2</td>
</tr>
<tr>
<td>District TB Centre</td>
<td>8</td>
</tr>
<tr>
<td>Mobile Medical Aid</td>
<td>286</td>
</tr>
<tr>
<td>Sub Centres</td>
<td>1</td>
</tr>
<tr>
<td>MCH</td>
<td>9</td>
</tr>
<tr>
<td>Maternity Hospital</td>
<td>1</td>
</tr>
<tr>
<td>Leprosy Hospital</td>
<td>1</td>
</tr>
<tr>
<td>Grand Total</td>
<td>1648</td>
</tr>
</tbody>
</table>

The case study of SKIMS is based on four major parameters *viz*: consumer right awareness,\(^{16}\) redressal against medical negligence, recourse to deficiency of medical service and compensation and consumer justice under the *J & K Consumer Protection Act, 1987* and *J & K Government Doctors (Relaxation of Restrictions on Private Practice) Rules, 1987*. Located in Soura area of Srinagar, this is the largest medical Institute under *Sher-i-Kashmir Institute of Medical Sciences, (Grant of Degrees) Act, 1983*.\(^{17}\) The *J & K Consumer Protection Act, 1987* is not applicable to government hospitals because of free medical care services to patients. But the medical services rendered by doctors and hospitals falls within the ambit of a “service” as defined in Section 2(1) (o) of the Act.
Table 1: CRA & Health Care Services

<table>
<thead>
<tr>
<th>Patients</th>
<th>Respondents</th>
<th>Yes</th>
<th>% age</th>
<th>No</th>
<th>% age</th>
<th>Indifferent</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Patients</td>
<td>50</td>
<td>10</td>
<td>20</td>
<td>35</td>
<td>70</td>
<td>05</td>
<td>10</td>
</tr>
<tr>
<td>Out Patients</td>
<td>50</td>
<td>12</td>
<td>24</td>
<td>34</td>
<td>68</td>
<td>04</td>
<td>08</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>22</td>
<td>88</td>
<td>79</td>
<td>79</td>
<td>09</td>
<td>09</td>
</tr>
</tbody>
</table>

Source: Field work

The above table clearly shows that 22% respondents have knowledge about consumer law or redressal agencies while as 79% respondents said that no they were not having any knowledge about consumer laws however 9% respondent didn’t said anything about the information of consumer laws. The legal literacy about the complaint mechanism for the deficiency in medical services is also in abysmally low. When we asked patients about the deficiency of medical services gives rise to grievance redressal at appropriate consumer forum almost 2/3 respondents feign ignorance about it.

Table 2: CPA & Grievance Redressal Mechanism

<table>
<thead>
<tr>
<th>Patients</th>
<th>Respondents</th>
<th>Yes</th>
<th>% age</th>
<th>No</th>
<th>% age</th>
<th>Indifferent</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Patients</td>
<td>50</td>
<td>10</td>
<td>20</td>
<td>35</td>
<td>70</td>
<td>05</td>
<td>10</td>
</tr>
<tr>
<td>Out Patients</td>
<td>50</td>
<td>11</td>
<td>22</td>
<td>34</td>
<td>68</td>
<td>05</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>21</td>
<td>21</td>
<td>69</td>
<td>69</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Field Work

The medical negligence on as the part of health care provider is frequent in J & K that is why the patient affected by medical negligence have faint idea about the complaint mechanism as victims. The Table II shows that 21% respondents have knowledge about complaints in consumer forums on the basis of data received from respondents 69% respondents said that they were not aware about the concept of complaints in consumer forums, however 10% respondents didn’t say anything about the complaints in consumer forums.

Table 3: CPA & Medical Negligence

<table>
<thead>
<tr>
<th>Patients</th>
<th>Respondents</th>
<th>Yes</th>
<th>% age</th>
<th>No</th>
<th>% age</th>
<th>Indifferent</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Patients</td>
<td>50</td>
<td>10</td>
<td>20</td>
<td>34</td>
<td>68</td>
<td>06</td>
<td>12</td>
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<tr>
<td>Out Patients</td>
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<td>26</td>
<td>32</td>
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<td>66</td>
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<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Field Work

The Comptroller and Auditor General (CAG) of India has reported that ‘even the emergency medicine department has been found to be not fully equipped to deal with cases of road traffic accidents having multiple organ injuries including orthopedic injuries.’ This is also pathetic to note that ambulances meant for patients have been found mis-utilized to the extent of 40 to 47 per cent during 2008-12.  

Health Care & Medical Negligence: The knowledge regarding negligence in health care services reveals that 23% respondents were aware about the complaints mechanism. The ordinary prudence about medical negligence depicts that 66% respondents don’t have knowledge about grievance redressal and 11% remain indifferent to liability of doctors and hospital authorities.
Table 4: Health Care Services & Medical Negligence

<table>
<thead>
<tr>
<th>Patients</th>
<th>Respondents</th>
<th>Yes</th>
<th>% age</th>
<th>No</th>
<th>% age</th>
<th>Indifferent</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Patients</td>
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<td>11</td>
<td>22</td>
<td>36</td>
<td>72</td>
<td>03</td>
<td>06</td>
</tr>
<tr>
<td>Out Patients</td>
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<td>10</td>
<td>20</td>
<td>35</td>
<td>70</td>
<td>05</td>
<td>10</td>
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<td>21</td>
<td>71</td>
<td>71</td>
<td>08</td>
<td>08</td>
</tr>
</tbody>
</table>

Source: Field Work

Compensation & Consumer Justice: The compensation in case of medical negligence to the patients and their kith and kin also represent empathic and ignorance. The patient interviewed regarding their response to compensation in case of medical negligence reveals that 21% respondents show that they have knowledge about penal provisions against doctors. Still majority of patients to the tune of 71% said that they were not having any information related penal provisions whereas 8% are either ignorant or indifferent didn’t say anything about penal action can be initiated in the case of medical negligence on part of hospital and doctor.

Table 5: Compensation & Consumer Justice

<table>
<thead>
<tr>
<th>Patients</th>
<th>Respondents</th>
<th>Yes</th>
<th>% age</th>
<th>No</th>
<th>% age</th>
<th>Indifferent</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
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<td>38</td>
<td>76</td>
<td>04</td>
<td>08</td>
</tr>
<tr>
<td>Out Patients</td>
<td>50</td>
<td>09</td>
<td>18</td>
<td>36</td>
<td>72</td>
<td>05</td>
<td>10</td>
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<tr>
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<td>17</td>
<td>74</td>
<td>74</td>
<td>09</td>
<td>09</td>
</tr>
</tbody>
</table>

Source: Field Work

The apex court ruling has played seminal role in curbing medical malpractice and making compensation an integral part of consumer justice that 17% respondents have knowledge about compensation given by consumer forums and 74% said that they were not having any information related compensation related consumer forums however 09% respondents didn’t say anything about compensation provided by consumer courts. This places the consumer justice in a conundrum especially in the aftermath of Supreme Court decision.

Conclusion

The analysis of health care services under consumer laws of erstwhile J & K state now Union Territory of J & K under Jammu and Kashmir Reorganisation Act, 2019 reveals that health status of the people has not been able to keep pace with the national targets. The state has a considerable segment of population living below poverty line, inadequacy of healthcare and burden of disease in an environmentally benign setting. The J & K Consumer Protection Act, 1987 has not achieved consumer right awareness and assertiveness in realisation health care services. The health services and disease overburden needs proper regulation. This becomes more important in the wake of unrest of decades has worsened the health status of people especially of population living below poverty line. The only salacious aspect is to note that the purpose and object with which the J & K Consumer Protection Act, 1987 has been passed has substantially achieved in the ambit of patient’s rights notably compensatory justice. But the SKIMS have been found inadequately equipped to deal with accidents and trauma prevention and mis-utilisation of ambulance services despite rich infrastructure. The most significant and equally multifaceted as well complex service in the field of consumer grievances is that of medical malpractice and the doctors of SKIMS and other government hospitals of state need to be more circumspect and careful towards medical services to patients to enlarge the realm of consumer justice, access to health and compensatory jurisprudence.

Conflict of Interest: No

Source of Funding: Self

Ethical Clearance: No
References


Effects of Migration on the Health of Kashmiri Pandits

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Abstract

Kashmiri Pandits (KPs), the Hindu community from the state of Jammu & Kashmir of India, are distinct from rest of the Hindu community of India. They have their own customs and rituals that broadly differ from the customs that are prevalent in the Hindu community. The community has its own language, social customs and a rich cuisine. The community had to migrate in the late 1980’s due to the onset of conflict in the state. They had to live in refugee camps in Jammu where the sanitation facilities were minimal. It caused a lot of health issues among the migrants. The change in the geographical environment led to the KPs suffers with skin diseases. There was a major difference between the climatic conditions of Jammu and the valley. Valley being cold and Jammu warm. The current study focuses on the health conditions of Kashmiri Pandits after migration.

Keywords: Internally Displaced People, Kashmiri Pandits, Migration, Refugee camps, Health conditions.

Introduction

Kashmiri Pandits (KPs), the Hindu community from the state of Jammu & Kashmir of India, are distinct from rest of the Hindu community of India. They have their own customs and rituals that broadly differ from the customs that are prevalent in the Hindu community. The community has its own language, social customs and a rich cuisine. Their culture is very different from the rest of Hindus in India, their customs and rituals vary to a great extent. They follow the traditions of sanatan dharma, also known as Hinduism. They belong to the small caste of saraswatbrahmans known as Pandits.

The community had to migrate to different parts of India as a result of conflicts that arose in the Valley due to self-determination in Kashmir valley by the Kashmiri Muslims. This self-determination process gave rise to selective killings of Kashmiri Hindus as a result of which the Kashmiri Hindus, primarily the KP community had no other option but to leave their homes in order to protect themselves from this crisis. This conflict had its roots in the disputes that arose between India and Pakistan at the time of partition in 1947. This political war between both the countries since partition had resulted in large scale bloodshed. This has affected all the communities of Kashmir including the Hindus, Sikhs, Muslims and Buddhists till date. The late 1980’s was the period when large scale migration of Kashmiris, especially Hindus had occurred in various parts of India as a result of the conflict prevalent in the valley at the time. The KPs had no other option but to migrate solely for self preservation. KPs migrated to different parts of India and concentrated mostly in the states of Delhi and Jammu. Immediately after migration many of them had to live in refugee camps in Jammu which made their lives miserable. The camps were in inhabitable conditions and did not provide proper infrastructure during extreme weather conditions as a result of which there was a visible impact on the health of the community, mostly the children in particular. The total number of families that have migrated from Kashmir is 59,452 families. In Delhi the total number of families is 19,338 including Hindus, Sikhs and Muslims. (Relief organisation Migrants, Jammu, Government of J & K).

The KPs are officially termed migrants by the Indian government. The KP community, however has raised objections for using such terms because this migration was not voluntary. They wished to be called Internally Displaced People (IDP) Malhotra 2007. IDPs are those who do not cross the borders to find a safe place to live, unlike refugees they are on the run from their own home. They stay within the country under the protection of their government even if that government is responsible for their displacement. According the UNHCR guidelines
on internally displaced persons; those persons who have migrated within their country should be given the status of internally displaced persons. However, the fact of the matter remains that in India there is no protection extended to these displaced persons. India did not sign the UNHCR convention 1951 and Protocol 1967. In the absence of refugee and IDP laws, the condition of these migrants was and shall remain wretched to say the least. Malhotra attempted to clarify the concept of IDP’s and refugees, where the refugees cross the international borders but not internally displaced people. The study defines how Kashmiri people can be identified as internally displaced people. The assumption used in the study was that internally displaced people bring about new modes of social organisation, which uses various response strategies to integrate in the host community and how that try to adjust socially and culturally which is beyond just physical survival. The paper also pointed out the fact that the displacement has impacted the social organisation of the Kashmiri people. The field research area of the study included 5 camps in Jammu region and apartments in Noida. The research focused on the determinants with which the displaced people integrate with the local population, these determinants includes ethnic, family and religious affiliations. The observation of the research shows how the internally displaced people living in Jammu camps are more miserable than the people living in Noida, as in Noida there are proper housing facilities where as in Jammu only one room tenements were available to the internally displaced people. A more peculiar feature was that the people living in Jammu camps belonged to the villages or rural areas of Kashmir such as Kulgam, Kupwara, Anantnag, Barramulla, on the other hand people living in Noida were from Srinagar city.

**Condition After Migration:** Migration led people to move to different parts of India. Most of the KPs moved to Jammu in the refugee camps. The camps were in miserable conditions and were not apt for living. Migrants were living in tents initially in the 1990’s and later on in 1994 these tents were transformed into one room tenements (ORTs). Theses tents did not protect them from the various weather conditions, dust storms were a major issue as it affected the beam of the tents. Another major issue was that of snakes. The land where these tents were established was isolated and more of a jungle. Many deaths happened because of the snake and scorpion bites. Various diseases caught migrants because of the unhygienic conditions in the camps.

Many migrants went into depression. Privacy was also a major concern in this arrangement. The couples specially lacked the private spaces.

In 2006, an elaborate report on the impact of migration on the socio-economic conditions of Kashmiri displaced people was published. It is an extensive empirical study conducted by J & K centre for minority studies. The findings of the study indicated that insecurity of life and honour were the chief causes of migration of KPs. It was found that 9 per cent migrant families moved out of Kashmir valley from January 1990 to May 1990. Migration took place from both rural as well as the urban areas of Kashmir including people from all occupational groups i.e. farmers, professionals, government servants, agriculturists, traders and self-employed. The study pointed out that there is no comprehensive policy on the issue of return and rehabilitation. The government policy clearly stated that the migrants will be returned with dignity and honour however nothing of the sorts has happened till now.

In another study, based on interviewing 50 migrants from refugee camps in Jammu, on migrant KPs observed that 90 per cent of the migrants were not happy with their incomes as they were able to make more in the valley. Unemployment among the youth became a major cause of concern. The study further pointed out that the hygiene conditions were miserable. It was observed that children were using Hindi or English for communication rather than speaking Kashmiri hence making the Kashmiri language vulnerable.

A study on effects of displacement on the Kashmiri migrations aimed at understanding the problems faced by Kashmir families after migration that were living in refugee camps in Jammu. It was found out that the camps were low on providing even the basic necessity to the migrants. There was no proper drainage system, water facilities or electricity. Changes in the climatic conditions also added to their miseries. The lack of basic amenities such as drinking water, drainage and sewerage, absence of proper lavatory facilities, poor housing, overcrowding, and extremes of climate, lack of healthcare, joblessness, idleness, depression, disease and death. They were accustomed to live in cold climates but a sudden change of the climatic condition caused skin and other air borne diseases to the migrants. The economic condition of the community was dwindling as migration left the people with no property of their own. The author noted that migration affected on the entire
social order of the community and that the cultural values have diminished. The author pointed out that the majority of respondents are willing to move back to the valley if they are assured of a peaceful environment in the valley. [11]

The emotional stress during displacement takes a toll on the physical as well as mental health. Large numbers of mental health problems are reported among IDPs. Psychological and mental disorders are epidemic in proportion. Reactive depression and nervous breakdown are very common in the youth. [12] Majority of the people of this community were having either hypertension or depression which is because of the separation of their relatives, friends and near and dear ones. [13]

Few migrants were able to get out of those camps in the early 1990’s and got themselves settled in Delhi or other states. They got good opportunities in the city as they were possessing knowledge and degrees. Few of them had their relatives already settled in the city which became a blessing. The city also helped them in achieving better standard of living.

The community has suffered a lot after the migration. Government at the centre and the state level did not address the problems of these people as required. The initial phase for the community was an arduous journey but they were able to settle themselves well in the city. Settling in a different place with new people was equally tough for the community. The reaction of the host community was also not welcoming. [6] The community had no choice but to adapt themselves with the host community and accept changes in their culture. Besides this the youth find it difficult to identify themselves with the Kashmir and its culture as they have lived most of their lives outside of Kashmir. Toshkhani argues that the youth are abandoning the culture and language which in turn is resulting in the fading away of the rich culture of Hindus of Kashmir. [14]

Further the studies found out that Incidence of child abuse was reported as higher since migration. Girls disliked camp living more than boys. [3]

**Conclusion**

The consequences of migration were hard for the Pandits. They had to leave behind their property and businesses. They had to live in refugee camps in Jammu where the sanitation facilities were minimal. It caused a lot of health issues among the migrants. The change in the geographical environment also led to the KPs suffers with skin diseases. There was a major difference between the climatic conditions of Jammu and the valley. Valley being cold and Jammu warm. The youth was unemployed and the education facility was not proper which lead to loss of education in children. The community also faced a lack of community sense; there were a lot of socio cultural changes which they had to go through. KPs suffered a lot after migration and are still struggling to get back their share in the valley. The cultural shock post migration has impacted them in certain aspects, the most important being the physical and psychological aspect. Migration to hotter places caused a lot of health issues, specially skin related problems as they were not accustomed with the hot and humid climate. Psychologically and emotionally they have felt isolated and neglected which impacted the overall performance of youth in achieving the best in life. However, the community adapted themselves with the host environment quite well and has also made peace with the said change, because of their adaptive quality.

They are now settled and have adapted the new environment; it has been almost twenty seven nine since they parted with their homeland. Some of them mentioned that they do not want another migration by returning to their homelands because they are not ready for another emotional turmoil and there are few who are haunting to go back.

**Ethical Clearance:** As secondary data was used for this research study, no ethical issues were involved and therefore no ethical clearance was taken.

**Source of Funding:** Self

**Conflict of Interest:** NIL

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Knowledge and Awareness about Nipah Virus Infection among Dentists and Dental Students in Chennai: A Cross Sectional Study

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Abstract

Background: Nipah virus infection is a zoonotic epidemic that has gained worldwide attention due to its high pathogenic potential, case fatality rate and lack of therapeutics or vaccines. Considering the recent outbreaks in Kerala and the fact that it is potentially contagious through saliva, awareness is an absolute necessity among all health professionals including dentists.

Aim: To evaluate the knowledge and awareness regarding Nipah virus infection among dentists and dental students

Materials and Method: A cross-sectional study was conducted among 100 dentists and 100 dental students. A structured questionnaire comprising of 18 questions assessing knowledge and awareness about Nipah virus infection was distributed to the participating dentists and dental students through Google forms. Data obtained from both groups (dentists and dental students) were compared and analysed using SPSS software version 16.0.

Results: The results revealed that 92% of the respondents had heard about Nipah infection earlier. Social media was found to be the most common source of information among both dentists (41.7%) and dental students (39.8%). The mean (SD) score obtained were 10.8±2.6 for dentists and 8.9±3.0 for dental students. The dentists were considerably more knowledgeable and aware of Nipah infection than dental students and the difference was statistically significant (p< 0.05).

Conclusion: Our study is one of the first of its kind to evaluate the knowledge and awareness about Nipah virus infection among dental professionals. Continuing education programs should be conducted among dental professionals and students to improve awareness as well as to ensure protection of personnel and prevent spread of infection.

Keywords: Nipah virus, dentists, awareness.

Introduction

Nipah virus infection is an epidemic that has gained worldwide attention in the recent past due to its high pathogenic potential, case fatality rate and lack of therapeutic interventions and vaccines[1]. It is a zoonotic infection caused by Nipah virus (NiV), a paramyxovirus that is mainly transmitted by a particular type of fruit bat that belongs to Pteropus species but has also shown high incidence of human to human transmission [2]. This deadly infection was first isolated and identified in September 1998 in Malaysia. The first outbreak in India was in Siliguri, West Bengal in 2001[3]. The outbreak in Calicut, Kerala in 2018 and its more recent emergence
in 2019 has sparked a renewed interest in studying this disease and also emphasizes why awareness is an absolute necessity among all health professionals including dentists. Since Nipah virus infection can be transmitted through saliva, dental surgeons have a responsibility to protect themselves and other patients from contracting the infection. The aim of this study is to evaluate the knowledge and awareness regarding Nipah virus infection among dentists and dental students.

**Materials and Method**

A cross-sectional study was conducted among 100 dentists and 100 dental students randomly selected from various dental institutes in south India from July to August 2019. An informed consent was obtained from all the participants and approval was obtained from the Institutional Review Board (IRB) prior to the commencement of the study.

A structured questionnaire comprising of 18 questions measuring knowledge and awareness towards Nipah was developed in English, and validity and reliability of the questionnaire was assessed among a pilot sample of 20 dentists and dental students not involved with the study. Further three epidemiologists specialized in public health were provided with the questionnaire, they assessed it for the face and content validity (CVI-0.86) and found it to be satisfactory. Test retest was used to assess reliability and was found to be acceptable (k=0.74).

The dentists and dental students were invited to participate through email and those who consented were provided with the questionnaire by Google forms. Awareness of participants about Nipah infection was assessed based on the respondent’s knowledge on aetiology, modes of transmission, clinical features, diagnostic tests and preventive measures. The data obtained was entered into excel worksheet. Each correct response by the participant was given a score of 1, every incorrect response was given a score of 0 and finally the overall score of each participant was also calculated and tabulated. Data obtained from both groups (dentists and dental students) were then compared and analysed for statistically significant difference using SPSS software version 23.0 (IBM, Chicago, IL). T-test was performed with 95% confidence interval and a value of P < 0.05 was considered to be statistically significant.

**Results**

**Awareness of the existence of Nipah (Chart 1 and Chart 2):** Out of the total 200 participants, 16 participants did not know about the infection. These participants were thus eliminated from knowledge assessment and the rest of the study was based on the responses of the remaining 184 participants which consisted of 52% dentists and 48% dental students.

**First source of information (Chart 3):** Out of the total 184 respondents, 75 (40.7%) stated social media, among which 40(41.7%) were dentists and 35(39.8%) were dental students. This was followed by 66(35.8%) participants who stated television, 29(15.7%) participants who stated newspapers and 14(7.6%) participants who responded that they had first received information about Nipah from friends/relatives.

**Causative organism (Chart 4—all other questions):** 159(86.4%) participants in this study were aware that it was a viral infection. Out of this, 91(61.6%) respondents were dentists and 68(42.76%) were dental students. The knowledge of dentists with regard to this question was found to be significantly higher than dental students. (**p value:0.001**)

**First outbreak in the world**

A total of 80(43.4%) participants that included 52(65%) dentists and 28(35%) dental students correctly responded that it was in Malaysia. There was a statistically significant difference between dentists and dental students with regard to knowledge about this question (**p value: 0.002**)

**Most Recent Outbreak in India:** Majority of the participants 137(74.4%) were aware of the most recent outbreak in Kerala, out of which, 78(56.9%) were dentists and 59(43.06%) were dental students. The dentists were found to have better knowledge than dental students with regard to this question as well. (**p value: 0.029**)

**Previous outbreak of Nipah in India (Chart 4):**

Out of the total 184 respondents, only 97 (52.7%), which included 50 dentists and 47 dental students, knew that there has been a previous outbreak in India. There was no statistically significant difference between dentists and dental students with regard to knowledge about this question (**p value: 0.858**).
**Main Reservoir Host of the Organism:** Among respondents, 155 (84.2%) participants correctly identified bats to be the main reservoir hosts of Nipah virus among which, 86 (55.4%) respondents were dentists and 69 (44.5%) respondents were dental students. Among those who responded correctly, there was a slight statistically significant difference between dentists and dental students \((P \text{ value: } 0.041)\).

**Average incubation period of the organism (Chart 4):** 72 respondents (39.6%) responded correctly that it is 4-14 days. There was no statistically significant difference between dentists and dental students \((P \text{ value: } 0.051)\).

**Main diagnostic test:** 100 (54.3%) participants correctly responded that it was ELISA and PCR tests. Out of this, 63 (63%) were dentists and 37 (37%) were dental students. Dentists were found to have significantly higher knowledge than dental students on this question \((P \text{ value: } 0.001)\).

**Vaccines to prevent Nipah infection:** For this, majority, 124 (67.3%) participants knew about the lack of such vaccines. Among those who responded correctly, 69 (55.6%) were dentists and 54 (43.5%) were dental students. There was no statistically significant difference between dentists and dental students with regard to knowledge about this question \((P \text{ value: } 0.133)\).

**Main clinical manifestations:** The main clinical manifestations of Nipah are fever, myalgia, respiratory distress and encephalitis. Out of the total 184 participants, 112 (60.8%) participants which included 68 (60.7%) dentists and 44 (39.3%) dental students responded correctly. Dentists were found to have a significantly higher knowledge about the various clinical features than dental students \((P \text{ value: } 0.004)\).

**The fatal complication of Nipah:** Out of 184 participants, 122 (66.3%) participants knew that encephalitis was the fatal complication of Nipah. Out of this, 74 (60.6%) were dentists and 46 (37.7%) were dental students. This question showed a statistically significant difference between dentists and dental students \((P \text{ value: } 0.001)\).

**Possibility of Nipah transmission through saliva:** When asked if Nipah could be transmitted through saliva it was found that most of the participants 132 (71.7%), including 69 (52.3%) dentists and 63 (47.7%) dental students were aware of such a possibility. There was no statistically significant difference between dentists and dental students with regard to knowledge about this question \((P \text{ value: } 0.966)\).

**Role of frequent hand washing and disinfection in limiting spread of Nipah:** The responses indicated that majority \([143(77.7%)]\) of the participants were aware about the importance of hand washing and disinfection in protection against Nipah. There was no statistically significant difference between dentists and dental students with regard to this question \((P \text{ value: } 0.234)\).

**The case fatality rate of Nipah infection:** Out of the total 184 participants, 76 (41.3%) respondents were aware that it was 40-70%. There was no statistically significant difference between dentists and dental students with regard to this question \((P \text{ value: } 0.623)\).

**Possibility of relapse in Nipah infection:** For this, out of the total 184 participants, majority \([107(58.2%)\]) of the participants, including 55 (51.4%) dentists and 52 (48.6%) dental students were aware of such a possibility. There was no statistically significant difference between dentists and dental students with regard to knowledge about this question \((P \text{ value: } 0.806)\).

**Mean overall score (Chart 6):** The mean overall score for each candidate ± standard deviation was calculated and based on this, the mean overall knowledge of dentists and dental students was analysed and it was 10.8 ± 2.6 for dentists and 8.9 ± 3.0 for dental students and it was thus inferred that there was a statistically significant difference between dentists and dental students \((P \text{ value: } 0.0005)\).
Chart 1: Group distribution (dentists and dental students)

Chart 2: Distribution of respondents based on whether they have heard about Nipah previously

Chart 3: Distribution of the various sources of information among dentists and dental students
Charts 4 and 5: The charts given above represent the distribution of the question-wise correct responses given by dentists and dental students. The questions highlighted in yellow showed a high statistically significant difference between dentists and dental students with regard to that particular question. Those highlighted in green showed a slight statistically significant difference between the two groups. The remaining questions showed no statistically significant difference between dentists and dental students.

Chart 6: Comparison of the mean overall score between dentists and dental students.
Discussion

This study shows the knowledge and awareness level about Nipah infection among 100 dentists and 100 dental students. 8% of the participants had never heard of Nipah and were excluded from knowledge assessment. This could indicate the need for awareness about Nipah infection. To our knowledge, there is no similar study in literature to test the knowledge about Nipah infection among dental students and dentists.

In our study, social media and television were the dominant sources of information among both dentists as well as dental students which possibly indicates the direction for communication of urgent information and guidelines in future. In a study on awareness regarding Nipah infection among health-care workers in a Medical College Hospital in Kerala by Varghese et al., newspapers were the most common source of information.

In our study, 86.4% appeared to know about Nipah being a viral infection. This was similar to a study done by Binub K in 2019 among medical students of Malappuram District where a higher proportion (95%) of the study population knew that Nipah was a viral infection, probably because the study was done in the same area where there was a recent Nipah outbreak and also because it was done among medical rather than dental students.

In our study, less than 50% were aware that it was first discovered in Malaysia and about a previous outbreak in India. In contrast to this, other studies have shown between 60% to 83.5% of the participants knew about previous outbreaks. In our study, 74.4% of the study population knew about its recent outbreak in Kerala while in other studies, it was reported as 94%.

In our study, majority (84.2%) were aware that bats were the reservoir hosts. Other studies showed lower numbers- 40% and 72% of the participants to be aware about the reservoir host of Nipah. Less than 40% of the participants knew about the average incubation period of Nipah in our study. A previously done study showed that 66% of the participants knew the right answer. In our study, 54.3% of the participants knew about the confirmatory tests for Nipah. An even lesser number of the study population (44%) knew about the confirmatory tests in another study. In our study, more than half of the participants knew that no vaccines/medications were available to prevent Nipah infection.

The most prominent clinical picture is that of fever, myalgia, respiratory distress and encephalitis with encephalitis being the fatal complication. Over 60% of the participants in our study were aware of this. The correct responses in earlier studies also ranged from 60-70%. In our study 66.3% were aware that encephalitis was the fatal complication of Nipah infection. Another study showed only 37% of the participants knew about this.

In this study, over 70% of the population was aware that Nipah has the potential to be transmitted through saliva. In our study only 31.5% of the participants had knowledge about the use of Ribavarin to control Nipah infection. In contrast to this, a previous study had 67% participants who were aware of this. In this study, 79.3% of the participants were aware that the use of personal protection equipment. However, studies done in the past had 90 to 95% participants who were aware of the correct answer.

In our study, only 77.7% were of the opinion that frequent hand washing and disinfection of equipment can contribute to reducing spread of Nipah. In the study by Varghese et al., 85% knew that maintaining proper hand hygiene can help to limit the spread of Nipah. In our study, only 41.3% of the participants knew the case fatality rate of Nipah infection. Similarly, only 37% of the participants in the study by Binub K had knowledge about this. In our study, 51.2% were aware about the possibility that Nipah infection could relapse.

The Dental surgeons had considerably more knowledge and better awareness about the etiology, clinical features, transmission potential, prevention and management of Nipah infection as compared to dental students, highlighting the need to educate dental students periodically about prevalent epidemics and their implications in dental practice.

Conclusion

Nipah Virus is a deadly infection with a high case fatality rate and it is imperative for health professionals to be aware of the prevailing health epidemics not just in their locality but also those at a global level. Nipah infection is of particular interest to dentists as it is an infection that can be transmitted through saliva. Our study is one of the first of its kind to evaluate the knowledge and awareness about Nipah virus infection among dental professionals. Dentists must therefore protect themselves and all those in the dental operatory
by deferring treatment for suspected cases. Considering the nonspecific initial symptoms of Nipah infection, adequate knowledge regarding this disease could be crucial in dealing with suspected cases in the dental operatory. Continuing education programs should be conducted among dental professionals and students to improve awareness as well as to ensure protection of personnel and prevent spread of infection.

**Ethical Clearance:** Obtained from Institutional ethics committee of Dr. MGR Educational and research institute, Chennai.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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1. Nipah virus [Internet]. Available from: https://www.who.int/news-room/fact-sheets/detail/nipah-virus
Factors Influencing Nutritional Status of Children Attending Integrated Child Development Services (ICDS) Programme: A Study on Kamrup District of Assam

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Abstract

Children are the most valuable asset of a nation; their good nutrition is the cornerstone for survival, health and development for current and succeeding generations which guarantee the sound and sustained economic development. The nutritional status of children impacts their health, cognition and educational achievements. But underweight and malnutrition are most prominent in India (According to NFHS-3 & NFHS-4). Therefore, government of India has initiated several schemes to develop the health status of people including the children on priority. Integrated Child Development Services (ICDS) programme, which was launched in 1975 with target to prevent the incidence of severe malnutrition of children under the age of 6 years in the country. This scheme also includes pregnant women, nursing mothers and adolescent girls in close combination with the health services for the improvement of health status and overall development of children and other beneficiaries. As a standard practice, it is expected that the proposed objectives of ICDS should be achieved; it is only the monitoring and evaluation which reflects the clear picture of the reality/situation at the ground level. The present study has made an attempt to examine the factor influencing nutritional status of children attending ICDS programme. This study may be able to provide a baseline data in effective implementation of the ICDS programme and improvement of nutritional status of children in future.

Keywords: Child nutrition, Health status, malnutrition, Growth, Development, ICDS, Kamrup.

Introduction

The most valuable asset of a nation is children; their good nutritional status impacts on cognition, health and educational attainment. In India, 20 per cent of children under five years of age suffer from wasting due to acute under nutrition; more than one third of the world’s children who are wasted live in India and has recorded the highest number of low birth weight babies per year at an estimated 7.4 million. Indian constitution were made provision for the improvement of nutritional status and standard of living of people. In India, people are facing problems mainly on famines, inadequate food supply, florid nutritional deficiency disorders, malnutrition, high infant mortality rate, illiteracy, ignorance, lack of awareness etc. Thus, to eliminate these problems and to raise welfare of the people, the Government of India has launched many programmes and schemes. Integrated Child Development Services (ICDS) Scheme aims at adopting an integrated approach to contributing towards human resource development and variety of socio-economic problems affecting both child and mother. The target group of ICDS is not only the population of Scheduled Castes(SC) and the Scheduled Tribes (ST), but also other people living below the poverty line and also include those people who needed to be protected from all kinds of injustice. Thus, Government of India has launched a unique, comprehensive and integrated programme for early childhood care and development and named it as “The Integrated Child Development Services (ICDS)”. The main motive behind the introduction of ICDS scheme is to enhance all round development of the children, especially for the weaker and most vulnerable sections of the society.

The ICDS scheme launched in 1975 including children, pregnant women, nursing mothers and adolescent girls in close combination with the health services for the improvement of health status and overall development of children and other beneficiaries.
**ICDS Beneficiaries and services:** The beneficiaries’ are:

- Children below 6 years,
- Pregnant and lactating women,
- Adolescent girls,
- Other women in the age group 15-45 years.

**Services:** The services provided under ICDS scheme are:

- Supplementary nutrition
- Pre-school non-formal education
- Nutrition & health awareness
- Immunization
- Medical check-ups
- Referral services

In Assam, ICDS scheme was introduced in the year 1975 in Dhakuakhana Development Block on experimental basis, along with 32 other blocks in the country. According to Integrated Child Development Service (ICDS) Scheme report 2012-13, the State APIP for Assam has been expanded to 223 blocks comprising 230 projects and 58,118 AWCs are in operation till 31st March of 2012. According to Census 2011, it is found that 26,395 numbers of villages of the state have AWCs.

**Statement of the Problem:** According to National Family Health Survey report, underweight and malnutrition are most prominent in India. The percentage of underweight children in India is 35.7 percent. Many schemes are developed to improve the health status of people. ICDS is launched to overcome the problem of malnutrition among children in the age group of 0-6 years. Although the ICDS programme appears to be well-designed and well-placed to address the multidimensional causes of malnutrition in India but there are several mismatches between the programme’s design and its actual implementation. Therefore, an attempt has been made to study on the factors affecting nutritional status of children attending ICDS programme.

**Objective:** To find out the factors influencing nutritional status of the children.

**Methodology:** The present study is based on both primary as well as secondary data. The secondary data are collected from different government reports and organizations. The main sources of secondary data are— The Department of Social Welfare, Government of Assam, National Family Health Survey -3 (NFHS-3), National Family Health Survey - 4 (NFHS-4), Census reports, Health and family welfare reports, Statistical Handbook of Assam, Nutrition Policy reports of Government of India etc.

The primary data are collected through sample survey. The samples are drawn by following multistage sampling technique, both random and purposive. The sample design involves the following stages:

**Selection of District:** This research study was conducted in Kamrup district, which is selected purposively. It is a pioneer district to have this project. From the secondary sources it has been observed that the nutritional status of children in Kamrup district is not very satisfactory. The stunted rate, wasted rate, severely wasted rate and underweight rate is higher in Kamrup district in comparison to many other districts of Assam. Therefore, Kamrup district is selected for conducting the present study.

**Selection of Development Blocks:** In Kamrup District, there are 17 developmental blocks and out of these 17 development blocks 5 blocks are selected randomly for the purpose of the study.

**Selection of Sample Villages:** From the selected development blocks, 4 villages are selected from each development block. Therefore, a total of 20 villages are selected for the study. The total number of villages of each Block is available on statistical hand book. The villages are selected through lottery method of random sampling.

**Selection of Anganwadi Centre:** From the selected 20 sample villages, 20 Anganwadi Centers are selected for the study one from each village.

**Selection of Beneficiaries:** The total number of beneficiaries in 20 AWCs is 312. Out of these 312 beneficiaries, 50% beneficiaries i.e. 156 beneficiaries are selected randomly for the purpose of the study.

**Method**

Weight-for-age is an indicator that is used to assess the nutritional status of children. According to WHO, this indicator is most prominent because it is caused by lack of nutritious food. Therefore, in the present study growth evaluation has been done by using weight-for-
age indicator with the help of growth chart. It provides a measure of extent of under-nutrition in the community. Directorate of Social Welfare and in collaboration with UNICEF has introduced three growth monitoring measure of children through ICDS scheme by AWWs. The nutritional status of the children is categorized as:

- normally weighted (denoted by green colour)
- moderately underweight (denoted by yellow colour)
- severely underweighted (denoted by orange colour)

The norms and standard of these three categories can be classified as:

| Table 1: Measurement of Nutritional Status of Children from birth to 5 years |
|-----------------------------|-----------------------------|-----------------------------|
| Age            | Normally Weighted (in Kg) | Moderately Under Weighted (in Kg) | Severely Under Weighted (in Kg) |
| 0-1 year       | 2.5 to 9                   | 2 to 7                       | 1 to 6.3                      |
| 1-2 years      | 9 to 11.5                  | 7 to 9                       | 6.3 to 8                     |
| 2-3 years      | 11.5 to 14                 | 9 to 10                      | 8 to 9                       |
| 3-4 years      | 14 to 16                   | 10 to 12                     | 9 to 10                      |
| 4-5 years      | 16 to 18                   | 12 to 13                     | 10 to 12                     |

In order to identify the different factors influencing the nutritional status of children, multinomial logistic regression is used. When the dependent variable is categorical in nature, it is not possible to use formal regression statistical tests like multiple regression. This calls for use of other tests such as logistic regression which is also known as binomial logistic regression which predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable. Multinomial logistic regression is an extension of the binomial logistic regression, and is used to predict a nominal dependent variable given one or more independent variable. In the present study, the dependent variable (nutritional status of the children) is divided into three categories: normally weighted, moderately underweight and severely underweight. So, multinomial logistic regression is used to study the factors influencing nutritional status of children.

The Multinomial Logistic Regression model for determining the nutritional status of children is as follows:

\[ Y_i = B X_i + e_i \]

Where, \( Y_i \) is the dependent variable, named nutritional status measured by the weight of the children having three categories – normally weighted, moderately underweight and severely underweight. The categories are taken as 2, 1 and 0 respectively.

\( X_i \) is the vector of independent variables.

\( B \) represents co-efficient of independent variables.

\( e_i \) is the error term.

**Results and Discussions**

In the present study, multinomial logistic regression model is used to study the various factors determining the nutritional status of children. For this, nutritional status of children is taken as dependent variable which is categorized into following three categories:

Based on the review of literature the following independent variables are included in the analysis:

\[
\text{Nutritional status} = \begin{cases} 
0 & \text{Severe} \\
1 & \text{Moderate} \\
2 & \text{Normal}
\end{cases}
\]
Description of Independent Variables used in the model:

Table 2: Coding of the Independent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RELIGION (R)</td>
<td>0 = Hindu</td>
</tr>
<tr>
<td></td>
<td>1 = Otherwise</td>
</tr>
<tr>
<td>2. CASTE (C)</td>
<td>0 = General</td>
</tr>
<tr>
<td></td>
<td>1 = Otherwise</td>
</tr>
<tr>
<td>3. FAMILY TYPE (FT)</td>
<td>0 = Nuclear</td>
</tr>
<tr>
<td></td>
<td>1 = Joint</td>
</tr>
<tr>
<td>4. MOTHER’S EDUCATION (ME)</td>
<td>Continuous (in Years of Schooling)</td>
</tr>
<tr>
<td>5. FATHER’S EDUCATION (FE)</td>
<td>Continuous (in Years of Schooling)</td>
</tr>
<tr>
<td>6. MOTHER’S EMPLOYMENT STATUS (MEM)</td>
<td>0 = Unemployed</td>
</tr>
<tr>
<td></td>
<td>1 = Employed</td>
</tr>
<tr>
<td>7. FATHER’S EMPLOYMENT STATUS (FEM)</td>
<td>0 = Primary</td>
</tr>
<tr>
<td></td>
<td>1 = Otherwise</td>
</tr>
<tr>
<td>8. MONTHLY HOUSEHOLD INCOME (MHI)</td>
<td>Continuous (in 1000 Rupees)</td>
</tr>
<tr>
<td>9. PRE-SCHOOL EDUCATION (PSE)</td>
<td>0 = Regularly attend</td>
</tr>
<tr>
<td></td>
<td>1 = Not attend</td>
</tr>
<tr>
<td>10. SUPPLEMENTARY NUTRITION SERVICE (SN)</td>
<td>0 = Fully availed</td>
</tr>
<tr>
<td></td>
<td>1 = Not availed</td>
</tr>
<tr>
<td>11. IMMUNIZATION (I)</td>
<td>0 = Fully immunized</td>
</tr>
<tr>
<td></td>
<td>1 = Not immunized</td>
</tr>
</tbody>
</table>

Result of Multinomial Logistic Regression Model:

Table 3: RC: Severe

<table>
<thead>
<tr>
<th>Variables</th>
<th>Normal B</th>
<th>Exp (B)</th>
<th>Moderate B</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (HINDU) [RC : Otherwise]</td>
<td>1.274</td>
<td>3.575</td>
<td>.137</td>
<td>1.147</td>
</tr>
<tr>
<td>C (GENERAL) [RC : Otherwise]</td>
<td>5.281</td>
<td>196.566</td>
<td>1.345</td>
<td>3.838</td>
</tr>
<tr>
<td>FT (NUCLEAR) [RC : JOINT]</td>
<td>2.531</td>
<td>12.566</td>
<td>1.649</td>
<td>5.202</td>
</tr>
<tr>
<td>ME</td>
<td>1.003</td>
<td>2.726</td>
<td>.245**</td>
<td>1.278</td>
</tr>
<tr>
<td>FE</td>
<td>.321</td>
<td>1.379</td>
<td>1.014**</td>
<td>2.757</td>
</tr>
<tr>
<td>MEM (UNEMPLOYED) [RC : EMPLOYED]</td>
<td>-3.213</td>
<td>.040</td>
<td>-2.001</td>
<td>.135</td>
</tr>
<tr>
<td>FEM (PRIMARY) [RC : Otherwise]</td>
<td>-.206**</td>
<td>.814</td>
<td>-3.516*</td>
<td>0.029</td>
</tr>
<tr>
<td>MHI</td>
<td>4.102**</td>
<td>60.461</td>
<td>1.541</td>
<td>4.669</td>
</tr>
<tr>
<td>PSE (REGULARLY ATTEND) [RC : NOT ATTEND]</td>
<td>3.262</td>
<td>26.102</td>
<td>3.006**</td>
<td>20.206</td>
</tr>
<tr>
<td>SN (FULLY AVAILED) [RC : NOT AVAILED]</td>
<td>1.001**</td>
<td>2.721</td>
<td>0.523</td>
<td>1.687</td>
</tr>
<tr>
<td>I (FULLY IMMUNIZED) [RC : NOT IMMUNIZED]</td>
<td>0.023</td>
<td>1.023</td>
<td>1.462</td>
<td>4.315</td>
</tr>
<tr>
<td>Intercept</td>
<td>-.107</td>
<td>-</td>
<td>-1.277</td>
<td>-</td>
</tr>
</tbody>
</table>

***p<0.01 **p<0.05 *p=0.10 RC- Reference Category, Cox and Snell $R^2 = .756$, Nagelkerke $R^2 = .895$, Goodness of fit (Chi-square) = 220.276 (not significant)

As shown in the above table ‘severely underweighted’ children are taken as the reference category. The estimated model compares ‘normally weighted’ children in reference to ‘severely underweighted’ and ‘moderately underweighted’ children in reference to ‘severely underweighted’ children. Based on the significance level of the Wald statistics it is found that in case of ‘normally weighted’ in reference to ‘severely underweighted’, three variables came out to be significant at 5 percent namely, husband’s employment, household monthly
income and supplementary nutrition service. Again, in case of ‘moderately underweighted’ in reference to ‘severely underweighted’, mother’s education, father’s education and pre-school education came out to be significant at 5 percent while father’s employment came out to be significant at 10 percent.

Factors affecting ‘normally weighted’ children in reference to ‘severely underweighted’ children: The β coefficient of father’s employment reveals that other variables remaining constant, having father who work in the primary sector is associated with a 0.206 decrease in the relative log odds of having normally weighted children than severely underweighted children. The odds ratio of father’s employment is 0.814. This indicates that controlling for other variables; children whose father works in the primary sector are .814 times less likely to have normally weighted children than severely underweighted children compared to those whose father are not engaged in the primary sector.

The β coefficient of household monthly income reveals that other variables remaining constant, increase in household income by 1000 rupees is associated with a 4.102 increase in the relative log odds of having normally weighted children than severely weighted children. The odds ratio of household monthly income is 60.461. This indicates that controlling for other variables; with increase in household monthly income, children are 60.461 times more likely to become normally weighted than severely underweighted.

The β coefficient of supplementary nutritional service reveals that other variables remaining constant, full availability of supplementary nutritional service is associated with a 1.001 increase in the relative log odds of having normally weighted children than severely weighted children. The odds ratio of supplementary nutritional service is 2.721. This indicates that controlling for other variables; children who have been availed full supplementary nutritional services are 2.721 times more likely to become normally weighted children than severely underweighted compared to those who have not been availed full supplementary nutritional service.

Factors affecting ‘moderately underweighted’ children in reference to ‘severely underweighted’ children: The β coefficient of pre-school education reveals that other variables remaining constant, regularly attending pre-school educationis associated with a 3.006 increase in the relative log odds of having moderately weighted children than severely weighted children. The odds ratio of pre-school education is 20.206. This indicates that controlling for other variables; children who regularly attending pre-school education is 20.206 times more likely to become moderately weighted than severely underweighted than those who don’t attend pre-school education regularly.

The β coefficient of mother’s education reveals that other variables remaining constant, increase in mother’s education by one unit is associated with a 0.245 increase in the relative log odds of having moderately weighted children than severely underweighted children. The odds ratio of mother’s education is 1.278. This indicates that controlling for other variables; with increase in years of schooling of mothers, children are 1.278 times more likely to become moderately weighted than severely underweighted.

The β coefficient of father’s education reveals that other variables remaining constant, increase in father’s education by one unit is associated with a 1.014 increase in the relative log odds of having moderately weighted children than severely weighted children. The odds ratio of father’s education is 2.757. This indicates that controlling for other variables; with increase in years of schooling of fathers, children are 2.757 times more likely to become moderately underweighted than severely underweighted.

The β coefficient of father’s employment reveals that other variables remaining constant, having father who works in the primary sector is associated with a 3.516 decrease in the relative log odds of having moderately underweighted children than severely underweighted children. The odds ratio of father’s employment is 0.029. This indicates that controlling for other variables; children whose father works in the primary sector are .029 times less likely to become moderately underweighted than severely underweighted compared to those whose fathers are not engaged in the primary sector.

Conclusion

The present study is an attempt to explore the nutritional status of children & its various determinants. The study reveals that various socio-economic factors like parents education, employment status, household monthly income have a significant impact on the nutritional status of childrens. Again, apart from it, the study also shows that ICDS programme influence the nutritional status of children. The present study found
that the supplementary nutrition service and pre-school education programme under ICDS scheme is positively related to the nutritional status of children which is statistically proved.

**Ethical Clearance:** It is a review article.

**Source of Fund:** Self

**Conflict of Interest:** Nil

**Reference**

Cultural Factors Affecting the Spread of HIV/AIDS among the Women in Jaintia Hills, Meghalaya

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Abstract

Despite years of study and lack of empirical evidence, assumptions about culture as a co-factor in the spread of HIV/AIDS still persist. In recent years, more and more ideas about cultural causality have been called into question, and often disproved by studies. Thus, in light of new evidence, socio cultural causes of the disease, is both warranted and long overdue. The overall objective of this paper is to unravel the socio-cultural factors contributing to the spread of HIV/AIDS among the Jaintia women of Meghalaya. The study adopted mixed research methodology, both qualitative and quantitative. The research designs employed were explorative, descriptive and contextual. The findings revealed that social cultural factors which include gender issues, violence, presence of risk beahviours, stigma and discrimination lead to HIV infection in the study area. Other issues which emerged include lack of information about HIV/AIDS, poverty, unsafe sexual practices, ignorance and cultural beliefs.

Keywords: Socio-cultural factors, HIV/AIDS, Jaintia Women, Meghalaya.

Introduction

The role of socio-cultural factors in the fight against HIV/AIDS has been the subject of much research in the last decade.\textsuperscript{1} Culture varies in different parts of the world and is one of the many reasons influencing human behavior, value systems, credences, and practical erudition. It is deeply rooted in all aspects of a society, including local perceptions of health and illness seeking behaviours. However, in the broader sense, it includes traditions and local practices, taboos, religious affiliations, gender roles, marriage and kinship patterns, and so forth.\textsuperscript{2} From this, it is clear that it influences attitudes and behaviours related to the HIV/AIDS epidemic: risk of contracting HIV, access to treatment and care, shaping gender relations and roles that put women and men at risk of infection, being supportive towards or discriminating against people living with HIV/AIDS and their families, etc. It encompasses all duties, rights and behaviours a culture considers appropriate for men and women. Hence, in social invention gender gives us a sense of personal identity as male or female. This creates notions of masculinity and feminity which in turn brings unequal power relations between men and women. Moreover, cultural norms prevent them from seeking information or admitting their lack of knowledge about sex or method of protection. To contextualize this even more, there is an unequal balance of power between men and their sexual partners – an imbalance whose detrimental effects have resulted in women becoming the face of HIV/AIDS. Lack of power by women in relationships means that they have very limited decision-making abilities in the relationship and are unable to negotiate safer sex and therefore risk infection to please the men.

Young women and adolescent girls aged 15-24 years are particularly affected with HIV infection. Globally, in 2015 estimated 2.3 million adolescent girls and young women living with HIV, that constitute 60 per cent of all young people infected with HIV years.\textsuperscript{3} Several studies on HIV infection among the women between age group 15-49 years were conducted globally (for both men and women). In view of high prevalence of HIV infection among the women in reproductive and sexual active group and availability of limited information on HIV particularly among young women, the present study focused on the young women belonging to the age group.
15-35 years with the aim to understand various social and cultural factors that reinforce women’s vulnerability to HIV/AIDS.

**Materials and Method**

The present cross-sectional study was conducted amongst tribal women of Jaintia Hills, Meghalaya covering East and West Jaintia Hills districts. Data was collected from 320 women of all the five blocks (Thadlasken, Laskein, Amlarem, Saipung and Khlehriet) of East and West Jaintia Hills, Meghalaya (The sample size of 308 was calculated using online sample size calculator http://www.surveysystem.com/sscalc.htm, giving prevalence estimates with 95% confidence level and within 5% confidence interval for a total number of people living with HIV (PLHIV) in Meghalaya, which is 1,541., Meghalaya AIDS Control Society, 2014). All the participants belonged to the age group 15-35 years. Interview schedules, in-depth interviews, focus group interviews were used to collect data to understand the social and cultural factors behind the HIV/AIDS infection. Information was gathered regarding marriage pattern, gender issues, violence against women, risk behaviour, stigma and discrimination and the cultural beliefs. Data was collected by interacting with the women and building rapport by developing mutual trust with them. This was supplemented with living in the community, participating in their activities and constantly observing what the women actually do in specific situations.

**Results**

In the present study, the decision making power of the family regarding what to eat everyday varies in different families. It is observed that in majority of the families the women decides what to be cooked and which school their children should go. However, the decision regarding sex and use of condom in most of the cases is taken by the male partners (74%). The percentage of women having power over household chores is 61% and men is 39%. The Jaintia society of Meghalaya is commonly known as matrilineal where authority, title, inheritance, residence after marriage and succession are traced through the female line (mother or maternal ancestors). The decision of divorce depends on both women and men. It is observed that the percentage of men deciding on divorce is more as compared to that of women (men 60% and women 40%). The study revealed various reasons of divorce like refusing sex, unfaithfulness, HIV infection, failure to support family and violence against women. (Table 1).

<table>
<thead>
<tr>
<th>Parameters Decision on</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>1. Cooking</td>
<td>197</td>
<td>61</td>
</tr>
<tr>
<td>2. Children’s schooling</td>
<td>212</td>
<td>66</td>
</tr>
<tr>
<td>3. Having sex</td>
<td>84</td>
<td>26</td>
</tr>
<tr>
<td>4. Use of condom</td>
<td>84</td>
<td>26</td>
</tr>
<tr>
<td>5. Household chores</td>
<td>194</td>
<td>61</td>
</tr>
<tr>
<td>6. Divorce</td>
<td>127</td>
<td>40</td>
</tr>
<tr>
<td>7. Inheritance of property</td>
<td>320</td>
<td>100</td>
</tr>
</tbody>
</table>

Moreover, the study also highlighted several forms of violence against women in Jaintia Hills, Meghalaya. It was found that the Jaintia women do not consider the harmful behavior by men as violence because these acts are considered to be normal in their society and they occur so often that they seem normal. The overall percentage of Jaintia women under study who faced violence of any form is 94%. In some cases, this has led to low self esteem, depression, and some women were even suicidal. There are few cases where the Jaintia women equally abuse their husband and physically assault them. In the present study 4% of the women agreed that they have had hit their husband when they come home drunk and start getting abusive and violent. (Fig. 1).
Another form of violence against women in Jaintia tribal society is to cope with an alcoholic husband who drinks away half his salary, comes home to inflict violence on his wife and children and then dies prematurely leaving his family to eke out a desperate living for themselves. The trauma of being members of a society where marriage is so brittle is that women often remarry with the hope that the second time they would be lucky to find a man who would look after their mental, physical and financial needs. Hence, their children from the first marriage are forced to accept a stepfather in their life. The study also revealed that in many cases the stepfather rape the stepdaughter.

The other kind of violence is the women having no control over their wombs and how many children they wish to have. Several women reported that in the different villages of Jaintia Hills, the women think they can keep their husbands only if they have unlimited sexual relationship. As a result, women have as many as seven, eight or ten children. They are poor and are unable to give each child proper food and education.

Early marriage severely increases young girls’ vulnerability to HIV as they are most likely to be forced into having sexual relationship with their (usually much older) husbands. Young girls have softer vaginal membranes which are more prone to tear, especially on coercion, making them susceptible to HIV and other STIs. Older husbands are more likely to be sexually experienced and HIV infected. The dramatic rise in young married girls’ exposure to unprotected sex is driven by pressure to bear children and their inability to negotiate safe sex. The significant age gap in spouses also further intensifies the power differential between husband and wife, which in turn discourages the open communication required to ensure uptake of voluntary counseling and testing for HIV, sharing test results and planning for safe sexual relations throughout the marriage. The Jaintia women are victims of early marriages which make them vulnerable to the disease. In the present study, the total number of early marriages i.e. before 18 years (legal age at marriage) amongst the Jaintia women is 46. The percentage of married women at the age of 15 years, 16 years, and 17 years is 4.3%, 6.5% and 3.4% respectively. (Fig. 2).

Risk behaviors among the Jaintia tribal women include unprotected sex and multiple sex partners. It was found in the study population that married couples never use condoms because of reproductive purposes. Furthermore, there was lack of knowledge regarding the use of condoms indicating their level of ignorance. Some women believed that continuous use of condoms was a sign of lack of trust or love. Married women had no decision on safe sex though they knew that their husbands have extramarital relationship. Risk behaviours such as having multiple partners increases HIV/AIDS infection in the community. (Fig. 3).
who are infected with HIV/AIDS are reluctant to adopt behaviour that might signal their HIV-positive status to others. So, it was observed in the present study that married HIV-positive men do not use a condom to have sex with his wife; an HIV-positive mother continues to breastfeed her baby. It was also found in the present study that people do not want to get tested for HIV/AIDS fearing that they might be diagnosed with HIV and that would lead to the discrimination in their society. It was reported that 61% women agreed that if a person is infected with HIV/AIDS they should be expelled from the community and be ashamed of themselves. They should not stay in the community as other people will get infected by them. For the betterment of the community, these people should leave the pleasures of family life. (Fig. 4).

![Stigma and discrimination related to HIV/AIDS among the Jaintia women](image)

**Fig. 4: Showing the stigma and discrimination related to HIV/AIDS among the Jaintia women**

Among the Jaintia women, certain prevalent cultural norms and practices related to sexuality contribute to the risk of HIV infection. For instance, negative attitudes towards condoms, as well as difficulties negotiating and following through with their use. Condoms also have strong associations of unfaithfulness, lack of trust and love, and disease in the study area. The importance of fertility among them hinders the practice of safer sex. Young women under pressure to prove their fertility prior to marriage become pregnant and therefore do not use condoms or abstain from sex. Every family has many children which are also seen as a sign of virile masculinity among the men of Jaintia Hills. Men tend to have more sexual partners and to use the services of sex workers. Urbanisation and migrant labour expose the Jaintia to a variety of new cultural influences, with the result that traditional and modern values often co-exist. Therefore, traditional values that could serve to protect people from HIV infection, such as abstinence from sex before marriage, are being eroded by cultural modernisation.

**Discussion**

This paper sought to ascertain the socio cultural factors facilitating HIV/AIDS among the women of Jaintia hills, Meghalaya. Unsafe sexual practices have been considered the main cause of HIV transmission worldwide. In the present study, none of the women were found to be using condoms when having sexual intercourse with their partners. Previous studies also reported unpopularity of HIV-preventive method like use of condom, among sexual partners, suggesting that people do not view them as source of HIV risk. The study suggested that young women may be entering into sexual relationships without full knowledge that their partners have other relationships or that they know but want to solicit some benefits from these extra partners, such as money or gifts. Such multiple sexual relationships are very conducive to the spread of STIs, especially HIV. The findings are consistent with the previous studies on youths. Another study revealed the prevalence of multiple concurrent partnerships among the sexually active university students. Domestic violence and sexual abuse are important correlates of HIV risk especially among women. World Health Organization has defined domestic violence as physical abuse (e.g. slaps, punches, kicks, assaults with a weapon, homicide), emotional verbal and psychological abuse e.g. belittling the woman, preventing her from seeing family and friends, intimidation, withholding resources, preventing her from working or confiscating her earnings) and sexual abuse (e.g. rape, coercion and abuse includes use of physical force, verbal threats, and harassment to have sex, unwanted touching or physical advances, forced participation in pornography or other degrading acts that often persist over time and are accompanied by threats on part of the perpetrator). Various studies have reported that the women lacked the ability to control sexual activities (including condom use) making them powerless in abusive relationships with HIV-positive men leading to high HIV risk behavior and abstaining the infected to obtain treatment for HIV/AIDS. The prevalence of violence was reported by 94% of the women, posing a risk to studied population for HIV infection.

Despite of the presence of HIV risk behaviors, the personal perception of HIV risk was found to be only 8% amongst the women of the present population. Although
one percent of women thought that their partner’s sexual behavior put them at risk of HIV infection. Similar findings have been reported among general population as well as high HIV risk groups like MSM and black Africans suggesting it as a major health issue. Studies have reported that a relatively good awareness of HIV did not always translate to a perception of individual risk, possibly because of lack of symptoms, assumptions about monogamy or a lack of acknowledgement of risky behaviours. This added to the reasons of low perception among the currently studied population. Low risk perception was found to be a barrier to HIV testing in many previous studies.

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Ethical Clearance: Taken from Ethical Clearance Committee of Amity University, Noida, U.P.

Conflict of Interest: Nil

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Mobile Learning among Physiotherapy Undergraduates: An Evaluation of Current Status, Dispositions and Performance

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Abstract
Mobile phones have become an almost essential part of daily life since their inception. They offer a lot of advantages especially offering participatory learning for the students. Their ability to provide learning apparatuses beyond the time and space dimension makes them all the more acceptable for current millennial generation. Thus this study tries to find out whether physiotherapy students are inclined towards the usage of mobile leaning and how is it affecting their academic performance.

Method: The study was conducted on 120 Bachelor of Physiotherapy students who were using smart phones from at least a year through a self reported questionnaire.

Result: Majority of the participants perceived m learning as advantageous though there were some disadvantages and barriers perceived as well. As anticipated, both by users and from the literature, universal internet access and screen size were a major limitation to device use.

Conclusion: M-learning devices can have a positive impact on the learning experiences of physiotherapy students. The results supported the feasibility of providing mLearning devices to support learning. However, universal internet and screen size are the fundamental limitation to optimal device utilization.

Keywords: Mobile learning, Physiotherapy students, Learning and study skills, Information and communication technology.

Introduction
Information and communication technology (ICT) is a ground-breaking technique which offers the possibility to create imaginative learning methodologies by giving more extravagant chances and encounters to the present age of students.¹ Presenting ICT inside the learning condition expels conventional study hall boundaries, and gives online development, which therefore can improve the present understudy commitment.² It gives a spot where students cooperate and support each other as they use a collection of devices and learning resources to their greatest advantage of learning destinations and critical thinking exercises.³

Noteworthy changes in higher education including the medical sciences have occurred because of ceaseless imaginative movements.⁴

Studies indicate increasing utilization patterns of ICT among health care professionals and learners.⁴

One of the ICT tools which is seeing rapid advancement is mobile phone.

Mobile phones have become an almost essential part of daily life as well as necessary medium of communication since their rapid growth in popularity in late 1990s.⁵

These latest portable electronic gadgets (advanced cells, tablet PC) have been obscuring the learning limits among study hall and home, just as limits between the
idea of PC and cell phones. The utilization of PDA and tablet has been soaring for the last a couple of years. Youthful grown-ups having a place with this age in India spend all things considered of more than 2.2 hours daily on their PDAs. As needs be, this conduct should prompt change or adjustments in instructive practices by establishments in order to guarantee that they keep their students connected with and what’s more, give a quality learning knowledge just as administration that will both fulfill contemporary understudies and pull in new ones.

The multifunctional flexible advancement enable learners to get to the Web pervasively for finding and looking information, messaging, examining digital books, and in fact shopping. The flexibility has in addition enabled adapting free of region and whenever without a doubt out of classroom education option.

Portable advancements give an instructive stage that is dynamic, taking into account more development, and challenge. Their advantages are showed in various aspects of training, including shared learning among friends, setting explicit learning, and the assistance of a functioning, valuable learning process. Also, portable based learning gives information - based learning apparatuses that permit learning outside the study hall. Learning is flexible as far as space, i.e., it occurs at the workplace, at local, and at spots of unwinding; it is versatile between assorted scopes of life, i.e., it might identify with work demands, personal development, or unwinding; and it is convenient concerning time.

The capacities of compact devices and their wide setting of utilization add to their inclination to develop community oriented and total learning works out, enabling students to share data, records and messages in groups.

It additionally fills in as a connection among information and aptitude based practice by giving prompt access to learning, and accordingly improves clinical thinking abilities. It additionally, incomprehensibly, advances self-learning, joint effort and in particular security of the student.

An instructor can convey a fixed number of ideas inside a constrained time, most study hall exercises are restricted to just the underlying introduction of the subject and practice is dominantly left to the understudy to do as homework. Hence, there are no open doors for issue goals until the following class. This is ideal situation for the utilization of a portable application (App) outside the study hall, and which additionally gives a chance to an instructor to change his or her job from only an area master to that of an arbitrator of the substance.

Physiotherapy is a gifted social insurance discipline that utilizes development based answers for treatment of pathologies, debilitations and incapacities. Physiotherapy examination, determination, and arranging of treatment conventions requires the broad investigation of various conditions, their related patho-mechanics, and the appraisal and the executives of conditions utilizing the most recent helpful method, for which physiotherapists need to rehearse widely to sharpen their aptitudes. In like manner, physiotherapy understudies need introduction of learning past a formal, instructional methodology in the homeroom and with a broad spotlight more on viable sessions. Appropriately, it is basic that physiotherapy learning expand well past the customary study hall setting and include broad self-learning and practice, which can undoubtedly be met utilizing versatile application learning and which can spur students to focus on the data introduced and hold it better.

Despite of all the advantages there have been studies that reveal practical and social limitations towards the usage of such versatile devices. Thus through this study we are trying to gather feedback from the students about their experience while using m learning.

**Method**

**Aims:** This study aimed to evaluate the impact of m learning devices on student attributes and academic performance by gathering feedback from a group of students, in a naturalistic setting. The objectives of the study were:

1. To identify students perceived impact of m learning as an adjunct to learning.
2. To identify whether m learning devices have an impact on studying efficiency.
3. To identify the perceived influence of smartphone on academic performance
4. To identify any significant limitations to the use of devices.

**Sample, Data Collection and Study Period:** The study was conducted in October 2018 on 120 Bachelor of Physiotherapy students who were using smart phones from at least a year. After taking written consent
participants were given a statistically validated survey questionnaire that had 3 parts and contained a mixture of likekt scale questions assessing perceived advantages and disadvantages, simple yes/no responses and free text boxes framed after an extensive literature review.

Questionnaire consists of 2 parts:

• First part consisted of participant’s demographic data.
• Second part consisted of questions related to the effect of mobile phone on academic performance and perceived advantages and disadvantages
• Third part consisted of free text boxes explaining the barriers or limitations of mobile learning.

Analysis: A self-reported questionnaire, based on a review of the literature, was used to understand the opinions of undergraduate physiotherapy students towards the use of smartphones, their advantages, disadvantages, barriers and effects on academic performance. Data were compiled in an MS Office Excel spreadsheet.

Descriptive statistics were utilized to describe participants and the mobile devices benefits and barriers.

Results

Both male and female students of age between 18-25 years were surveyed.

Table 1: Smartphone using behavior

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variable</th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How often does the use of mobile phone helps to</td>
<td>13</td>
<td>36</td>
<td>52</td>
<td>19</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>learning specific topic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>how often does the use of mobile phone saves time</td>
<td>9</td>
<td>28</td>
<td>52</td>
<td>31</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>and facilitate learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>how often does the use of mobile phone improve the</td>
<td>13</td>
<td>34</td>
<td>50</td>
<td>23</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>quality of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>how often does the use of mobile phone helps to</td>
<td>0</td>
<td>29</td>
<td>33</td>
<td>58</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>find updated information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig 1

Fig 2
Table 2: Perceived Advantages

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>how often does the use of mobile phone helps to easily contact with teacher for studies</td>
<td>12</td>
<td>45</td>
<td>22</td>
<td>41</td>
<td>120</td>
</tr>
<tr>
<td>2.</td>
<td>how often does the use of mobile phone helps to easily contact to classmates to get help in studies</td>
<td>5</td>
<td>18</td>
<td>30</td>
<td>67</td>
<td>120</td>
</tr>
<tr>
<td>3.</td>
<td>How often does the use of smartphone for creation of time table and learning plans</td>
<td>37</td>
<td>48</td>
<td>27</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>4.</td>
<td>How often does the use of smartphone help to receive SMS reminder or project deadline</td>
<td>26</td>
<td>39</td>
<td>19</td>
<td>36</td>
<td>120</td>
</tr>
<tr>
<td>5.</td>
<td>how often does the use of mobile phone helps to doing assignments</td>
<td>3</td>
<td>39</td>
<td>38</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>6.</td>
<td>how often does the use of mobile phone help in Downloading study material</td>
<td>3</td>
<td>21</td>
<td>32</td>
<td>64</td>
<td>120</td>
</tr>
<tr>
<td>7.</td>
<td>How often you feel that your academic performance has been increased due to mobile phone</td>
<td>11</td>
<td>51</td>
<td>38</td>
<td>20</td>
<td>120</td>
</tr>
</tbody>
</table>

**Perceived Disadvantages:** Participants were asked a series of questions concerning the disadvantages of the use of mobile devise. Answers were rated on a 5 point Likert scale from Strongly disagree (1) to Strongly agree (5).

High cost of device (36%), accessibility of information due to absence of internet connection (39%), lack of proof of quality and accuracy of available apps (28%) and risk of accessibility of personal data (23%) are the major disadvantages of mobile usage.

**Limitations or Barriers in mobile learning:** Students indicated that the most commonly discussed
type of obstacle in mobile learning is the insufficient size of device screens (50%) followed by network accessibility (39%). 14% of the students also felt it as being a distracter. Learning style was discussed as a minor barrier that might affect management of mobile learning (2%).

Discussion

Education is impactful and a major vehicle for change in society\textsuperscript{17}, therefore should be imparted smartly.

Effective learning strategies can be developed by innovative and creative teaching method, which interestingly benefit both students and teachers alike, motivating them to learn innovate and retain knowledge more efficiently. It should make an observable change in the learner, and which leads to greater engagement, understanding and/or a measureable impact on student learning\textsuperscript{18-19}.

Mobile learning being one such ICT tool which is already deep rooted in the lives of current millennial generation and is helping by creating opportunities for the collaboration and eliminating barriers on and off the campus.\textsuperscript{20}

The advantages participants of our study have perceived are in consonance with H Amruta and her co authors who has beautifully explained that how m learning can bridge the distances in learners and how portability in learning has the capacity to hook the generation Y\textsuperscript{21, 22}.

Elia, 2011\textsuperscript{23}, Crescente and Lee, 2011\textsuperscript{24} claim that m learning helps in improving the literacy rate by increasing the participation rate and offering a learning stage in the user’s hand which supports our study well where our participants (69%) are too agreeing that m learning is helping in improving learning processes, thus their academic performance and saves time, also supported by findings of Blanka in 2015.\textsuperscript{25}

Thus, it seems that use of smartphone for academic purposes and for learning skills has the potential to help students to learn efficiently if it is carefully integrated into the classroom and outside the classroom. So according to their positive answer, we can assume that smartphone has positive effect on academic performance and learning skill among the students of physiotherapy.

Quicker access to the web is viewed as a noteworthy advantage of mLearning gadgets\textsuperscript{28} and even after expanded availability, our outcomes demonstrated understudies still felt restricted by web get to\textsuperscript{29}. These outcomes propose that web network in clinical spaces will assume a noteworthy job in limiting the capability of such gadgets for position based training and is referenced by Deutsch and partners (2016) as a key factor in arranging before usage of a m Learning program.\textsuperscript{30}

Therefore better planning, preparation, and updated policies would improve learning processes in the area of mobile learning.

Limitations: Given the setting, the research question and the naturalistic methodological approach the main limitation was the lack of control group. The anonymous nature of the questionnaire made it impossible to identify and followup the survey non-responders. The general is ability is also limited by performing the study at a single site. Finally, there is a danger of recall bias as students were asked to self-report their usage.

Conclusion

Physiotherapy students embrace mLearning devices for their academics. The devices had a positive effect on the perceived efficiency of students’ work. However, as is commonly reported elsewhere, small screen size and limited internet access mainly inhibit them to use them extensively.

Ethical Clearance: Taken from Institutional Ethical committee

Source of Funding: Self

Conflict of Interest: Nil

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Skin Lesion Classification Using Convolution Neural Networks

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Abstract

Skin cancer is one of the deadliest disease found in humans. These skin cancers are of various types like Basal Cell Carcinoma (BCC), Melanoma, Nevus, Seborrheic Keratosis (SK), Squamous Cell Carcinoma (SCC). Some of the skin cancers can be identified visually, but in order to diagnose a skin cancer patient should have to undergo for a biopsy test and it takes a long time to diagnose. To overcome this an automated skin lesion classification system has to be developed. In this work, a basic architecture of the Convolution Neural Network (CNN) model is used to classify different skin lesions. The proposed model achieved better accuracy for SCC Vs SK, BCC Vs SK, Melanoma Vs Nevus and Melanoma Vs SK are 0.9741, 0.9867, 0.9506 and 0.9734 respectively for 25 epochs when compared to the other related works.

Index Terms: Skin cancer, Basal Cell Carcinomsa, Melanoma, Nevus, Seborrheic Keratosis, Squamous Cell Carcinoma, CNN, Training Accuracy, Validation Accuracy.

Introduction

The occurrence of cancer has been increasing over the past 20 years. Cancers are of different types, one of the most common type of cancer is the skin cancer. A skin cancer may be of two types melanoma and non melanoma. Every year globally 1,32,000 melanoma and about 2 - 3 million non melanoma skin cancers are occurring[1]. Even though the skin cancers are visually identified, the diagnostic accuracy achieved by an unaided expert is around 60% only.

A modern technique of aided visual inspection is Dermoscopy, which magnifies both the skin and elements surface reflection. The skin cancer images are digitally acquired by using dermoscopic technique. These dermoscopic images are used as inputs to the CNN. An enormous work has been done using CNN on skin cancer dataset. A conventional Computer Aided Diagnostic(CAD) system involves 3 phases-segmentation, feature extraction and classification.

In this work CNN is considered in order to eliminate the tedious process of pre-processing, segmentation and feature extraction, since it is having capability to work with raw data. CNN dramatically improves the classification of skin lesion in categorization and detection process by handling a large variations in the dataset.

Bi, Lei, et. al.,(2017)[2] have done classification of skin lesions as melanoma, seborrheic keratosis and nevus using deep residual networks achieving an average AUC of 91.50.

Matsunaga, Kazuhisa, et al.,(2017)[3] have proposed lesion classification using Deep Neural Networks. The CNN are fined tuned with the training samples using generic object recognition in Keras with RMS Prop and AdaGrad optimization achieving an AUC of 0.924 with Melanoma classifier and 0.993 with Seborrheic Keratosis classifier.

Boman, Joakim, et. al.,(2018)[4] evaluated the performance of the CNN during classification of skin lesions. Using Transfer learning, Inception v3 was trained for different skin lesions achieving an AUC of 0.71 for Melanoma versus Nevus, 0.91 for Basal Cell Carcinoma versus Seborrheic Keratosis, 0.91 for Squamous Cell Carcinoma versus Seborrheic Keratosis,
0.84 for Seborrheic Keratosis versus Melanoma, 0.83 for Solar lentigo versus Melanoma respectively.

Harangi, Balazs et al., (2018)\textsuperscript{[5]} have done skin lesion classification using ensemble of features extracted from different pretrained models GoogLeNet, AlexNet, ResNet, VGGNet. The accuracy achieved for classifying melanoma, nevus, and seborrheic keratosis is 0.891.

Mahbod, Amirreza, et al. (2019)\textsuperscript{[6]} proposed a fully automatic computerized method for skin lesion classification using deep features extracted from different CNN and abstraction levels. Three pre-trained deep models AlexNet, VGG16 and ResNet-18, are used as deep feature generators. An AUC of 83.83% for melanoma classification and 97.55% for seborrheic keratosis classification was achieved respectively.

M A Albahar (2019) et. al., \textsuperscript{[7]} have proposed a CNN with novel regulizer for skin lesion classification achieving an Area Under the Curve (AUC) of 0.77, 0.93, 0.85, and 0.86 for Melanoma against Nevus, Basal Cell Carcinoma versus Seborrheic Keratosis, Melanoma versus Seborrheic Keratosis, Melanoma versus Solar Lentigo respectively.

Hence, in this paper work is done on classification of two class skin lesion classification using Convolution Neural Network. Section 2 gives a brief introduction about Convolution Neural Network. Section 3 gives a description about the subset of skin lesion database and explains about the application of CNN to the dataset. Section 4 presents the results for classification of skin lesions. Section 5 gives conclusions.

Convolution Neural Networks: For an image classification CNN’s are very much useful because of their high accuracy. CNN was first proposed by computer scientist by LeCunn et.al.,\textsuperscript{[8]} that uses a hierarchical model to get a fully connected layer, in which all the neurons are connected to each other to process the output. A CNN is constructed by combining convolutional, pooling and fully connected architectures. A simple CNN model consists of two hidden layers (convolution layers). To create feature maps CNN uses various kinds of kernels to convolve the input image which results in the output matrix of a convolution layer.

\[
Q_i = A_f \left( b_i + \sum_{M=1}^{N} I \ast K_{m_i} \right) 
\]

(1)

Where the input image I is convolved with kernel \( K_{m_i} \). The bias \( b_i \) is added to each element obtained to the sum of all convoluted matrices

The size of the input image ‘I’ should be increased by padding with zeros to maintain the output image same as that of the input image. The output of the convolution consists of both negative and positive values. The negative values are removed using Activation or Non linear functions such as Hyperbolic, Softmax, Rectified Linear Unit (ReLU), Exponential Linear Unit (ELU), Scaled Exponential Linear Unit (SELU) which are given in the Equations 2,3,4,5 and 6 respectively.

\[
f(x) = \frac{1}{1+e^{-x}}
\]

(2)

\[
(z_i) = \frac{e^{x_i}}{\sum_j e^{y_j}}
\]

(3)

\[
f(x) = \begin{cases} 
0 & \text{for } x < 0 \\
1 & \text{for } x \geq 0 
\end{cases}
\]

(4)

\[
f(x) = \begin{cases} 
\alpha(e^x - 1) & \text{for } x < 0 \\
\alpha & \text{for } x \geq 0 
\end{cases}
\]

(5)

\[
sef(x) = \lambda \begin{cases} 
x & \text{for } x < 0 \\
\alpha(e^x - 1) & \text{for } x \geq 0 
\end{cases}
\]

(6)

The convolution layer is followed by pooling layer which is used to reduce the size of the feature maps and parameters of the network that increases computational speed. Max pooling is used widely to select the maximum of the value. The hyperparameters of pooling layer are filter size, stride and max pooling.

Regularization method need to be used to introduce dropouts not only on the training data but also on the new entries to reduce the problem of overfitting. Loss function gives the difference between the output and target variable which helps in the connection of various inputs to the next layer independently. The architecture of CNN is shown in Figure 1.
Methodology: The dermoscopic raw images are given to the input layer of CNN. First the inputs are convolved using a kernel. To capture different properties of input data one or more number of kernels can be used on each convolution layer. A stride is applied to perform the convolution by shifting the Kernel K with N input elements. Finally the output of the convolution is applied to the sigmoid activation function. This helps in the connection of various inputs to the next layer independently.

Dataset: The dataset for the present work is obtained from International Skin Imaging Collaboration (ISIC) ISBI 2017 challenge[9] which is shown in Figure 2. There are 2000 training, 600 testing and 150 images for validation. The dataset also includes 586 skin lesions of Basal Cell Carcinoma, 2169 skin lesions of Melanoma, 18566 skin lesions of Nevus, 419 skin lesions of Seborrheic keratosis and 226 skin lesions of Squamous Cell Carcinoma.

Results

The main objective of this work is skin lesion classification using convolution neural networks. The size of the skin lesions obtained from the ISIC archive ranges from 4288 X 2848 to 722 X 542 approximately. The size of the input images which are given as input to the CNN are reduced to 128 X 128 to keep the computational cost low. Convolution is used to extract the features from the given data. It acquires the features using the relationship between pixels by learning image features using small squares of input data. The stride and filter size should be specified in order to perform convolution.

Convolution is done by placing the filter on the image matrix and the respective digits are multiplied by each of them which are further added to make a value. In the present work, Layer 1 is convolution with 256 filters of size 3 X 3 and stride of 1 is used. Convolution layer is used with an activation function in order to remove the negative values while multiplying using activation functions. The activation function used is this work Sigmoid.

Layer 2 is the Max pooling which is used to reduce the spatial volume of the image so that the computation
becomes relatively simple. Max pooling is the process of obtaining the maximum value among the given matrix when a filter is placed over the given matrix. Max pool of size 2 X 2 with stride 2 is used in this work. Layer 1, layer 2 can be used multiple times by changing the parameters if needed and these layers are called hidden layers.

Flattening is performed to make the multi dimensional images(matrix) to vector form. The vector is thus fed into the fully connected layer having a neural network with a dense layer containing 64 neurons. The output layer consists of 2 neurons to classify the skin lesions into different categories.

The two layer feed forward neural network consists of 16384 input neurons in the hidden layer and two neurons in the output layer. In this work Adam optimizer is used. The SPARSE categorical cross entropy is used for updating the weights by back propagating the error backwards.

Skin lesion classification of Melanoma Vs Nevus, Melanoma Vs Seborrheic Keratosis, Seborrheic Keratosis Vs Squamous Cell Carcinoma and Basal Cell Carcinoma Vs Seborrheic Keratosis is done using Convolution Neural Network. Binary classification of the skin lesions is done and the graph of accuracy against epochs was shown in Figures 3.
The skin lesions from the ISIC Archive are augmented by rotating, flipping and zooming the images which are given as input to the Convolution Neural network. The over fitting problem can be overcome by data augmentation and regularization through dropout.

The hyper parameters for the present work are shown in shown in Table 1.

Table 1: Hyper parameters used in binary classification

<table>
<thead>
<tr>
<th>Hyper parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Rate (Alpha)</td>
<td>0.001</td>
</tr>
<tr>
<td>Beta_1</td>
<td>0.9</td>
</tr>
<tr>
<td>Beta_2</td>
<td>0.99</td>
</tr>
<tr>
<td>No. of Epochs</td>
<td>25</td>
</tr>
<tr>
<td>Batch Size</td>
<td>32</td>
</tr>
</tbody>
</table>

The skin lesions from the ISIC Archive are augmented by rotating, flipping and zooming the images which are given as input to the Convolution Neural network. The over fitting problem can be overcome by data augmentation and regularization through dropout.

The performance of classification was evaluated using metrics such as training and validation accuracy as shown in Table 2. The number of epochs used were only 25 above which the classification may lead to under fitting and there is a reduction in the training and validation accuracy.

Table 2: Training and Testing Accuracy for Skin Lesion Classification

<table>
<thead>
<tr>
<th>Lesion Classification</th>
<th>No. of Training Images</th>
<th>No. of Images for Validation</th>
<th>Training Accuracy</th>
<th>Testing Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanoma Vs Nevus</td>
<td>2083</td>
<td>232</td>
<td>0.9506</td>
<td>0.9181</td>
</tr>
<tr>
<td>Melanoma Vs Seborrheic Keratosis</td>
<td>2328</td>
<td>259</td>
<td>0.9734</td>
<td>0.8610</td>
</tr>
<tr>
<td>Seborrheic Keratosis Vs Squamous Cell Carcinoma</td>
<td>580</td>
<td>65</td>
<td>0.9741</td>
<td>0.8923</td>
</tr>
<tr>
<td>Seborrheic Keratosis Vs Basal Cell Carcinoma</td>
<td>901</td>
<td>101</td>
<td>0.9876</td>
<td>0.9208</td>
</tr>
</tbody>
</table>

The detection of skin cancer in early stages is a challenging task. Due to the lack of proper early detection system skin cancer diseases are becoming non curable and leads to death. In this paper, skin classification is done using basic architecture of Convolution Neural Network achieving a good accuracy when compared to the other complex algorithms. In future the accuracy may be improve by considering different architectures like GoogLeNet, AlexNet, ResNet, VGGNet in the future work. The training and validation accuracy may be improved using external data for cross validation. The best structure of CNN model can be evaluated using optimization algorithms to find out the best parameters of the network. Extensive data augmentation needs to be done to the input data to cross validate the accuracy of the result.

**Conclusion**

The detection of skin cancer in early stages is a challenging task. Due to the lack of proper early detection system skin cancer diseases are becoming non curable and leads to death. In this paper, skin classification is done using basic architecture of Convolution Neural Network achieving a good accuracy when compared to the other complex algorithms. In future the accuracy may be improve by considering different architectures like GoogLeNet, AlexNet, ResNet, VGGNet in the future work. The training and validation accuracy may be improved using external data for cross validation. The best structure of CNN model can be evaluated using optimization algorithms to find out the best parameters of the network. Extensive data augmentation needs to be done to the input data to cross validate the accuracy of the result.

**Conflict of Interest Statement:** The authors do not have any conflicts in the subject matter or materials discussed in this manuscript.

**Source of Funding:** The authors have no source of funding from any agencies.

**Ethical Clearance:** Clearance taken from the DEAN Faculty of Engineering, ANU College of Engineering & Technology, Acharya Nagarjuna University and Department Research Committee (DRC) members to publish this work.

**References**


A Study of Postinfectious Glomerulonephritis in Adults

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¹Associate Professor, Dept of Nephrology, ²Associate Professor, Dept of Medicine, ³Resident, Dept of Medicine, Kasturba Medical College-Mangalore, Manipal Academy of Higher Education, Karnataka, India

Abstract

Introduction: To study the clinical presentation and outcome of postinfectious glomerulonephritis in adults.

Materials and Method: This was a prospective study of 50 cases of post-infectious glomerulonephritis. All patients were followed up for 18 months. The mode of presentation, history of sore throat or skin infections were documented. Serum creatine, Urinary proteinuria, C3 level, and ASO titre were performed. All these patients were followed up every two weeks after discharge for six months and four weekly thereafter for one year. Outcomes were classified as complete remission, partial remission and development of end stage renal disease.

Results: In their presentation to the hospital Oedema was present in 98% of the cases. 84% of patients had oliguria, Gross haematuria was present in 24% of patients and hypertension was present in 92% of the patients. ASO titre was positive in 16% of the patients. Most patients (82%) had proteinuria between 2.5-3.5 gm/24hrs. Complete remission was achieved in 84% of the patients. Partial remission in 12% of the cases and 4% of the patients went on to develop end stage renal disease (ESRD). The presence of gross haematuria and nephrotic range proteinuria correlated with the development of end stage renal disease.

Conclusion: Gross haematuria, nephrotic proteinuria, impaired renal function and presence of crescents in kidney biopsy at initial presentation are poor prognostic indicators of post-infectious glomerulonephritis in adults.

Keywords: Glomerulonephritis, postinfectious, proteinuria, outcomes, prospective.

Introduction

Post-infectious glomerulonephritis is an immune complex mediated glomerulonephritis caused by different organisms. The characteristic renal histopathology is diffuse, proliferative glomerulonephritis, often exudation with IgG and C3 subepithelial and mesangial deposits. The more extensive use of renal biopsies highlighted atypical histological forms of the disease. There is however little information about the long term prognosis of glomerulonephritis associated with infections in adults. Although the majority of patients make a complete clinical recovery, a significant number, especially the elderly continue to exhibit urinary abnormalities including sub- nephrotic range proteinuria, hypertension, and abnormal urine sediments. In the recent years only a few studies with a small number of patients and relatively short follow-ups have been reported and its long term prognosis remains undefined. Hence we decided to study the clinical presentation and outcome of post infectious glomerulonephritis in adults.

Materials and Method: The main aim of this study was to study the clinical presentation and outcome of postinfectious glomerulonephritis in adults. This was a prospective study. Clearance was obtained from the Institutional ethics committee. Informed consent was obtained from all the participants. All patients with post-infectious glomerulonephritis in adults presenting with low C 3 and normalizing within 8 weeks of presentation and biopsy proven post-infectious glomerulonephritis were included in this study. Glomerulonephritis in
children, other glomerulopathies and chronic kidney disease patients were excluded. A detailed history especially history of sore throat and skin lesions in the past two to three weeks were elicited and examination was done to look for oedema, hypertension in all participants. Investigations done included urea, creatinine, ASO titre, 24hrs urine protein, Serum C 3. Extracapillary proliferation (crescents) on kidney biopsy was considered present when it involved > 30% of glomeruli. All these patients received antibiotics, antihypertensives, and anti-oedema measures according to their clinical presentation. Patients with crescents received intravenous pulse methyl prednisolone one gram for three consecutive days followed by oral steroids of 1 mg/kg/day for one month and gradually tapered. All these patients were followed up every two weeks after discharge for six months and four weekly thereafter for one year. Investigations like serum creatinine, urine routine and microscopy, 24 hour urinary protein, serum C3 were repeated at the end of 8 weeks after initial presentation.  

Complete remission was diagnosed when plasma creatinine was < 1.2 mg/dl, Proteinuria < 0.2 gm/24 hrs and urinary red blood cells < 5/HPF.  

Partial remission was diagnosed when serum creatinine > 1.2 and < 5 mg/dl, proteinuria between 0.21 and 3.5 gm/ 24 hrs and / or urine red blood cells > 5/HPF. End stage renal disease (ESRD): chronic renal insufficiency requiring maintenance haemodialysis.

Results

A total of 50 participants were included in the study. 34 (68%) patients were males in the study. 16(32%) patients were females in the study. The maximum number of patients in our study were between the ages of 25-35 years. Mean age of presentation was 31.71 ± 6.75 years. The four cardinal features of post-infectious glomerulonephritis including oedema, oliguria, gross haematuria and hypertension were studied. The occurrence of these clinical features along with the preceding history of sore throat or skin lesions are shown in Table 1. The level of proteinuria among the subjects are shown in Table 2. Most of our patients had proteinuria between 0.2-2.5gm/24hrs. The mean 24 hour urine proteinuria in our study was 1158.6± 837.22 mg/24hrs ranging from a minimum of 255 mg/24hrs to a maximum of 3678 mg/24 hrs. The mean serum creatinine at presentation was 1.7 ± 1.4 ranging from a minimum of 0.6 mg/dl to a maximum of 7.2 mg/dl. ASO titre was found to be positive in 16% of the patients. All patients received antibiotics, antihypertensives, and anti-oedema measures according to their clinical presentation. The outcome of the patients is shown in Table 3. The mean number of weeks for complete remission was 19.31± 6.45 weeks ranging from a minimum of ten weeks to a maximum of 36 weeks. In eight patients, kidney biopsy was performed due to worsening renal function. Out of these, four showed diffuse proliferative glomerulus with IgG and C3 deposits. These patients received temporary haemodialysis and three underwent partial remission at eighteen months, whereas one progressed to end stage renal disease on maintenance haemodialysis. Two patients showed crescents and were treated with steroids and temporary haemodialysis. One of them had partial remission after eighteen months after initial presentation and the other patient progressed to end stage renal stage on maintenance haemodialysis.

Table 1: Clinical Presentation

<table>
<thead>
<tr>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oedema 49(98%)</td>
</tr>
<tr>
<td>Oliguria 42(84%)</td>
</tr>
<tr>
<td>Gross haematuria 12(24%)</td>
</tr>
<tr>
<td>Hypertension 46(92%)</td>
</tr>
<tr>
<td>Sorethroat 6(12%)</td>
</tr>
<tr>
<td>Skin lesions 2(4%)</td>
</tr>
</tbody>
</table>

Table 2: Proteinuria

<table>
<thead>
<tr>
<th>Proteinuria (gm/24hrs)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2-2.5</td>
<td>41(82%)</td>
</tr>
<tr>
<td>2.5-3.5</td>
<td>7(14%)</td>
</tr>
<tr>
<td>&gt;3.5</td>
<td>2(4%)</td>
</tr>
<tr>
<td>Total</td>
<td>50(100%)</td>
</tr>
</tbody>
</table>

Table 3: Outcome

<table>
<thead>
<tr>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete remission 42 (84%)</td>
</tr>
<tr>
<td>Partial remission 6 (12%)</td>
</tr>
<tr>
<td>ESRD* 2 (4%)</td>
</tr>
</tbody>
</table>

Discussion

In our study, post-infectious glomerulonephritis was found predominantly in the third decade. Nattachai Srisawat et al found that most of the cases in their study were in the fifth decade. 1 Our study showed a male predominance which is consistent with other studies. In our study the typical prior history of sore throat were observed in only six patients and prior history of typical skin lesions in two patients and these eight patients had
high ASO titre. In our study ASO titre positivity was only observed in 16% of the patients with post-infectious glomerulonephritis. Gabriella Moroni et al observed ASO positivity in 47% of their patients. In our study the mean range of proteinuria was 1.2gm/24hrs and nephrotic range proteinuria was seen in only 4% of the patients. Gabriella Moroni et al found that 16% of their patients had nephritic range proteinuria and the mean proteinuria was 3.7g/24hrs. After a follow up of fifty patients for 18 months, 84% of our patients had complete recovery, 12% entered partial remission and 4% progressed to end stage renal disease on maintenance haemodialysis. Montseny et al in contrast found complete remission in only 26% of their adult cases. However, the short follow up of that study with a mean duration of 9 months may have precluded the observation of late recoveries in other patients, since complete remission occurred after a median of 12 months in that study. In our study complete remission occurred after a median of five months. Hinglais N et al, who studied the prognosis of post streptococcal glomerulonephritis found that it took a median period of 12 months for complete remission. At the end of 18 months, in our study, partial remission was observed in 12% of the patients. Gabriella Moroni et al observed partial remission in 20% of their patients. In our study only 4% of the patients progressed to end stage renal disease after a follow up of 18 months showing a relatively better prognosis of post-infectious glomerulonephritis in adults. Gabriella Moroni et al found 37% of their patients progressed to chronic renal insufficiency suggesting that the long term prognosis of post-infectious glomerulonephritis was worse in adults. In our study the presence of oedema, oliguria, hypertension at presentation did not correlate with the outcome. However gross haematuria at initial presentation showed a significant correlation with the development of end stage renal disease. Montseny JJ et al showed that nephrotic range proteinuria at onset was associated with adverse outcome. Similarly our study has shown that presence of nephrotic range proteinuria at initial presentation has a significant risk of developing end stage renal disease.

**Conclusions**

Gross haematuria, nephrotic proteinuria, impaired renal function and presence of crescents in kidney biopsy at initial presentation are poor prognostic indicators of post-infectious glomerulonephritis in adults.

**Ethical Clearance:** Taken from the institutional local ethics committee before the start of the study.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


Outcome of Accelerated Recovery Programme on Occupational Stress among Nurses

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Abstract

Introduction: Among all the health care professions, Nursing is very stressful. Many studies identified that nurses suffer from moderate to high stress from the workplace. The objective of the study was to measure the outcome of the Accelerated Recovery programme in reducing occupational stress among Nurses.

Materials and Method: Quantitative research approach with Pretest posttest control group design was adopted to conduct a study among 120 nurses in Narayana Medical College Hospital, Nellore. By random allocation, nurses were assigned into study group (SG=60) and control group (CG=60). Index of Clinical Stress was used to gather data. For nurses in the study group, Accelerated Recovery programme with routine activities was executed and nurses in the control group underwent routine activities for five weeks. Posttest was conducted I (5th week), II (3rd month), III (6th month), IV (9th month), and V (12th month). Data were analyzed using descriptive statistics like mean (M) and standard deviation (SD) inferential statistics like Wilcoxon signed-rank test, Mann Whitney U test and repeated measure ANOVA.

Results: Repeated measures of the clinical stress over a period of time within [(SG: F= 597.142, p < .001), (CG: F= 0.558, p< .05)] and between (F= 159.345) the study and control groups showed statistical significance at p< 0.001. It is evident that the level of clinical stress has decreased significantly in the study group than the control group.

Conclusion: The results have confirmed that ARP is effective in decreasing the occupational stress among nurses. Building resilience is essential to enhance both personal and professional wellbeing.

Keywords: Nurses, Occupational stress, Job stress, Workplace stress, Resilience, Guided Imagery, Neurolinguistic Programming, Personal narrative.

Introduction

Among all the health care professions, Nursing is very stressful(1). The backbone of any health industry is the nurses. A report by US Occupational Safety and Health Institute states that among 130 professions which was studied for mental health problems related to work, nursing ranks 27th place as nurses work beneath constant pressure and stress than other medical professionals(2).
The demands of the job needs the nurses to be with energy levels, mental alertness, soaring skills, empathy toward patient and families, round the clock patient care, collaboration with other health care team members, in an environment where there are limited resources, and staff shortage which adds to the exhaustion.

The prevalence study conducted in India revealed 87.4%, a different study in Saudi Arabia reported 45.5%, a study in Iran identified 57.4% nurses had occupational stress. A Pilot study in the USA reports 92% of nurses have moderate-to-very high stress levels and a study in South West Ethiopia reports 58.46% job-related stress.

Out of ten jobs, the nursing profession is considered to have a maximum intensity of job-related injury or illness which necessitates the absenteeism from the occupation. In 2010, the median number of absenteeism days from work due to musculoskeletal disorders was seven. Five percent of injuries to the registered nurses were mainly ascribed by the physical attacks on the job, and they are always uncovered for exceptional dangers.

Today, there are numerous studies are carried out on the prevalence of occupational stress, factors influencing, injuries related to work, job satisfaction, and the problems related to the shortage of nurses. Managing stress at the right time will improve the quality of life and the patient care as well. Accelerated Recovery programme (ARP) is a package that includes self care measures, guided imagery, Neurolinguistic programme, and thought field therapy. The objective of the study was to measure the outcome of Accelerated Recovery programme in reducing occupational stress among Nurses.

Materials and Method

Study Design: The present study was carried out from April 2015 to March 2017 in Narayana Medical College Hospital, Nellore, India which is a tertiary care multi-speciality teaching hospital. The study adopted a Quantitative research approach with Pretest posttest control group design.

Population and Sample: Using power analysis, the sample size was calculated, which was 117 and was rounded off to 120. Nurses were first screened for Secondary traumatic stress. Then nurses who scored >30 in Index of clinical stress were recruited for the study. Nurses who already participated in Neurolinguistic programming, Cognitive behavior therapy, and stress management were excluded from the study. By random allocation, nurses were assigned into the study group (SG=60) and control group (CG=60).

Measures: Index of Clinical Stress (Abel, 1991) has 35 items which measure the level of subjective individual stress. The responses are expressed on an eight-point rating scale which is rated as 1= none of the time, 2= very little, 3= a little of the time, 4= some of the time, 5= a good part of the time, 6= most of the time, 7= all of the time. Out of 35 items, four items have reversed scoring. The total score ranges from 0 to 100. The obtained score is interpreted as 0-30: No stress and >30: Significant stress.

Ethical Consideration: Permission from Institutional Ethics Committee, Narayana Medical College was obtained. Also, permission was taken from the Director, Medical Superintendent, and Nursing Dean, Narayana Medical College Hospital. By explaining the nature and the purpose of the study, informed consent was obtained from nurses. The confidentiality of information was maintained.

Data collection procedure: After the work schedule, nurses were met by the researcher who fulfilled the inclusion criteria. Nurses were made to sit comfortable in a separate room where the study was carried out. On day one, using Index of clinical stress, pretest data was collected. For nurses in the study group, ARP with routine activities was executed and nurses in the control group underwent routine activities for five weeks. ARP is an individualized standard treatment protocol for five-weeks with five sessions, each lasting for 90-120 minutes. The session involves listening to audios, didactic and experiential training. The first session is assessment of the condition with the practice of guided imagery. Second session involves the construction of a personal and professional time-line. Session three, involves development of a self-management plan, thought field therapy and Neuro-linguistic. Session four focuses on supervising the self where the ‘Letter from the Great Supervisor’ is read by the nurse. Session five evaluates the programme goals address the pathways for recovery and closure. (Baranow sky and Gentry 2010). For the nurses in the study group, continuous reinforcement was given by follow-up telephonic calls. Posttest was conducted I (5th week), II (3rd month), III (6th month),
IV (9th month), and V (12th month) for both study, and control groups.

**Data Analysis:** Data collected was coded, tabulated and were analyzed using SPSS version 16.0. Descriptive statistics like mean (M) and standard deviation (SD) was used to find the effect of ARP on the index of clinical stress and Inferential statistics like Wilcoxon signed-rank test, Mann Whitney U test and repeated measure ANOVA to determine the impact of the ARP on index of clinical stress within and between the groups and over a period. Statistical significance was set at p< 0.05.

**Results**

Most of the nurses were in the age group of 21-30 years (SG: 58.4%, CG: 53.4%), were females (SG: 90%, CG: 83.3%), mostly unmarried (SG: 86.7%, CG: 71.7%), have B.Sc(N) as the professional qualification (SG: 68.3%, CG: 73.3%), work in ICU (SG: 83.3%, CG: 86.7%), half of them have an experience < 1 year (SG: 50%, CG: 56.7%), work as staff nurse (SG: 85%, CG: 90%), and less than half of them use listening to music (SG: 48.3%, CG: 46.6%) as their coping strategy.

Significant change is distinguished in the mean scores of clinical stress within the SG (Z: 6.762, 6.745, 6.738, 6.458 which is statistically significance at p < .001 and in CG (Z: 0.541, 0.081, 0.837, 0.217, and 0.260) which is statistically significance at p < .001(Table 1). Between-group comparison shows that during pretest, the means scores of the clinical stress, in the study and control groups was 72.45, 73.78 whereas means scores of the clinical stress during posttest I (32.2, 72.85), posttest II (33.67, 74.03), posttest III (36.35, 75.13), posttest IV (40.28, 73.98), and posttest V (43.03, 74.52) with (Z: 0.767, 9.475, 9.456, 9.456, 0.947) which is statistically significant at p < .001(Table 2).

Repeated measures of the clinical stress over a period of time within [(SG: F= 597.142, P < .001), (CG: F= 0.558, p< .05)] and between the study and control groups (F= 159.345) showed statistical significance at p< 0.001 (Table 3).

### Table 1: Comparison of Occupational stress among nurses within the study and control groups (N=120)

<table>
<thead>
<tr>
<th>Test</th>
<th>Study Group (n=60)</th>
<th>Control Group (n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(SD)</td>
<td>MD</td>
</tr>
<tr>
<td>Pretest</td>
<td>72.45 (7.577)</td>
<td>73.78 (8.405)</td>
</tr>
<tr>
<td>Posttest I</td>
<td>32.2 (6.913)</td>
<td>40.5</td>
</tr>
<tr>
<td>Posttest II</td>
<td>33.67 (5.239)</td>
<td>38.78</td>
</tr>
<tr>
<td>Posttest III</td>
<td>36.35 (6.251)</td>
<td>36.1</td>
</tr>
<tr>
<td>Posttest IV</td>
<td>40.28 (6.123)</td>
<td>32.17</td>
</tr>
<tr>
<td>Posttest V</td>
<td>43.03 (5.663)</td>
<td>29.42</td>
</tr>
</tbody>
</table>

### Table 2: Comparison of Occupational stress among nurses between the study and control groups (N=120)

<table>
<thead>
<tr>
<th>Duration of the Study</th>
<th>Study Group (n=60)</th>
<th>Control Group (n=60)</th>
<th>Mean Difference</th>
<th>Z-value p-value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Pretest</td>
<td>72.45</td>
<td>7.577</td>
<td>73.78</td>
<td>8.405</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest I</td>
<td>32.2</td>
<td>6.913</td>
<td>72.85</td>
<td>8.311</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest II</td>
<td>33.67</td>
<td>5.239</td>
<td>74.03</td>
<td>8.553</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Posttest III</td>
<td>36.35</td>
<td>6.251</td>
<td>75.13</td>
<td>7.498</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest IV</td>
<td>40.28</td>
<td>6.123</td>
<td>73.98</td>
<td>8.416</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest V</td>
<td>43.03</td>
<td>5.663</td>
<td>74.52</td>
<td>8.327</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Table 3: Repeated measures of Occupational Stress over a period of time among nurses within and between the study and control groups (N=120)

<table>
<thead>
<tr>
<th>Component</th>
<th>Group</th>
<th>Within F-value</th>
<th>Within p-value</th>
<th>Between F-value</th>
<th>Between p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Stress</td>
<td>SG (n=60)</td>
<td>597.142</td>
<td>0.000</td>
<td>159.345</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>CG (n=60)</td>
<td>0.558</td>
<td>0.458</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The results of the study suggest that the intervention of ARP had a positive outcome in diminishing the nurse’s clinical stress from baseline to post-intervention with continuous reduction from one to 12 months. The socio demographic data reveals that half of the participants were in 21-30 years, four fifth of them were females which substantiate that nursing is female dominated profession. More than half of them are graduates. Three fourth of them are junior nurse working in Intensive care units with minimal experience in the hospital. Less than half use listening to music as their coping strategy. A study on the experience of clinical stress among novice nurses in a tertiary care teaching hospital reported high level of stress with a significant association on variables like age, marital status, educational qualification, area of work, and duration of work at p< .001(16). In a study to examine nurses level of occupational stress and the coping strategies, the age group of < 30 years, less than one year experience and perceived work-related issues and patient demands are felt to be stressful (17). An institutional study to identify the level of occupational stress and the determinants reported that 51% of the nurses reported moderate stress and 3% reported severe stress(18).

The present study adopted intervention such as guided imagery, NLP, thought field therapy, debriefing which has made the outcome of stress reduction. The findings are supported by various such studies which are conducted as individual intervention. An evaluative study on the impact of online guided imagery training on stress and anxiety reported that the stress level has reduced from 17.8 to 13.5, anxiety mean scores reduced from 56.4 to 54.3 at p < .001 which is similar to the present study finding (19).

A pilot study determined the effectiveness of EFT on perceived stress and anxiety among nursing students reported a decrease in the perceived stress and anxiety with a decrease in somatic symptoms which was significant at p< .05(20). The result of Emotion regulation training proved to reduce the mean scores on occupational stress from 136.6 to 113.02 which is significant at p< .05 in nurses working in the critical area(21).

A study investigated the effectiveness of Neuro-linguistic programming (NLP) on occupational stress where in the experimental group, the baseline score was 121.36 which has come down to 64.53 after the intervention whereas the control group had a baseline score of 120.88 and in post-test, the score is 120.96 and statistically significant difference at p = .0001(22).

As the researchers has offered the package of intervention which could have benefitted the nurses which has been identified that the effect was found till one year.

Conclusion

The results have confirmed that ARP is effective in decreasing the occupational stress among nurses. Further research is needed to identify which intervention had an intense effect in reducing occupational stress. A balance between stress and job satisfaction will enhance the professional quality of life thereby preventing the long term effect of compassion fatigue. Building resilience is essential to enhance both personal and professional wellbeing. Health care facilities have to provide adequate resources for work which will condense stress levels in nurses and assist balance in work-life.

Acknowledgements: The authors are thankful for the Management, Director, Medical Superintendent, Nursing Dean of Narayana Medical College Hospital for their permission and support to conduct the study and all the nurses for their participation and cooperation during the study. This article was derived from the thesis of Rajeswari H, with Registration Number 4413030 of MAHER, Meenakshi University, Chennai, India.

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**Source of Funding:** Self

**References**


Healthy Emotional Expression: An Intervention for Anxiety and Suicide Ideation among School Students

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Abstract

The present study has been performed to understand the effectiveness of intervention among the school students who were experiencing anxiety and suicide ideations. It was assumed and asserted that an interactional therapy which consist of Relaxation, written expression and verbal expression is a mean of healthy expression of emotions. Results proves that interactional therapy is found to be an effective method to reduce the level of anxiety and suicide ideation among school students. The scores of anxiety and suicide ideation is found to have gone down in both the age groups i.e 13-15 years and 16-18 years when compared after the intervention.

Keywords: Anxiety, Suicide ideation, Written expression, Relaxation, Verbal expression.

Introduction

The ever dynamic world has become a major challenge for all of us. With time the obstacles are also evolving. The present paper is an effort to understand the most suitable way to deal with challenges of human lives. Gross in 1998, 1999 defined Emotional expression as how one conveys emotional experience through both verbal and non-verbal behavior¹. Elliotts & Jacobs, 2013 explained expression as the act of presenting one’s thoughts, ideas and feelings via speech, writing, or through any other method.²

Types of Expression: Frank (2001) stated that facial expression is a form of expression where individual shows his/her feeling through verbal and non-verbal behaviour.³

Linguistics: Kristen A. Lindquist, Jennifer K. MacCormack, and Holly Shablack (2015) explained expression is fixed i.e a form of word is presented with some specific meaning to it.⁴

Anxiety: Browne (2018) said anxiety is a feeling of uneasiness, worry, tension about the things whose results are uncertain. There are multiple symptoms of anxiety through which one can understand that if an individual is experiencing anxiety for example., heart palpitation, restlessness, muscle tension etc.⁵

Types of Anxiety Disorders (APA): Individuals who experience GAD are always in the hunt of danger in the space and are very observant. they become overly concerned with everyday hassles. Generalized anxiety disorder is “characterized by chronic excessive worry accompanied by three or more of the following symptoms: restlessness, fatigue, concentration problems, irritability, muscle tension, and sleep disturbance”.

Phobias: According to National Institute of Mental Health Worldwide between 5% and 12% of the population suffers from phobic disorders. The basis of phobias are irrational and irrelevant and they believe in the idea as anyone else.

There are 3 types of Phobias:

- Specific Phobia
- Social Phobia
- Agoraphobia

Panic Disorder: According to taylor Panic disorder refers an abrupt surge of intense attack rising to a peak when thoughts of particular stumble are present. In this disorder person experiences brief attack of intense terror which results in physical symptoms such as dizziness, nausea, difficulty in breathing or sweating C Barr Taylor 2006.⁶
Post-Traumatic Stress Disorder: Post-Traumatic Stress Disorder is a result of Traumatic experiences in an individuals’ lives (Caroline Vaile Wright, Linda L. Collinsworth, Louise F. Fitzgerald, 2009). According to DSM – V some of the common symptoms include hyper-vigilance, flashbacks, black outs, lack of concentration, avoidant behaviors, anxiety, anger and depression.

Separation Anxiety Disorder: It occurs when children are separated from their parents children tends to experience Separation Anxiety Disorder (G Masi, M Mucci, S Millepiedi - CNS drugs, 2001). It is considered as disorder as the level of anxiety among the children is excessive and inappropriate.

Suicide: It is a process of ending one’s life and is one of the important reason of death worlds wide (Matthew K. Nock, Guilherme Borges, Evelyn J. Bromet, Christine B. Cha, Ronald C. Kessler, Sing Lee, 2008). This phase of life also involves a feeling of hopelessness and helplessness. According to Timothy J. Legg, 2018 symptoms of suicide ideation includes sleeplessness, loss of appetite or doesn’t feel hungry, social withdrawn alone etc.

Suicide Ideation: According to Nock, M. K., & Favazza, A. R. (2009) it is a deliberate effort to destroy one’s body tissues. Inability to deal with one’s life circumstances create a cycle of negative thoughts and the person end up ending their lives in the process. According to M. David Rudd, 1989, problem of youth suicide is a great concern.

Healthy Emotional Expression: Facing challenges and obstacles in life journey is natural and common across all human existence but how we manage the state of mind in those dire circumstances decides the mental health of an individual. Edward J. Murray Daniel L. Segal, 1994 has stated that by practicing relaxations method like, yoga, meditation etc, last but not the least by letting those disturbing emotions go and by not pondering upon them again and again it is recommended that one shall strive for healthy means of expressing emotions.

Davide Margola, Sara Molgora, Tracey A. Revenson 25 march 2014 the aim of this research was to study the Effects of Benefit-Focused Versus Standard Expressive Writing on Adolescents’ Self-Concept During the High School Transition. To do this research two groups of expressive writings were made namely benefit – focused versus standard expressive writing. It was found out that in the initial 5 years 201 male students wrote about the potential benefits of school transition. It was found out that benefit focused group found to have better short – term academic self – concept.

Gian Mauro Manzoni, Francesco Pagnini, Gianluca Castelnuovo and Enrico Molinari (2008) worked on the topic ‘Relaxation training for anxiety: meta-analysis done for ten-years’. From 1997-2007 all the studies which consist of relaxation training specifically Jacobson’s Progressive Relaxation, Autogenic training, applied relaxation and meditation were evaluated. There were 27 studies which qualified. Results shows relaxation training contributes in the reduction of Anxiety.

Caroline Smith, Heather Hancock, Jane Blake-Mortimer Kerena Eckert (2007) did a study on A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. This study was conducted for 10 to 16 weeks to find the effectiveness of the yoga and meditation on stress and anxiety. 10 weekly one hour sessions of either relaxation or yoga were given to the participants. In the end of the research it was found out that though both the method are crucial for the betterment of patients with stress and anxiety but yoga is found to be more effective.

Sheese, B. E., Brown, E. L., & Graziano, W. G. (2004) did the research on Emotional expression to figure out the effectiveness of emotional expression through E- mail. It emphasises upon the effectiveness of the e-mail based writing treatment. For this study the 546 participants were randomly distributed into long and short term traumatic writing. By repeating this procedure for 5 weeks it has been found out that e-mail based writing treatment helps to produce positive physical and mental health.

Stacey H. Kovac PhD, Lillian M. Range (2002) gave their contribution when they found out that when an individual writes about their negative/ suicidal emotions, the intensity of those emotions reduces. They did the work on more than 100 college students for 2 weeks, wherein students were asked to express their emotions on pen and paper. This practice was repeated for 20 minutes till 4 days. Eventually the researchers could claim that this process is reducing the suicidal thoughts in the participants.

Material and Method

Study population, sample size and data: The
study started diagnosing 400 children with suicide ideations and anxiety of various severity levels, who were attending schools at Delhi/NCR, of which there were 340 drop outs from the further plan due to exclusion criterion. The prospective study finally comprised of 60 students classified as Early and Late adolescents, of which 30 were girls constituting 50% of sample and remaining 30 boys making up rest 50%.

Independent samples t-test - allows us to compare two groups of observations, all of which have come from the different group of people but possibly with a different mean for each condition. One has two experimental conditions and has used different participants in each condition. Systematic improvements in the parameters are noticed with corresponding magnitude of such effect in the population of interest. Systematic variations were assessed using experimental condition comparison; mean ($\bar{X}$) and corresponding difference were supported by 95% confidence interval for every possible significant statistics or otherwise. Further to support the significance of such comparisons, effect size is duly reported for every experimental phase evaluation using $r$ (Rosenthal, 1991; Rosnow & Rosenthal, 2005), $d$ (Cohen’s d). Mean differences are evaluated using p-value, t statistics, error bar graph and box - whisker distribution, all the comparisons denoted by $p < .01/.05$ or *** are highly significant at both the levels of significance 1%, and 5%

**Intervention Plan:** For 3 and a ½ months children with anxiety and suicidal ideation issues were called for 1 hour for one to one interpersonal therapy sessions (30 adolescents for each group – 13-15yr and 16-18yr). The intervention focused on enhancing social support, decreasing interpersonal stress, facilitating emotional processing by attacking anxiety and improving interpersonal skills. The plan is for the student to become more aware of his or her ability to deal with interpersonal problems that have kept him or her from being able to actively manage the symptoms of anxiety and suicide ideation. Three method were used to unburden the emotions, they are as follows:

- Relaxation Therapy
- Written Expression
- Verbal Expression

**Tools:** State–Trait Anxiety Test by Sanjay Vohra and Suicidal Ideation Scale by S. Sisodia & V. Bhatnagar

**Results**

**Table 1: Assessment of Mean and t-scores for pre-intervention anxiety levels amongst 13-15 and 16-18 years of school students.**

<table>
<thead>
<tr>
<th>Age Classification</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t- Value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-15 years</td>
<td>30</td>
<td>54.77</td>
<td>6.71</td>
<td>.324</td>
<td>.747</td>
</tr>
<tr>
<td>16-18 years</td>
<td>30</td>
<td>55.30</td>
<td>6.00</td>
<td>.009</td>
<td>.009</td>
</tr>
</tbody>
</table>

No sufficient evidence to reject Ho

As per Table- 1, the mean, standard deviation, t and p value of Pre intervention anxiety scores for the 13-15 and 16-18 years age group was computed. The difference between the age group classification school students was found out to be non- significant with $p – value = .747$ at .05 level of significance, which clearly depicts that there was no sufficient evidence to reject the null hypothesis.

**Table 2: Mean and t-scores of Pre intervention Suicide Ideation scores among 13-15 and 16-18 years of school students.**

<table>
<thead>
<tr>
<th>Age Classification</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t- Value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-15 years</td>
<td>30</td>
<td>78.87</td>
<td>8.569</td>
<td>2.702</td>
<td>Sig***</td>
</tr>
<tr>
<td>16-18 years</td>
<td>30</td>
<td>85.30</td>
<td>9.834</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***Significant at both the levels (0.05 and 0.01)

Pre intervention suicidal ideation scores for the 13-15 years and 16-18 years of school students was computed. The difference between the age group was found out to be highly significant with $p – value = .009$ at .05 and .01 level of significance.

**Table 3: Representing Mean response, and t-scores for Post Test Anxiety of 13-15 years of school students**

<table>
<thead>
<tr>
<th>Pre- Test, Post–Test Scores of 13-15 years students</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t- value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre – Test</td>
<td>30</td>
<td>54.77</td>
<td>6.71</td>
<td>10.22</td>
<td>Sig***</td>
</tr>
<tr>
<td>Post Test</td>
<td>30</td>
<td>40.83</td>
<td>5.53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at both the levels (0.05 and 0.01)
The mean obtained by 13-15 years of school students on post-test Anxiety score is 54.77 and post-test is 40.83, t-value is found to be 10.22, which shows that the results are significant on both the levels i.e. 0.05 and 0.01.

**Table 4: Mean and t-value scores of Post-test Anxiety scores of 16-18 years school students.**

<table>
<thead>
<tr>
<th>Pre-test and Post-test Anxiety scores for 16-18 years</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre- intervention</td>
<td>30</td>
<td>55.30</td>
<td>6.00</td>
<td>12.38</td>
<td>Sig***</td>
</tr>
<tr>
<td>Post- intervention</td>
<td>30</td>
<td>42.83</td>
<td>4.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at both the levels (0.05 and 0.01)

Mean value of pre intervention anxiety obtained by 16-18 years school students is 55.30, post-intervention mean scores is 42.83. t-value Anxiety scores was found to be 12.38. Hence p is significant on both the levels i.e. 0.05 and 0.01.

**Table 5: Mean and t scores of Suicide Ideation among 13-15 years of school students post intervention.**

<table>
<thead>
<tr>
<th>Pre-test, Post-test S.I Scores of 13-15 yr of students</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>30</td>
<td>78.87</td>
<td>8.56</td>
<td>9.58</td>
<td>Sig***</td>
</tr>
<tr>
<td>Post-test</td>
<td>30</td>
<td>58.53</td>
<td>10.28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at both the levels (0.05 and 0.01)

Mean scores for Pre-test Suicide Ideation is 78.87 and for post-test is 58.53, corresponding t-value is 9.58 hence the p is significant at both the levels i.e. 0.05 and 0.01.

Pre-Test mean for 16-18 year school students for suicide ideation is found to be 85.30 and after intervention the mean is 70.07 & p significant at both the levels i.e. 0.05 and 0.01. This shows that the intervention is effective.

**Table 6: Mean and t-value scores of Suicide Ideation among 16-18 years of school students post intervention.**

<table>
<thead>
<tr>
<th>Pre-test, post-test S.I scores of 16-18 yrs students</th>
<th>N</th>
<th>Mean</th>
<th>S.D</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>30</td>
<td>85.30</td>
<td>9.83</td>
<td>11.48</td>
<td>Sig***</td>
</tr>
<tr>
<td>Post-Test</td>
<td>30</td>
<td>70.07</td>
<td>10.72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at both the levels (0.05 and 0.01)

**Discussion and Conclusion**

The current study is an attempt to understand if relaxation therapy, written expression and verbal expression is repeated for 3 months of time in regular interval will it have effect results in two age groups, i.e. 13-15 years and 16-18 years. Students with Anxiety and suicide ideations were identified to proceed the research work. Despite of having a clear criteria for the selection of participants, researcher faced huge difficulty in gathering the students and collecting the consent of parents as well as students. Students who are unable to manage their life circumstances are highly judged by their peers.

Results of the present study shows improvement in anxiety scores as the (Mdiff- 13.93) with 95% CI, p < .000) for pre-post intervention for 13-15 years of school students. Whereas mean difference for 16-18 years is 12.46, 95% CI and p< .000) which is a highly significant score. Mean Scores obtained on pre-test suicide ideation for age 13-15 years is 78.87 and the post test mean scores are 58.53. Mean difference obtained for the same is 20.33 with 95% CI, p < .000. The results
clearly indicates significant improvement in the anxiety and suicide ideation and intervention is found to be very effective for 13-15 years of age group. Mean score for 16-18 years school students pre-test suicide ideation is found to be 85.30, whereas for post-test it is 70.07. The mean difference for the 16-18 years school students is 15.23 with 95% CI, p < .000. Therefore the results are promising in its nature.

It can be concluded that if students are individually exposed to the same 3 step process to reduce the Anxiety and Suicide Ideation, there will be a significant difference in the level of anxiety and suicide ideation. It can also be said that therapy is going to be effective irrespective of the age of the school students.

Conflicts of Interests: Authors declares no conflict of interest.

Funding: Self

Ethical Clearance: This study was entirely done for the benefit of the children. Prior consent was taken from the parents as well as from the schools to conduct the research procedure.

References

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Measures to Assess Standing Balance in Individuals with Spinal Cord Injury: A Review

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Abstract

Background/Aim: Standing balance after the spinal cord injury is one of the major rehabilitation goals to improve the community participation. Measurement of realistic goal of standing balance requires the use of validated scales in population with spinal cord injury. The study aimed to identify and review the psychometric properties of outcome measures used to assess standing balance in spinal cord injury.

Method: Multiple databases were searched from the earliest records to March 2019. Reliability, validity and clinical utility of measures of standing balance were extracted.

Results: Seventeen outcome measures were identified and out of these only six measures- Smart Balance Master, Berg Balance Scale, Activity-Based Balance Level Evaluation (ABLE) scale, Mini BES Test, Functional Reach Test (FRT), and Community Balance & Mobility (CB & M) Scale are direct measurements of standing balance in SCI population with reported psychometric properties.

Conclusion: There is a need for reliable and valid tests to comprehensively assess standing ability in people with SCI, which encompass a range of tasks that have relevance to ADLs.

Keywords: Spinal Cord Injury, Standing Balance Assessment/Measurement, Paraplegia, Rehabilitation, Reliability, Validity.

Introduction

Primarily, the spinal cord injury results from a complete or incomplete damage to the spinal cord, thus leading to variable loss of motor, sensory and autonomic function. While during the rehabilitation, one of the biggest concerns of an individual with spinal cord injury is the scope of standing and walking. Standing is perceived to be a much more realistic goal than walking as it gives various benefits to the individual like prevention of contractures in lower limbs, minimization of osteoporosis, stimulation of circulation, reduction of spasticity and improvement in renal function¹. Hence, for the individual with SCI, the ability to stand and walk is discerned to be the most significant priority.

Balance or postural control can be defined as the ability to control the centre of mass in relation to the base of support and subsequently requires complex interaction of musculoskeletal and neural systems²,³. Standing balance is determined as the measurement which is used for the assessing of the balance and its ability to perform functional activities in standing position. The control of the balance can be divided into three main elements, the ability to maintain a posture, keep control of balance during voluntary movements (proactive) and regain control after unforeseen loss of balance (reactive)²,³. These elements are influenced by many factors, thus affecting the standing balance of a subject with SCI including the lower extremity motor score, spasticity, age, height, sensations in lower extremity, trunk control,
upper limb strength, cardiorespiratory fitness and self-motivation to stand and walk.

To make a good evaluation of balance control in subjects with SCI, it is vital to assess varying elements required for maintenance of posture during static and dynamic movements. Although a customized standing balance and gait training protocol are designed for individuals with spinal cord injury, there are very limited tools to evaluate standing balance of this population.

**Objective:** To identify and review the psychometric properties of the current clinical and biomechanical outcome measures used to assess standing balance in population with spinal cord injury.

**Method**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines have been used for the present review study. Also, the review has no registered protocol.

**Search Strategy:**

**Study Selection Criteria:** Inclusion criteria:

- Adult Participants with acute, subacute, and chronic SCI;
- ASIA Impairment Scale AIS (A-D);
- Measure of balance along with
- Information on its psychometric properties using individuals with SCI

**Exclusion Criteria:** Non-English articles

**Data Sources:** MEDLINE/Pubmed, Research Gate, Scopus, Cochrane from the earliest records to March 2019 were searched for the collection of relevant data. The search items were standing balance measurement/assessment/evaluation, postural stability and spinal cord injury/injuries, paraplegia, and tetraplegia.

**Study Selection:** All three researchers selected the papers after searching with the relevant keywords. Overall, ninety nine articles were extracted for inclusion and exclusion criteria. One author identified twenty one duplicated articles. The other author screened and excluded twenty three articles after exploring and reading the title and abstract. Out of remaining fifty five full text papers, fifteen articles were excluded as those papers mentioned the sitting balance measurement in spinal cord injury. Overall, the screening of the remaining forty full text articles was done by all the three researchers to prevent disagreement. Lastly, references for the selected studies were also searched manually for additional information.

**Data Extraction:** All the articles were scrutinized and read thoroughly in order to extract the relevant information regarding the properties of scale, domain of balance assessed by the scale, scoring criteria, and the subject characteristics on which the scales were utilized. Majorly, reliability and validity were the main psychometric properties which were studied for the scale. Reliability implies whether a scale gives consistent results in a given population. Moreover, it includes internal consistency and reproducibility. While validity is the ability of an instrument to measure an outcome to the degree to which it is intended to measure. The detailed properties of all the instruments/scales were thus explored and highlighted in the study.

**Results**

The search yielded one posturographic parameter- Smart Balance Master along with sixteen clinical outcome measures with varying psychometric properties that directly or indirectly measured standing balance in SCI individuals- Berg Balance Scale (BBS), Walking Index for Spinal Cord Injury-II (WISCI-II), Activity-based Balance Level Evaluation (ABLE) Scale, Functional Independence Measure (FIM), Spinal Cord Injury- Functional Ambulatory inventory (SCI-FAI), Six Minute walk tests(6MWT), 50 foot walk test, Ten meter walk test (10mWT), Two minute walk test (2MWT), Timed up & Go test (TUG) and Mini-Balance Evaluation System’s test (Mini-BESTest), Functional Reach Test (FRT), Community Balance and Mobility Scale (CB & M), Walking Romberg, Timed Standing and Tandem Stance.

Out of these, eight measures were omitted as these were determinants of walking function- (WISCI-II, SCI-FAI, 10mWT, TUG, 6MWT, 2MWT, 50 foot walk test) and measures of functional independence (SCI-FAI, FIM).

Another three clinical measures of balance namely walking Romberg, timed standing with eyes closed and tandem stance were also removed as there is no mentioning of psychometric characteristics in population with SCI.
The remaining six measures were divided into clinical and biomechanical measures of standing balance. For the clinical measures, Berg Balance Scale, Activity-based Balance Level Evaluation scale, Mini-Balance Evaluation System’s test, Functional Reach Test, and Community Balance and Mobility Scale are included. While biomechanical measure was measuring the balance using Smart Balance Master System.

Clinical Measures of Balance: Berg Balance Scale was developed initially to assess balance in elderly population on a set of predetermined tasks. Few studies have established the psychometric properties of the BBS in the SCI population. Recently, one of the crucial studies examined the concurrent validity and interrater reliability of the BBS in the chronic SCI population. In this study of 42 participants, it was discerned that the scores of BBS correlate with Falls Efficacy Scale and motor scores of individuals. Moreover, interobserver reliability was high with reference to each item as well as final score. However, BBS failed to identify difference between fallers and non fallers.

With reference to SCI population, BBS exhibits excellent interrater reliability and concurrent validity with WISCI-II, SCI-FAI, TUG and 10 MWT. In one study, the researcher tried to establish the concurrent validity of the Berg Balance Scale in a sample of 32 ambulatory subjects with AIS D SCI. The validity of BBS was established with WISCI-II, SCI-FAI, 10MWT and TUG. Subsequently, the correlation was high but still BBS showed ceiling effects supplementation of which requires the need of its use along with 10MWT or 2MWT.

ABLE scale is a recently developed scale for the SCI population to assess sitting and standing balance as well as walking abilities. The standing sub scale has 13 items for assessing static and dynamic components of balance. Content validity was established through expert opinion and discriminant validity through the Bonferroni Post hoc comparison.

The MINI BESTestscale (derived from BESTEST) measures the ability of balancing anticipatory and reactive postural control sensory interaction and dynamic gait. Additionally, the components of MINI BESTest were found to strongly correlate with BBS, TUG, SCIM- mobility items and 10 MWT. Also, it could identify individuals walking with without the use of assistive aids, and those who had high/ low concerns about falls. The items were correlated in individuals with Chronic SCI.

The Community Balance and Mobility Scale (CB & M) is designed to assess balance in ambulatory patients who suffer from balance impairments. Furthermore, the scale has been assessed for its use in incomplete SCI but as a retrospective assessment. The scale was perceived to have high correlates with the scores of 6 MWT and moderate with 10 MWT & BBS scores. High internal consistency was further evaluated. CB & M was shown to be a valid measure in SCI patients with high functioning levels.

Standing Functional Reach Test (FRT) has been used to assess the forward and lateral reach in spinal cord injured subjects. The distance reached is thereby measured and assessed as a predictor of balance and falls. Consequently, the test assesses dynamic balance through a single test. Studies show the efficacy of FRT as a measure to predict falls in spinal cord injury subjects along with good intertester reliability.

Biomechanical measure of Standing Balance: The Smart Balance Master System measures static balance, limit of stability and dynamic balance. It uses a force platform to identify a person’s COG and thereby the stability is checked by change in percentage of limits of stability, movement time and path sway. Concurrent validity of SBM was established with BBS in incomplete SCI. High level of association was found with BBS. Consequently, it was concluded that LOS tests of Smart Balance Master system may be used along with BBS to assess dynamic standing balance-ability.

Discussion

Standing, being one of the most integral aspects of function and a major rehabilitation goal after the spinal cord injury is assessed via different tools. Although, the Berg Balance Scale is reported to be the most commonly used one in this population, however, there are few items which are not suited for subjects of SCI. BBS has been widely used and recommended only for patients with AIS C & D. Also, it shows ceiling effects and does not permit the use of assistive devices. Thus, the researchers cautioned that the BBS should be used in with walking tests when assessing a patient for appropriate assistive device use.

ABLE scale showed minimal floor & ceiling effects with multiple overlapping item’s difficulty levels.
Although the scale is able to distinguish individuals after SCI on the basis of functional mobility. Further research will be required to establish the reliability and validity of the scale with existing scales for widespread usage.

MINI Bestest was compared with BBS for assessing balance of walking subjects in SCI. Author recommended MINI Bestest over BBS as no ceiling effect was observed. But the test has only been assessed in AIS D individuals who have the highest functional level in the SCI population along with need for further validation.

Smart Balance Master (Neurocom) assesses balance function during stance with the help of force platform. The researchers have claimed that LOS test of SBM is a relevant balance evaluation tool; however, it has been used in AID individuals. Furthermore, testings required to find test retest reliability of the SBM tests.

Functional reach tests have been proven as a good screening tool for fall risk prediction in ambulatory individuals with spinal cord injury. However, the test measures only dynamic balance. Therefore, it is needed to complement the test with other measures to evaluate all aspects of standing balance.

Community Balance & Mobility Scale is determined as a strong measure of balance in incomplete SCI subjects with high level of functioning which limits its usage in early stages of rehabilitation. Herein, the balance training is initiated and simple components for balance assessment is required. The researchers have thus recommended the testing of CB & M scale in prospective studies in order to check overall efficacy of the items.

Study Limitations: Though the study tried to incorporate all the assessment tools used for standing balance assessment, however, the exclusion of Non-English articles limits the incorporation of all scales. Also, the study does not include assessment of standing balance in paediatric SCI population.

Conclusion

Although Biomechanical and clinical measures of standing balance have been used in individuals with SCI, with BBS being the most commonly used tool in the population. However, there is a need for the development and establishment of psychometric properties of a clinical tool to measure the standing balance in spinal cord injury including the factors that contribute to the achievement of safe, and independent standing in varying environmental contexts.

Conflict of Interest: Nil

Source of Funding: Self sponsored

Ethical Clearance: Taken from Institute Ethical Committee of Amity University.

References
11. Dittuno PL. Walking index for spinal cord injury


Medical Tourism and its Scope in India

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Abstract

Indian healthcare sector is one of the fastest growing sectors. The growth of trade in health care services through medical tourism has led India as an affordable destination. Patients from foreign countries come to India for surgical purposes due to low cost and high quality of hospital services. The country has huge potential to grow up and also expected to grow at a compound annual growth rate of 17 percent from the year 2011 to 2020.

Keywords: Health, healthcare, trade, medical tourism, cost, quality.

Introduction

Privatization of healthcare sector is a strategy for reducing government burden and this strategy was first adopted by USA. Under the pressure of international agencies like World Bank (WB), World Health Organization (WHO), other countries also thumbs up the mercerization policy. In parallel direction, globalization has opened up the scope for trade in healthcare sector. Trade in health care sector intrinsically linked with globalization.

The health care sector is divided into four sub sectors. These sectors are medical and dental services, nursing and midwifery, hospital services and other health services. According to general agreement of trade and services (GATS), there are four modes of doing trade in health care services, such as cross border provision of services, cross border movements of consumers or consumption abroad, commercial presence, cross border movement of service providers. The main focus of the study is concentrated in mode two which is popularly called health tourism or medical tourism.

Researchers have pointed out the global recession as the responsible factor behind commercialization, corporatization and marketisation of health care sector. The process received a boost during the late 1970s and early 1980s and the process was accelerated during the 1980s and 1990s with the growth of the pharmaceutical and medical equipment industries.

People from developed countries and other Asian countries come to India for medical treatment and people from India also go abroad for same purposes. This movement of patients from one place to another place is called as medical tourism. People travel to other countries because they are sick and need medical treatment to get healthy; such treatment includes organ transplant, surgery, dental treatment, medical therapy.

Indian health care is one of the fastest growing sectors. Trade in health care services is a billion dollar profitable industry for India in the twenty first century. Growth of trade in health care services through the medical tourism has led India as an affordable destination. It provides first class world medical care at third world prices.

Patients from foreign countries come to India for surgical purposes due to low cost and high quality of hospital services. The country has huge potential to grow up and expected to grow at a compound annual growth rate of 17% from the year 2011 to 2020.

The paper is explorative in nature. It is a contribution to the existing literature on medical tourism. The main objective of the paper is to find out the influencing factors of medical tourism and also explores the potentiality of medical tourism in India through a brief survey on existing literatures and based on secondary data.

Following the introduction part the paper has two sections, section two contains literature review, and section three contains importance of the study.

Literature Review: This section covers four sub sections including summary and conclusion.
Defining Medical Tourism: World tourism organization (WTO) defines tourism as travelling to and staying in places outside domestic environment for more than one consecutive year for leisure, business and other purposes. Traditionally tourism means travel for pilgrimage to holy places in country side. But in modern concept tourism means travel for leisure, pleasure, business and health. There are different forms of tourism like dark tourism, ecotourism, heritage tourism, health care tourism, medical tourism, space tourism and many more evolving day by day. Health tourism and medical tourism is not same. Medical tourism is a part of health tourism. Health tourism is composed of wellness tourism and medical tourism. The act of travelling abroad to obtain medical, dental and surgical care is called medical tourism. Medical tourism in correct term is the medical, surgical or dental interventions.

Medical tourism is a component of health care tourism. Health care tourism implies travelling outside ones local environment for the maintenance, enhancement and restoration of an individual’s well being in mind and body. It involves relaxation, exercise, massage, cosmetic surgery, operation and reproductive procedures.

Influencing Factors of Medical Tourism: There are many factors both from supply and demand sides which lead the growth of medical tourism. Researchers have finger out some pull factors (supply) for example, country environment like condition of economy, image of the country and status of tourism and healthcare industry and push factors (demand) factors for example, age, gender, income, education, insurance coverage. Moreover, economic, political and regulatory factors like Visa, Tax, as demand side factors and cost, time, quality, and affordability of travelling abroad are supply side factors of medical tourism.

New marketing strategies and innovative technique like telemedicine, internet has predominant impacts on medical tourism. Many hospitals in the world have partnership with travel agencies. It promotes the benefits of various turnkey packages of medical tourism services. Another evidence shows that internet as a driving factor in outsourcing healthcare services and making medical travel a global phenomenon.

Other literatures have shown that Cost and quality of services of medical care is a major factor which leads to growth of medical tourism. For example, study on Bangladesh healthcare system explains about the country’s dependency on India in case of medical care. The study starts with a brief overview of hospital sector has found that about 57 percent of total Bangladeshi patients seeking treatment abroad especially in India in 1999. This is because medical services facilities in Bangladesh are inadequate, and the services quality in India is relatively better than in Bangladesh. It is found that maximum number of patients do not seek visa on medical grounds in order to avoid hassles and take tourist visa to enter India for medical treatment. Another study on India gives a comparative picture of Indian medical care facilities with the world. The topic is starts with a general overview of Indian medical tourism. The author has compared the cost of surgery in India with that of Uk and USA. It shows that India has ability to do a knee replacement surgery at a least cost if we compare it with UK, USA. It also adds that India has same expertise of doctors and same infrastructure as UK, USA. The paper states that Non Resident of India (NRI) has been taking the advantage of Indian medical market because they avoid long waiting lists. Finally the paper wants to state that India offer world class treatment at an economical rate. Thus low cost, high quality and easy access medical alternatives for people across globe are the driving factor of medical tourism. Apart from low cost, other factors like information technology, shorter waiting time and convenient legal issues are the prime factors for the development of medical tourism.

Emergence of Medical Tourism in the world: Travelling abroad for treatment has increased dramatically in the 21th century and is one of the fastest growing exports of trade in healthcare services by the private corporate hospitals. Many places have been growing as an important medical tourism destination in the world.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>India, Thailand, Singapore, Malaysia, Turkey</td>
</tr>
<tr>
<td>Europe</td>
<td>Spain, Germany, Hungary, Poland, Portugal, Greece, Austria</td>
</tr>
<tr>
<td>Latin America</td>
<td>Costa-Rica, Mexico, Panama, Brazil, Argentina, Colombia</td>
</tr>
<tr>
<td>Africa</td>
<td>South Africa</td>
</tr>
</tbody>
</table>

Source: Ministry of Tourism, Government of India, 2013

United States of America is considered as one of the most technically advanced medical health care.
The American healthcare system is the most expensive system in the world\textsuperscript{22}. The Deloitte Centre for health solution report 2015 states that the inbound medical tourism to the United States is approximately $5 billion annually and patients come from the countries like North America, the Caribbean, Europe and the Middle East\textsuperscript{23}. Moreover availability of advanced medical technology and sophisticated training of physicians is the major factors for growth of medical tourism in US\textsuperscript{23}. However the economic recession has had a negative impact on patient’s ability to afford medical care in America\textsuperscript{24}. Therefore, many people from United States started to move outside of the country and consequently Mexico has become the popular destination for the American\textsuperscript{25}. Stomach surgery, eye exams and routine checkups are among major services that Americans are seeking in Mexico\textsuperscript{26}. Another important destination for medical tourism is Malaysia. This country is a primary destination of medical travelers in the ASEAN region around 75 percent of medical tourists from ASEAN region\textsuperscript{27}. Most international patients come from neighboring countries with less developed medical infrastructure such as Indonesia\textsuperscript{27}. From this industry the country has gained a good amount of revenue and it is expected that the revenues from this sector will grow at a compound annual growth rate of around 37 percent during 2012-2016\textsuperscript{28}. There has been increasing cross border trade and travel for health care services to countries such as India, Thailand, Malaysia, Indonesia and Mexico, patients from developed and developing countries for diagnostic, surgical, non- surgical treatment in search of value for money\textsuperscript{29}. The main cause of patients flow from outside is the low medical cost compared to that of developed countries. Foreign patients are motivated to come to developing countries like India, Thailand because of low cost of surgery, less or no waiting time, technology and facilities, quality of services\textsuperscript{30}

**Emergence of Medical Tourism in India:** In Indian history it is found that many learned people from China, Tibet, Greeks, Afghans and Persians came to India to learn curing and preventive therapy. Ayurvedic is a popular medical care method and is world famous. Yoga and Ayurvedic medicine were most popular in India as early as 500 years ago and there was a constant flow of medical voyagers and spiritual students to India to seek the benefits of Yoga and Ayurvedic healing method\textsuperscript{31}. Ayurvedic texts were translated in many foreign languages. Europe, Paracelsus known as father of modern western medicine, but the system of modern medicine is borrowed from Ayurvedic\textsuperscript{31}. The rising cost of health care services and complexity of the procedures in developed countries has given the opportunity for growth of medical tourism in India. India has huge potential to grow up medical tourism sector\textsuperscript{10}. It becomes a new channel for the transfer of medical services from the developed world to developing world\textsuperscript{11}. Evidence shows that American and Europeans frequently travel to India and Thailand for heart and knee replacement surgery\textsuperscript{31}.

**Table 2: Number of tourist arrived in 2003.**

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Medical Tourist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Singapore</td>
<td>2,70,000</td>
</tr>
<tr>
<td>Jordan</td>
<td>1,50,000</td>
</tr>
<tr>
<td>Malaysia</td>
<td>100,000</td>
</tr>
<tr>
<td>India</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Source: Indian Tourism Organization annual report, 2005

Medical tourists travel to India for surgical purposes which enhance the scenario for medical tourism in India. In India there are several hospitals with quality certification, English speaking staff and highly trained physicians and has cost advantage over developed countries. For example; the treatment like cardiology procedures (CABG) surgery cost US $ 7390 in India, cost US $ 15300 in Singapore, cost US $ 10093 in Malaysia and cost US $ 19360 in Thailand. When we compare the cost of CABG treatment in above mentioned countries with that of India, international patient can save 51.7%, 26.8%, and 61.8% respectively. Similarly, the cost of treatment for pace maker single chamber in India is US $ 5394 and that of in Singapore, Malaysia, and Thailand is $ 7450, $6857, $9500 respectively. Thus an international patient can save money in India. The medical cost advantage in Indian medical treatment is an important factor\textsuperscript{2}. 

**Conclusion**

The increasing demand of health care has positive impact on medical tourism industry. Low cost, high quality and easy access medical alternative for the people across world are the driving factor of medical tourism. In India Many patients from developed countries come to India because of low surgical cost. However the country must care about the availability of healthcare resources like doctors, nurses, hospital equipment so that medical tourism can grow at a sustainable way.
Likely Contribution of the Study: Medical tourism is growing in many developing countries. It has provided employment generation and has created an opportunity to grow up other subsidiary services like hotel, restaurant, shopping mall etc.

Medical tourism for healing human body: pain and trouble of human being can be removed through medical care. Medical care facilitates to enjoy a disease free life. Thus development in medical facilities is prerequisite of human life.

Medical Tourism as an Income Source: Medical tourism can be an important source of export income. It helps the country to earn foreign income and the earning income can be used for the development of the economy.

International and Interregional Cash Flow: medical tourism is a global industry. It is an important source of interregional and international cash flow. A recent survey stated that medical tourism fetches an annual growth rate of 25-30 percent annually at global level.

Efficiency: Medical tourism improves the efficiency of business structure and hospital administration. Moreover it promotes professional attitude among hospitals and challenging and rewarding employability.

Source of Funding: Self

Conflict of Interest: Nil

Ethical Clearance: The paper is based on secondary information, collecting from various research papers.

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1. Rama V. Baru. Privatisation of Health Services, a south Asian perspective. Economic and Political Weekly.2003; 38: 4433-4437
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28. Baliga H. Medical tourism is the new wave of outsourcing from India. India Daily. 2006; 21(4): 16-19


Comparative Evaluation of Adherence of Three Different Species of Oral Microflora on Prosthetic Dental: Vitro Study

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²Vrmultispeciality Dental Clinic & Implant Centre, Thane, Mumbai, Maharashtra

Abstract

Background: The knowledge of bacterial and candidal interaction and its adhesion to different dental materials is an important factor to be considered before using it in the oral cavity for rehabilitating any hard or soft tissue. In this study an evaluation and comparison of adherence of three different species of oral microflora on three different dental alloys is seen on broth and artificial saliva as a medium.

Materials and Method: The purpose of this study is to evaluate the effect of different dental alloys on microbial growth in two different mediums (Broth and Artificial saliva). Three different dental alloys: Titanium, nickel chromium and cobalt chromium are selected for the study. A total of 180 samples are taken. They were then autoclaved and studied for microbial adherence of streptococcus mutans, Enterococcus faecalis and candida albicans species. The adherence of the samples tested was checked in ELISA reader at 545nm.

Results: Group 1 Artificial saliva and Group 2 SDA and BHI broth showed Statistical significant values of adherence between the C. albicans, S. mutans and E. Faecalis when compared with titanium, nickel chromium and cobalt chromium dental alloy.

Keywords: Oral microflora, Dental alloys, Adherence, Antibacterial, Antifungal.

Introduction

In advanced dentistry casting alloys like nickel chromium, cobalt chromium and commercially pure titanium (Cp Ti) are widely used for removable or fixed dental prosthesis. Whether it is a cast partial denture, fixed dental prosthesis or implant supported removable or fixed dental prosthesis¹. As per literature, reports state that these dental materials may cause local tissue response such as local allergic reaction, gingivitis, periodontitis in the oral cavity.¹

The knowledge of bacterial interaction and its adhesion to different dental materials is an important factor to be considered before using it in the oral cavity for rehabilitating any hard or soft tissue. Comparative studies done by Antonio et al and other authors on the various microflora and their effect on various dental alloys shows adhesion and antimicrobial activity of dental alloys towards the oral microflora². Dental biofilm also known as dental plaque or oral biofilm caused by oral microflora act as a major etiologic factor in causing gingivitis and periodontitis³. Biofilm formation and bacterial colonization is a continues process which takes plays in oral cavity³. The resultant increase in microbial numbers and its adhesion at the surface have shown to increase and advance the maturation rate of plaque formation⁴. Microbial adhesion towards the surface can be due to Initial non-specific interactions such as electrostatic interaction, vander walls forces and acid base interactions,and also specific interactions such as receptor-lingand binding⁵.
This in vitro study involved a comparison of the degree of bacterial adherence and biofilm formation on three different species of oral microflora on prosthetic dental alloys, thus enabling us to determine which biomaterial had minimal proclivity toward bacterial adherence and biofilm formation.

Materials and Method

Three different dental alloys: Titanium, nickel chromium and cobalt chromium are selected for the study. A total of 180 samples are taken. The samples are divided into two groups each group 1 and group 2. Each group is then further divided into subgroups group 1: a, b, c and group 2: a, b, c.

Fabrication of casting samples: 180 wax pattern samples were fabricated from crown wax on a metal die measuring 2mm in thickness and 1cm in diameter (Figure 1). The wax patterns are casted as per manufacturers instructions. (Figure 2)

Microbiological study: The samples are then suspended in two different materials of Sabaroud dextrose and artificial saliva for testing candida albicans, Broth heart infusion and artificial saliva for E. faecalis and Broth heart infusion and artificial saliva for streptococcus mutans respectively. Each microorganism is then inoculated into their respective culture media and incubated for 18 hours at 37°C. cells along with the samples are then harvested and washed three times in pbs (phosphate buffered saline). The samples are then taken and suspended in the fresh broth medium. and the test species with the test samples are incubated at 37°C for 24 hours. After 24 hours the test tubes containing the microorganism are vortex until the microorganisms are diffused in the medium. The broth is discarded and the samples are again rinsed in pbs (phosphate buffered saline) for three times.

Each sample is then suspended separately in 0.1% Crystal Violet solution and let it stand for 15 mins. The crystal violet solution is then discarded and samples are rinsed in pbs (phosphate buffered saline) for three times. The samples are then dried. after drying the samples are now de-stained using 33% acetic acid (Figure 3). The de-stained solution is then transferred to the ELISA Plate. The absorbance of the de-stained solution Is read at 540 A in ELISA reader. (Figure 4)

Results

Table 1: Pairwise comparison between the micro organism according to the Metal in each medium

<table>
<thead>
<tr>
<th>Medium</th>
<th>Metal</th>
<th>(I) Micro</th>
<th>(J) Micro</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliva</td>
<td>Titanium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>-0.009</td>
<td>0.014</td>
<td>0.83(NS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>0.101</td>
<td>0.014</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>0.110</td>
<td>0.014</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td>Nickel chromium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>-0.222</td>
<td>0.052</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>-0.263</td>
<td>0.052</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>-0.041</td>
<td>0.052</td>
<td>0.72(NS)</td>
</tr>
<tr>
<td></td>
<td>Cobalt chromium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>-0.315</td>
<td>0.087</td>
<td>0.003*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>-0.742</td>
<td>0.087</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>-0.427</td>
<td>0.087</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Broth</td>
<td>Titanium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>0.017</td>
<td>0.023</td>
<td>0.74(NS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>-0.025</td>
<td>0.023</td>
<td>0.53(NS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>-0.042</td>
<td>0.023</td>
<td>0.18(NS)</td>
</tr>
<tr>
<td></td>
<td>Nickel chromium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>-0.135</td>
<td>0.055</td>
<td>0.051(NS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>-0.214</td>
<td>0.055</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>-0.079</td>
<td>0.055</td>
<td>0.33(NS)</td>
</tr>
<tr>
<td></td>
<td>Cobalt chromium</td>
<td>C. albicans</td>
<td>E. Faecalis</td>
<td>-0.064</td>
<td>0.054</td>
<td>0.48(NS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Mutans</td>
<td>-0.275</td>
<td>0.054</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. Faecalis</td>
<td>S. Mutans</td>
<td>-0.211</td>
<td>0.054</td>
<td>0.002*</td>
</tr>
</tbody>
</table>
Table 2: Comparison between the medium according to the Metal in each micro organism

<table>
<thead>
<tr>
<th>Micro</th>
<th>Metal</th>
<th>Medium</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Mean difference (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Albicans</td>
<td>Titanium</td>
<td>Saliva</td>
<td>10</td>
<td>0.322</td>
<td>0.036</td>
<td>0.057 (0.023, 0.092)</td>
<td>0.003*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.265</td>
<td>0.037</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nickel chromium</td>
<td>Saliva</td>
<td>10</td>
<td>0.544</td>
<td>0.059</td>
<td>0.150 (0.098, 0.202)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.394</td>
<td>0.051</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cobalt chromium</td>
<td>Saliva</td>
<td>10</td>
<td>0.461</td>
<td>0.061</td>
<td>0.092 (0.018, 0.166)</td>
<td>0.02*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.369</td>
<td>0.094</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Faecalis</td>
<td>Titanium</td>
<td>Saliva</td>
<td>10</td>
<td>0.331</td>
<td>0.028</td>
<td>0.083 (0.055, 0.110)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.248</td>
<td>0.030</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nickel chromium</td>
<td>Saliva</td>
<td>10</td>
<td>0.766</td>
<td>0.076</td>
<td>0.237 (0.162, 0.313)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.529</td>
<td>0.085</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cobalt chromium</td>
<td>Saliva</td>
<td>10</td>
<td>0.776</td>
<td>0.053</td>
<td>0.343 (0.284, 0.402)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.433</td>
<td>0.072</td>
<td></td>
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</tr>
<tr>
<td>S. Mutans</td>
<td>Titanium</td>
<td>Saliva</td>
<td>10</td>
<td>0.221</td>
<td>0.032</td>
<td>-0.069 (-0.122, -0.015)</td>
<td>0.01*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.290</td>
<td>0.074</td>
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<tr>
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<td>Nickel chromium</td>
<td>Saliva</td>
<td>10</td>
<td>0.807</td>
<td>0.177</td>
<td>0.199 (0.028, 0.370)</td>
<td>0.03*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.608</td>
<td>0.187</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cobalt chromium</td>
<td>Saliva</td>
<td>10</td>
<td>1.203</td>
<td>0.329</td>
<td>0.559 (0.312, 0.806)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broth</td>
<td>10</td>
<td>0.644</td>
<td>0.172</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Metal Die Measuring 2mm in Thickness and 1 cm in Diameter

Figure 3: Samples Destained Using 33% Acetic Acid

Figure 2: Finished and Polished Metal Alloys

Figure 4: Absorbance of Destaine Solution Read in Elisa Reader
Discussion

Dental plaque and biofilm formation on the surface of different dental alloys whether it is a polished surface or and rough surface is s being a major and prime etiologic factor for various dental diseases like dentinal caries and periodontitis\textsuperscript{2,3,6-8}. Colonization of this various bacteria and the initial biofilm formation and then maturation of the plaque starts as soon as this dental material come in contact with oral environment\textsuperscript{9,10,11}. The early plaque formation or acquired pellicle on any surface area mainly contents of various salivary proteins and bacterial enzymes. The process of adhesion begins with a process of interaction of the various bacteria with the salivary proteins at a distance. Also the electrostatic repulsive forces along with van-der-waals attractive forces helps in initial adhesion of the microorganism to the surface\textsuperscript{5,11}. Nickel chromium, cobalt chromium and titanium are the material of choice in doing most of the prosthetic rehabilitation. This material is used in prosthodontics starting from simple cast partial denture to the titanium used for implant supported prosthesis. Their strength, biocompatibility and their ability to form a good bond with the oral environment have kept them in market since ages. Even though research is being carried out on numerous other material like zirconium, ceramic, poly-ether-ether-ketone etc. still these materials are not able to replace the titanium and other dental alloys due to their disadvantages\textsuperscript{13-15}. In the following study conducted we have chosen nickel chromium, cobalt chromium and titanium to check the adherence of various bacteria and fungi species and to evaluate their antibacterial and antifungal activity. In the following study conducted we have chosen nickel chromium, cobalt chromium and titanium to check the adherence of various bacteria and fungi species and to evaluate their antibacterial and antifungal activity. Numerous study was done on nickel chromium alloy for its cause as an allergic reactant. The result showed that the allergic reaction was due to the beryllium content. Hence for this study we have used a beryllium free nickel chromium alloy\textsuperscript{13-15}. Implanted supported prosthesis are a boon to dentistry and implants are replacing various other options of prosthetic treatment whether it is complete denture or removable or fixed dental prosthesis. Among this various factors plaque formation around implants and bacterial adhesion over implant surface has lead it to marginal bone loss around implant. If not treated it further lead to peri-implantitis and thus implant failure\textsuperscript{2,15}. Riley and Meein 1982 examined the activity of bacteroides species against similar metal. The study was conducted on Comparison between activities of cobalt, nickel, mercuric and chromium chlorides these samples were tested against all the microorganisms and it was seen that all the test showed similar activities\textsuperscript{14}. In the present invitro study done may be of clinical importance as the adherence of candida albicans, E. Faecalis, Streptococcus mutans tested on titanium alloy samples showed a statistically significant lower values of adherence when comparison was done between nickel chromium and cobalt chromium alloy samples. This might be stated that titanium has an inhibitory effect on various different microorganisms\textsuperscript{16}. Also a three-year study done by Adell et al 1986 on titanium abutment and teeth gave the result that the microflora appearing on the titanium abutment were different from the microflora appearing on the human dentition. They concluded as surface energy and its characteristics of the titanium dental alloy may influence the accumulation of the oral microflora. In the following study conducted comparison of titanium dental alloy with different dental alloys was done. The comparison wherein the result showed a statistical significant values\textsuperscript{17}. Our present study mimics the oral environmental condition such as oral microorganism and saliva. Also the factors which influence the bacterial adhesion to the surface such as culture medium used, condition of the culture, culture of the species of microorganism, incubation time, environment of the culture medium after inoculation and the growth of the microorganism were also considered. The result of this study showed interaction between the nature of the microorganisms studied, the culture medium i.e. artificial saliva and broth medium (sda broth and bhi broth) and the dental alloy. The role of each microorganism in the oral environment plays a major role whether to create the oral environment into the disease state or maintain the oral environment into biologically healthy state when any restorative material is suspended into this environment. Considering E. Faecalis in particular, this microorganism plays a major role in peri apical lesion or apical periodontitis. previous studies have shown that E. Faecalis enters the root canal space via the dentinal tubules which may also lead to infection of the root canal space. This Studies have also contributed in stating that these species can also spread infection to the treated root canal teeth at the apical region of root.
From the prosthodontic point of view it is an important consideration applied while restorative the prosthesis from crown and bridge, as this microorganism have the ability to enter via dentinal tubules. The prosthetic part replaced in the oral cavity should have all the ability to resist the adherence of such species. Present study showed the effect of adherence of E. faecalis on titanium, nickel chromium and cobalt chromium in two different medium. The result showed a statistically significant value when all the three factors were considered the least adherence of E. faecalis were seen with titanium alloy followed by cobalt chromium alloy. Whereas the highest adherence value was seen nickel chromium alloy. Considering the nickel chromium and cobalt chromium there was no statistical significant relation was seen. Hence titanium alloy can be considered as a metal of choice for fabrication of restorative materials like custom made post or copings fabricated for single crown and fixed dental prosthesis.

Antimicrobial activity of various metals have been studied with different species of microorganisms. One of the study done by Hwang et al to see the antimicrobial activity on orthodontics appliances showed a positive result on S. mutans bacteria. Streptococcus mutans is involved and designated to form decay. When silver ion were studied with streptococcus mutans the result showed that the adherence of S. mutans was very less also the silver ion showed an antimicrobial effect on this species. In the following study the same effect has been studied to see the antibacterial effect of Streptococcus mutans on titanium, nickel chromium and cobalt chromium dental alloy. There was stastical significant result was seen of the adherence of the S. mutans on the dental alloys being studied. When comparision was done least adherence value was seen with respect to titanium alloy followed by nickel chromium. The highest value of adherence was seen with the cobalt chromium alloy. This indicates that there may be more antibacterial effect seen by titanium alloy followed by nickel chromium and cobalt chromium alloy.

Formation of dental plaque is a multifactorial facet. With initialization of biofilm formation on tooth surface and the restorative surface of the dental alloys used in fabrication of these prosthesis. The present study result showed a statistical significant value of adherence of the microorganism to the dental alloys, irrespective of the surface of the dental alloys being polished or not polished.

### Conclusion

The results of the present study showed that microbial adherence is seen least with titanium alloy compared to nickel chromium and cobalt chromium alloy.

- Estimating the metal as a factor adherence was more for cobalt chromium alloy flowed by nickel chromium alloy and least for titanium alloy.
- Estimating the microorganism as a factor least adherence was seen with candida albicans and highest adherence was seen for Streptococcus mutans followed by E. faecalis.
- Estimating the medium as a factor highest value of microorganism was seen in saliva medium compared to broth medium.

Within the limitation of this study it can be concluded that the antibacterial and antifungal effect seen with titanium alloy was more compared to nickel chromium alloy and cobalt chromium alloy.

### Ethical Clearance: Taken (attached a copy).

### Source of Funding: Self

### Conflict of Interest: Nil

### References


Quality of Life and Quality of Sleep among Post CABG Patients

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Abstract

Introduction: Coronary artery bypass grafting (CABG) surgery is one among the most common procedures performed in the world, and it is one of the possible treatments for coronary artery disease (CAD). A study to assess the quality of life and quality of sleep among post coronary artery bypass grafting (CABG) patients was done in Amrita Institute of Medical Science, Kochi. Objectives of the study were to (1) identify quality of life among post CABG patients (2) identify the quality of sleep among post CABG patients (3) find out the correlation between quality of life and quality of sleep among post CABG patients (4) Find the association between quality of life and selected demographic variables among post CABG patients (5) Find the association between quality of sleep and selected demographic variables among post CABG patients.

Methodology: A quantitative approach with a descriptive correlational design using a non-probability convenience sampling technique was used to collect data from 101 post CABG patients. The setting used for the study was CVTS OPDs at AIMS, Kochi. A standardized quality of life questionnaire and quality of sleep (Pittsburgh sleep quality index) tool was used for the assessment along with a semi-structured questionnaire to assess socio-demographic and clinical data.

Results: The study result showed that the majority of samples (97%) had good QOL with mean score of 69.22. PCS (96%) showed higher value than MCS (68.3%). Considering sleep 61.4% expressed good quality of sleep. There was a significant weak negative correlation between QOL and quality of sleep (r = -0.246). Hence as QOL increases and quality of sleep increases. Also a significant association found between QOL and socio-demographic variables like occupation (p=0.018), association between sleep and socio demographic variables like occupation (p=0.05).

Conclusion: Overall QOL and quality of sleep improved after CABG.

Keywords: Quality of life, Quality of sleep, CABG.

Introduction

Coronary artery bypass grafting (CABG) is an established and highly effective therapy for coronary artery disease. CABG has been effective than the medical therapy, for the relief of angina pectoris(1).

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The first coronary artery bypass operation in human being was using a saphenous vein graft and coronary artery anastomosis was performed in November 1964 by Garrett and Debakky(2). In spite of general decline worldwide, off-pump coronary artery bypass grafting (CABG) surgery is performed in more than 60% of patients undergoing CABG in India; mainly because of shorter operative time and reduced procedure cost(3).

Sleep is considered as an altered state of consciousness in which the individual’s perception and reaction to the environment are decreased. Normal sleep required for an adult is 6-8 hours. The person having coronary artery disease may show sleep disturbances.
This cause changes in quality of life, behavioural pattern, loss of appetite and mood changes. The common sleep disorders identified among post CABG patients are insomnia, sleep apnoea, circadian rhythm, sleep disorders, restless leg syndrome, sleep disorders secondary to medical and surgical disorders.

Pain, stress, anxiety, and sleep disorders are common after surgery. All of these factors can compromise treatment and quality of life following surgery. Evidence indicate that patient’s quality of sleep after heart surgery is frequently poor, particularly during the postoperative period and that patients experience high level of sleep disruption, irregular sleep cycles, and reductions in slow wave sleep.

Although the effectiveness of coronary artery bypass grafting (CABG) is being evaluated in terms of mortality, complications or recurrence of symptoms, empirical studies assessing the change in patients quality of life (QOL) after CABG need to be studied as findings keep changing as time progress. A systematic analysis of how well the patient is considering a multiple variable need to be studied which has greater impact in improving the overall performance of the patients after CABG.

Behrouz far, Nezafati (2009) conducted a descriptive study to assess the relationship between sleep patterns and the quality of life in CABG patients at Iran. 91 patients selected for the study, Samples were selected in three phases 24 hours before surgery, as well as 6 and 10 weeks after surgery. Interview checklists were used for data collection. Three scales were used, Pittsburgh sleep quality index, Epworth sleepiness scale and sleep log and quality of life was measured with 36 short forms. The first two interviews were done at the hospital clinic and the last through telephone. The result showed that mean score of sleep in all three stages were normal and mean score of quality of life was in the mid one-third of 0-100 scale. No significant differences were found between on-pump and off pump groups in their sleep patterns and quality of life. All three stages, sleep quality positively and significantly correlated with quality of life p< 0.001, p=0.002 and p=0.004 respectively. The significant positive correlation existed between sleep efficiency and quality of life p< 0.001, p=0.002 and p=0.005 respectively. Finally, the researcher concluded that a significant and positive correlation between sleep pattern and quality of life in CABG patients.

Material and Method
Quantitative research approach with descriptive correlational design was used to identify the QOL and sleep among post CABG patients. The study was conducted among 101 post CABG patients after one year of surgery and coming for follow up in CVTS OPDs of Amrita Institute of Medical science, Kochi. The subjects were selected by non-probability convenience sampling technique. The data were collected using semi-structured questionnaire to assess the socio-demographic characteristics, SF-36 standardized tool to assess the quality of life of post CABG patients and PSQI standardized tool to assess the quality of sleep of post CABG patients. The content validity was obtained from 7 experts. The tool was found to be valid. Informed written consent was obtained from the samples after explaining the purpose of the study. Data was collected in CVTS OPD. Anonymity and confidentiality of samples were maintained. A pilot study was conducted among 10 samples who met the eligibility criteria. It was found that the research design was appropriate, research tools were valid and reliable and the study was amendable to statistical analysis. The data was analyzed using descriptive and inferential statistics.

Results
Section I: Description of sample characteristics:
In this study the majority of sample 65(64.4%) were under the age group of 61-70 years. In gender, majority of sample were male 92 (91.1%). Most of the sample 58(57.4%) were married & 46 (45.5%)were having high school education. The data illustrated that most of the samples were unemployed, retired 27(26.7%) and 25(24.8%) were private employed. When considering the food habits most of the 80(79.2%) sample were non vegetarian. The majority 92(91.1%) of the sample were belongs to nuclear family. Among 101 samples the common types of surgery were OFF pump 85(84.2%). Consider the indications of surgery majority were having triple vessel disease 76(75.3%) and were having normal EF 78(77.2%). Regarding smoking habit majority of the samples were ex-smoker 65(64.4%) and 62(61.4%) were ex alcoholic. Among the samples 95(94.1%) had normal BMI. Considering the complications majority 60(59.4%) were had no complications after CABG. Considering the hours of sleep per day most of them had 6-8 hours of sleep.
Section II: Description of QOL assessment of post CABG patients

Table 1: Description of quality of life among post CABG patients n=101

<table>
<thead>
<tr>
<th>Quality of Life</th>
<th>Minimum value</th>
<th>Maximum value</th>
<th>Good QOL(%)</th>
<th>Poor QOL(%)</th>
<th>Mean value</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall quality of life (QOL)</td>
<td>39</td>
<td>94</td>
<td>97</td>
<td>3</td>
<td>69.22</td>
<td>9.368</td>
</tr>
</tbody>
</table>

Figure 1: Bar diagram representing distribution of samples based on components of quality of life n=101

Figure 2: Bar diagram representing quality of life based on domains of physical components n=101

Domains of Physical components

Figure 2: Bar diagram representing quality of life based on domains of physical components n=101
Section IV: Correlation between the quality of life and sleep among patient after Coronary Artery Bypass Grafting

Table 3: Correlation between QOL & quality of sleep n=101

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of life</td>
<td>-0.246*</td>
</tr>
<tr>
<td>Quality of sleep</td>
<td></td>
</tr>
</tbody>
</table>

*significant at 0.05 level

Section V: Association between quality of life and selected demographic variables: The association between QOL and selected demographic variables like age, gender, marital status, education, income, diet pattern and type of family were not statistically significant with p value of 0.05 level. Whereas occupation showed statistically significant (0.05).

Discussion

The first objective was to identify the quality of life among post coronary artery bypass grafting patients: The results from the present study showed that overall quality of life of post CABG patients 97% had good quality of life with mean score of 69.22 and standard deviation 9.368. Considering the physical component summary 96% samples had good quality of life with mean score 77.98, and mental component summary 68.3% samples had good quality of life with mean score 57.07. That means PCS higher than MCS.

The similar findings were observed in a descriptive study conducted by Anastasios Merkouris, Dimitrios Pistalos to assess the QOL after CABG patients at Greece in 2008. The findings showed that the overall QOL of patients was improved, good level of QOL with an average score of 80.4.\(^{(8)}\)
The present study findings are contradictory to a study findings done by Lee GA conducted a cohort study to assess the patients reported health related quality of life five years post CABG at Australia in the year 2008. The findings showed that good level of QOL with an average score of 66.02%. MCS (53.6) was higher than PCS (45.8). PCS had poor QOL and MCS had good QOL(9).

The second objective was to identify the quality of sleep among post coronary artery bypass grafting patients: The results from the present study showed that good quality of sleep was observed in 61.4% and 38.6% had poor quality of sleep with a mean score 5.02.

Hikmet Yilmaz, Ihsan Iskesen conducted a descriptive study to assess the Sleep Characteristics of Patients After Cardiac Surgery at Turkey in 2015. The finding showed that immediate post-operative period sleep quality was poor, after 6 weeks that improve the sleep after CABG(10).

The third objective was to find the correlation between the quality of life and quality of sleep among post Coronary Artery Bypass Grafting patients: The present study result found that there is a significant weak negative correlation (r=-0.246) between QOL and quality of sleep. Thus referred as the quality of life increases with increase quality of sleep. Negative correlation means quality of life increases quality of sleep decreases, but in this study quality of sleep questionnaire (PSQI) had reverse scoring, that means lowest score of sleep indicate good quality of sleep and highest score of sleep indicate poor quality of sleep. Majority of the samples had lowest score, that shows that good quality of sleep.

The above findings were supported by the quantitative descriptive study conducted by Ulla.M. Edell, Jerker to assess the sleep and QOL among post CABG patients at Sweden in 2000. The study include 38 male patients aged 45-68 underwent CABG. The Nottingham Health Profile (NHP) instrument demonstrated that 6 months after surgery the QOL was significantly improved. The findings showed that improve the sleep one month after CABG(11).

The forth objective was to find the association between the quality of life and with selected socio demographic variables

Taghipour H.R conducted a descriptive study to assess the QOL one year after CABG at Iran in 2011. The result showed that mean age of patients was 61.4, most of them were males. On pump surgery had better general health than off pump surgery 47.9 (p=0.024). Negatively correlated with EF r=-0.220. Chi-square value is 0.19(12).

Conclusion

Overall quality of life and quality of sleep improved one year after CABG. Majority of the samples expressed more physical wellbeing than of emotional wellbeing hence forth, there is an alarming need to give a holistic care for patients.

Conflict of Interest: Nil

Source of Funding: Self

Ethics and Consent: Ethical clearance obtained from institutional ethical committee of Amrita Institute of Medical Sciences, Kochi for conducting this study. Consent obtained from patients and bystanders.

Reference
1. Susan.SW, Erika, Sivarajan F. Cardiac Nursing; vol (2). Lippincott;2005. p: 541,184,190,753,567
8. Lee GA. Patients reported health-related quality of life five years post coronary artery bypass graft
Effectiveness of Sublingual Versus Oral Misoprostol for Induction of Labour at Term

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Abstract

Objective: To compare the efficacy and safety of 50 microgram (\(\mu\)g) sublingual Misoprostol with 50 microgram (\(\mu\)g) oral misoprostol for labour induction at term.

Method: One hundred twenty women with medical or obstetric indication for induction of labour at term with unfavorable cervix were randomized to receive 50mcg of misoprostol either orally or sublingually. Primary outcome was number of women delivering vaginally within 24hrs of induction. The need for oxytocin, mode of delivery, doses of Misoprostol required and neonatal outcomes were analyzed and compared between the groups.

Results: Induction to vaginal delivery time was < 24hours in 43(71.7\%) in sublingual group and 36(60\%) women delivered vaginally in < 24hours in oral group. No significant difference was found in the number of women delivering vaginally within 24hrs of induction among both the groups. Time from administration of first dose to delivery in sublingual group was lesser compared to oral group. 46.7\% of women required oxytocin in sublingual groups, whereas 75\% in oral group which was statistically significant. Sublingual group had lesser number of women requiring more than 1 dose of misoprostol compared to the oral group.

Conclusion: Sublingual misoprostol seems to be having better efficacy than the oral misoprostol and has lesser induction to delivery interval. Hence can be considered to induce labour at term for ripening of cervix.

Keywords: Sublingual administration; oral administration; misoprostol; induction; labour.

Introduction

“Induction of labor is defined as intervention designed artificially to initiate uterine contractions leading to progressive dilatation and effacement of the cervix and birth of the baby”.\textsuperscript{(1)} Induction is indicated when the mother and fetus are benefited with higher chance of healthy outcome than the birth being delayed. \textsuperscript{(1)} Misoprostol is commonly used for induction of labor as it is stable at room temperature and has rapid onset of action. It can be administered in oral, sublingual or rectal routes. The efficacy of misoprostol varies with different routes of administration due to change in their pharmacokinetics. Sublingual route has better efficacy compared to other routes as it bypasses enterohepatic circulation and has lesser hyperstimulation rates.\textsuperscript{(2)} The objectives of the study were to compare the efficacy of 50microgram of sublingual Misoprostol with 50microgram of oral misoprostol for labor induction at term, number of women delivering vaginally within 24 hours of the induction, induction to delivery interval and adverse effects and neonatal outcomes in two groups.

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Phone No.: 09886792043
Method

This hospital based non blinded randomized comparative study was conducted in the Department of Obstetrics and Gynecology department in a medical college in Karnataka over a period of one year six months between September 2014 and March 2016 after approval from the Institutional Ethical Committee of Kasturba Medical College, Manipal University, Mangalore. Informed and written consent was obtained from the women on a predesigned consent form.

Statistical Analysis: Sample size was taken as 120 women with term gestation with indications for labor induction 60 in each group. Fisher’s exact test and chi square test were applied for the statistical analysis. A statistical package SPSS version 17.0 is used to do statistical analysis. P value < 0.05 is considered to be significant.

Women were admitted in the hospital after satisfying the inclusion criteria. Demographic details such as age, height, weight, parity, gestational age and amniotic fluid index (AFI) and indication for induction were noted. They were randomized to receive either 50 mcg of sublingual (Group A) or 50 mcg of oral misoprostol (Group B) every 4th hourly till a maximum of three doses. A pelvic examination was done to assess the Bishop’s score which was followed by a 20 minute Non stress test (NST) to rule out non-reactive fetal heart rate. Fetal and maternal monitoring was done by clinical auscultation of fetal heart rate and monitoring uterine contractions. Vaginal examination was done every 4 hours to assess Bishop’s score. The dose was repeated every 4 hours, a maximum of 3 doses were given. No significant difference was found between the two groups. Most of the participants were in the age group of 18-26 years i.e. 45 (75%) and 37(61.2%) in Group A and Group B respectively. Most of the patients were nulliparous accounting to 80% in sublingual group and 70% in oral group. Induction to vaginal delivery time was < 24 hours in 43(71.7%) in sublingual group and 36(60%) women delivered vaginally in < 24 hours in oral group. No significant difference was found in the number of women delivering vaginally within 24hrs of induction among both the groups (Table 2). Time from administration of first dose to delivery in sublingual group was 11hrs 16min with standard deviation of 4hrs 15min, while in oral group the mean time from induction to delivery was 15hrs 15min with standard deviation of 6hrs 30min and was found to be statistically significant. These observations suggest that there was increased induction to delivery interval when misoprostol was used by oral route compared to sublingual route (Table 3).

Inclusion criteria were women in the age group between 18-35 years, live singleton pregnancy at term gestation (gestational age of > 37 weeks) with medical or obstetric indication for induction, cephalic presentation, unfavorable cervix (Bishop’s score ≤ 6) and reassuring fetal heart tracing. Exclusion criteria were cephalopelvic disproportion, history of caesarean section or any uterine surgery, multiple gestations, malpresentation, hypersensitivity reactions for prostaglandins, contra indications for prostaglandins usage (e.g. Asthma) and parity > 4.

The Primary outcome studied were number of women delivering vaginally within 24 hours. The Secondary outcome analyzed include time interval between induction to vaginal delivery, number of misoprostol doses required, patients requiring oxytocin augmentation, failed inductions, number of caesarean section, neonatal outcomes-meconium stained amniotic fluid, non reassuring fetal heart status, Apgar score at 1 and 5 min and NICU admissions and side effects like uterine hyperstimulation, gastrointestinal disturbances and pyrexia.

Results

A total number of 120 women with term pregnancy were included and 60 women were assigned to receive a 50 mcg sublingual misoprostol and 60 women are assigned to receive a 50 mcg oral misoprostol.

Table 1 shows the indication of labor in both the study groups. Main indications for labor induction were postdatism and premature rupture of membranes. No significant difference were found between the two groups. Most of the participants were in the age group of 18-26 years i.e. 45 (75%) and 37(61.2%) in Group A and Group B respectively. Most of the patients were nulliparous accounting to 80% in sublingual group and 70% in oral group. Induction to vaginal delivery time was < 24 hours in 43(71.7%) in sublingual group and 36(60%) women delivered vaginally in < 24 hours in oral group. No significant difference was found in the number of women delivering vaginally within 24hrs of induction among both the groups (Table 2). Time from administration of first dose to delivery in sublingual group was 11hrs 16min with standard deviation of 4hrs 15min, while in oral group the mean time from induction to delivery was 15hrs 15min with standard deviation of 6hrs 30min and was found to be statistically significant. These observations suggest that there was increased induction to delivery interval when misoprostol was used by oral route compared to sublingual route (Table 3).

In sublingual group, 45 (75%) required a single dose of Misoprostol for labor induction compared to 31 (51.7%) in oral group. In oral group, 29(48.3%) of the women required more than 1 dose of misoprostol compared to the sublingual group with p value of 0.029 which was statistically significant. In sublingual group, 53.3% of women did not need oxytocin for augmentation...
of labor where as in Oral group, 75% of women required oxytocin (Table 4).

In sublingual groups, failed induction was observed in 8(13.3%), where as in oral group it was 9 (15 %) and the result was not statistically significant. Number of women delivered vaginally was 44 (73.3%) in sublingual group and 40 (66.7%) in oral group. Cesarean delivery was 26.7% in sublingual group and 33.3% in oral group with a p value of 0.426 which was not statistically significant.

Most common indication for Cesarean delivery was failed induction in 8 (50%) in sublingual and 9 (45%) in oral group which was not statistically significant. Other indications were meconium stained amniotic fluid, non reassuring fetal heart status and secondary arrest of descent. Table 5 compared the neonatal outcome in both the groups. Meconium stained amniotic fluid, non reassuring fetal heart status, meconium stained amniotic fluid, non reassuring fetal heart status, low APGAR scores and NICU admissions were the neonatal outcomes and there were no statistical significance found among the two groups.

The most common side effects among both the groups were GI disturbances in 2(3.3%) sublingual and 6(10%) in oral group and pyrexia in 1(1.6%) sublingual and 3(5%) in oral group which was not statistically significant. There was no hyperstimulation noted in any of the cases in both the groups.

### Table 1: Indications for induction and their distribution in both study groups

<table>
<thead>
<tr>
<th>Indication for Induction</th>
<th>Sublingual Misoprostol N (%)</th>
<th>Oral Misoprostol N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post datism</td>
<td>30 (50)</td>
<td>36 (60)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Oligohydramnios</td>
<td>5 (8.3)</td>
<td>2 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Hypertension in pregnancy</td>
<td>4 (6.7)</td>
<td>3 (5)</td>
<td></td>
</tr>
<tr>
<td>PROM</td>
<td>21 (35)</td>
<td>19 (31.7)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: No. of women delivered vaginally within 24hrs of induction

<table>
<thead>
<tr>
<th>Induction to Vaginal delivery time</th>
<th>Sublingual N (%)</th>
<th>Oral N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 24 hours</td>
<td>43 (71.67)</td>
<td>36 (60)</td>
</tr>
<tr>
<td>&gt; 24 hours</td>
<td>1 (1.6)</td>
<td>4 (6.6)</td>
</tr>
<tr>
<td>Total</td>
<td>44 (73.3)</td>
<td>40 (66.6)</td>
</tr>
</tbody>
</table>

*p value < 0.05 is considered significant

### Table 3: Time from induction to delivery

<table>
<thead>
<tr>
<th>Induction to delivery time</th>
<th>Sublingual Group</th>
<th>Oral Group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>11 hour 16 min</td>
<td>15 hour 15 min</td>
<td>0.001*(s)</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>4 hours 15 min</td>
<td>hours 30 min</td>
<td></td>
</tr>
</tbody>
</table>

*p value < 0.05 is considered significant: s: significant

### Table 4: No. of women required oxytocin augmentation

<table>
<thead>
<tr>
<th>Oxytocin augmentation</th>
<th>Sublingual N (%)</th>
<th>Oral N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not required</td>
<td>32 (53.3)</td>
<td>15 (25)</td>
<td>0.001(s)</td>
</tr>
<tr>
<td>Required</td>
<td>28 (46.7)</td>
<td>45 (75)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

*p value < 0.05 is considered significant: s: significant

### Table 5: Neonatal outcomes among both the study groups

<table>
<thead>
<tr>
<th>Neonatal Outcome</th>
<th>Sublingual N (%)</th>
<th>Oral N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSAF</td>
<td>5 (8.3)</td>
<td>9 (15)</td>
<td>0.225 (NS)</td>
</tr>
<tr>
<td>NRFHS</td>
<td>3 (5)</td>
<td>4 (6.7)</td>
<td>0.697 (NS)</td>
</tr>
<tr>
<td>APGAR 1min &lt; 9</td>
<td>1 (1.7)</td>
<td>5 (8.3)</td>
<td>0.209 (NS)</td>
</tr>
<tr>
<td>APGAR 5min &lt; 9</td>
<td>1 (1.7)</td>
<td>1 (1.7)</td>
<td>1.000 (NS)</td>
</tr>
<tr>
<td>NICU admission</td>
<td>1 (1.7)</td>
<td>0 (1.7)</td>
<td>(NS)</td>
</tr>
</tbody>
</table>

*MSAF: meconium stained amniotic fluid, NRFHS: Non reassuring fetal heart rate, *NS: Not significant

### Discussion

The present study was a prospective study designed to study the effectiveness of the sublingual and oral misoprostol for term induction of labor. Post-datism and PROM were the most common indications for induction. Similar indications for induction of labor were noted in other studies.\(^{(3-5)}\)

Forty three (71.6%) women delivered vaginally within 24hours of induction with sublingual misoprostol compared to 36 (60%) women in oral group. According to the study conducted by Bartusevicius and colleagues, there was no statistical difference noted among women delivering vaginally within 24hours of induction with 50 mcg of sublingual misoprostol or 25 mg of vaginal misoprostol. 58 women (83%) in the sublingual group and 53(76%) in the vaginal group delivered vaginally within 24 hours.\(^{(4)}\)
In the present study, time from administration of first dose to delivery in sublingual group was 11hrs 16min, in oral group the mean time from induction to delivery was 15hrs 15min and was found to be statistically significant. These results suggested that induction to delivery interval was increased when misoprostol was used by oral route compared to sublingual route. Similar results were observed in other studies.(4,5) Humaira Zaman Malik and colleagues compared 100 µg oral misoprostol with 50 µg sublingual misoprostol for induction of labor, they observed that 92% women delivered within 12 hours of induction in sublingual group and 84% of women in oral group.(6) In sublingual group, 45 (75%) required a single dose of Misoprostol for labor induction compared to 31 (51.7%) in oral group. In oral group, 29 (48.3%) of the women required more than 1 dose of misoprostol compared to the sublingual group. In sublingual group, 53.3% of women did not need oxytocin for augmentation of labor where as in Oral group, 75% of women required oxytocin. These results were comparable to other studies.(4–7)

In sublingual groups, failed induction was observed in 8(13.3%), where as in oral group it was 9 (15 %) and the result was not statistically significant however in H.Z.Malik study, there were no cases of failed induction in both the groups.(6) Number of women delivered vaginally was 44 (73.3%) in sublingual group and 40 (66.7%) in oral group. Cesarean delivery was 26.7% in sublingual group and 33.3% in oral group with a p value of 0.426 which was not statistically significant whereas Bartusevicius and colleagues observed in their study, that there were no difference in the mode of delivery among both the groups. Seven(10%) in the sublingual group and 8(11%) in the vaginal group underwent emergency cesarean section for non reassuring fetal heart status.(4) In a study conducted at Mashhad University of Medical Sciences, where 25 µg vaginal misoprostol was compared with 25 µg sublingual misoprostol for induction of labor, women underwent cesarean section due to non establishment of active labour.(8)

The most common side effects among both the groups were GI disturbances in 2(3.3%) sublingual and 6(10%) in oral group and Pyrexia in 1(1.6%) sublingual and 3(5%) in oral group which was not statistically significant. There was no hyperstimulation noted in any of the cases in both the groups. In a study done by Sedigheh A and coworkers, Tachysystole, vomiting and abdominal pain were the common side effects in both the groups. Abdominal pain and vomiting were more in sublingual group than vaginal group.(9)

Meconium stained amniotic fluid, non reassuring feta heart status, low APGAR scores and NICU admissions were the neonatal outcomes and there were no statistical significance found among the two groups. Similar results were noted in other studies.(5,6,10,11) According to Bartusevicius and colleagues, neonates were admitted in NICU for neonatal respiratory distress syndrome in the sublingual group and congenital infection and neonatal respiratory distress syndrome in the vaginal group.(4)

Conclusion

Sublingual misoprostol has better efficacy than the oral misoprostol and has shorter induction to delivery interval. It can be considered for ripening of cervix before induction of labor in high risk conditions and prolonged pregnancies.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support

References


A Cross Sectional Assessment of Tuberculosis (TB) Related Knowledge and Awareness among Urban Slum Dwellers in Wardha District

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Abstract

Introduction: Risk factors for spread of Tuberculosis such as overcrowding and unhygienic environment, poverty and social taboos are more prevalent in urban slums. Hence, to assess awareness about TB in slum community becomes important in program planning as awareness plays vital role for Tuberculosis prevention and control.

Objectives: To study the knowledge and awareness about Tuberculosis among urban slum dwellers.

Methodology: This community based cross-sectional study was conducted in four urban slums of Wardha district, Maharashtra during three months (January-March 2019). We visited house to house in the slum areas; and dwellers available at home and willing to share their knowledge on TB were involved. Total 169 people were interviewed with the help of pre-structured questionnaire which includes awareness about symptoms, mode of spread, prevention, and treatment of TB.

Result: Among 169 dwellers, 111(65.68%) were male and 58(34.32%) were female. About 20(11.83%) respondents never heard about TB. Those 149(88.17%) who heard about TB; for 87(51.48%) dwellers, commonest source of information was friends and family, followed by mass media. Most of them, 132(78.11%) knew that TB spreads through air inhalation of droplet. Cough is a main symptom of TB was informed by 128(75.74%) respondent whereas 56(33.14%) replied for fever >2 weeks. Notably, 150(88.76%) participants indicated that government PHC/CHC/District Hospital is the place for management, whereas 37(21.89%) responded towards private practitioners. Awareness level was significantly high among male than female and among literate than illiterate.

Conclusion: Slum dwellers are vulnerable to get infected with TB or converted to disease status. Although awareness level for TB was found to be relatively satisfactory among the most of the slum dwellers, it was not absolute. There is scope to increase knowledge by conducting awareness activities or augmenting community visits by health workers in slum areas. This will increase the knowledge of habitat female group and illiterate which was observed to be significantly less satisfactory.

Keywords: Tuberculosis (TB), Awareness, Urban Slum community

Introduction

Tuberculosis is an ancient disease, and drugs are discovered so long back, still we are struggling to eliminate it. As per Global TB report of 2015, its incidence has dropped by an average of 1.5% per year since 2000, and effective diagnosis and treatment of TB
In 2015, worldwide incidence of TB cases was 104 lakh and; in India, it was 28 lakh. India accounts for highest number of mortality; global mortality due to TB in 2015 was 14 lakh; whereas in India, it was 4.8 lakh. As per Global TB report 2016, the highest burden of both TB and MDR TB was estimated in India. its incidence in India was about one fourth of the global burden. Globally, in 2017, 10.0 million people developed this disease, where India contributed incidence about 27%.

The Global Plan to Stop TB; first in 2001–2005 and the second in 2006–2015 were an important step in achieving the ultimate goal of ‘Elimination of TB by 2050’ i.e. one case per million. The Stop TB Strategy acts as a framework to channel national program for effective control. TB program strategy seeks to strengthen health systems (infrastructure), capacity building of health workforce, engage all care providers (Private stream and NGO), promote research and funding; and empower people with TB and communities.

Tuberculosis is more prevalent in marginalized community such as urban slums or tribal regions. Risk factors for spread of TB such as overcrowding, unhygienic environment, poverty; along with social taboos are more prevalent in urban slums. TB spread can be prevented, if community knows about its mode of spreading. TB can be easily controlled if people are able to recognize at least common symptoms. National health programs playing vital role in prevention and control of TB, however community awareness for basic knowledge on TB such as mode of spread, symptoms, progress and treatment availability is equally important to accelerate the programs goals. Hence, we planned to assess awareness about Tuberculosis in slum community.

Objective: To assess the knowledge and awareness about Tuberculosis among the urban slum dwellers.

Methodology: Study Design and settings: This community based cross-sectional study was conducted in urban slum of Wardha district, Maharashtra during three months (January-March 2019). Four slum areas beside railway station and track (Tarfail, Fulfail, Station Fail, and Itwara) was covered.

Study Participants: Participants were adult above 20 years of age & residents of slum area.

Sample Size and Sampling Technique: There were total 226 houses in these slum pockets and was decided for complete enumeration. Visited house to house in these slum area, and collected the information from adult (>20 years) resident who were available at home and willing to share their knowledge on TB. Total 169 adults shared information on TB in these slum areas, whereas others refused to talk on TB.

Data Collection Tools and Technique: Participants were interviewed with the help of pre-structured questionnaire after informed consent. This tool included questions on awareness about mode of spread, symptoms, prevention, and treatment of TB.

Results

Out of 169 participants, male respondents were 110 (65.09%) and female were 59(34.91%), whose mean age was observed to be 43.27 (+14.37 SD) and 41.44 years (+17.21 SD) respectively. About 85.21% interviewed dwellers were literate and 82.84% were married.

Table 1: Socio demographic information of participants

<table>
<thead>
<tr>
<th>Socio demographic Information</th>
<th>Frequency (%)</th>
<th>n=169</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>110 (65.09%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59 (34.91%)</td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>25 (14.79)</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>32 (18.93)</td>
<td></td>
</tr>
<tr>
<td>Middle School</td>
<td>54 (31.95)</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>35 (21.30)</td>
<td></td>
</tr>
<tr>
<td>Higher Secondary</td>
<td>08 (4.73)</td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td>13 (7.69)</td>
<td></td>
</tr>
<tr>
<td>Post Graduate</td>
<td>02 (1.18)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>140 (82.84%)</td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>22 (13.02)</td>
<td></td>
</tr>
<tr>
<td>Widow/ Widower</td>
<td>07 (4.14)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Source of information for Tuberculosis [multiple responses allowed]

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Friends and Family</td>
<td>87</td>
<td>51.48</td>
</tr>
<tr>
<td>2 Television [News &amp; advertisement]</td>
<td>68</td>
<td>40.24</td>
</tr>
<tr>
<td>3 Hoardings / Wall Paintings</td>
<td>28</td>
<td>16.57</td>
</tr>
<tr>
<td>4 Doctor / Health worker</td>
<td>26</td>
<td>15.38</td>
</tr>
<tr>
<td>5 News paper</td>
<td>09</td>
<td>5.33</td>
</tr>
<tr>
<td>6 Radio</td>
<td>06</td>
<td>3.55</td>
</tr>
<tr>
<td>7 What’s ap Message</td>
<td>03</td>
<td>1.78</td>
</tr>
<tr>
<td>8 Other (school)</td>
<td>04</td>
<td>2.37</td>
</tr>
</tbody>
</table>
Main source of information about TB was documented as friends and family by 87 (51.48%) participants followed by television media 68 (40.24%). Doctors or health workers contributed only 26 (15.38%) as a source of information.

Table 3: Awareness about symptoms suggestive and Mode of spread of TB (Multiple response allowed)

<table>
<thead>
<tr>
<th>Symptoms suggestive of TB</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cough more than 2 weeks</td>
<td>128</td>
<td>75.74</td>
</tr>
<tr>
<td>2 Fever more than 2 weeks</td>
<td>56</td>
<td>33.14</td>
</tr>
<tr>
<td>3 Significant Weight loss</td>
<td>31</td>
<td>18.34</td>
</tr>
<tr>
<td>4 Hemoptysis</td>
<td>21</td>
<td>12.43</td>
</tr>
<tr>
<td>5 Any abnormality in chest radiography</td>
<td>02</td>
<td>1.18</td>
</tr>
<tr>
<td>6 No Response</td>
<td>28</td>
<td>16.57</td>
</tr>
</tbody>
</table>

Mode of spread of TB (Multiple response allowed)

<table>
<thead>
<tr>
<th>Mode of spread of TB</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Air Inhalation of Droplet Nuclei</td>
<td>132</td>
<td>78.11</td>
</tr>
<tr>
<td>2 Water</td>
<td>15</td>
<td>8.88</td>
</tr>
<tr>
<td>3 Food</td>
<td>11</td>
<td>6.51</td>
</tr>
<tr>
<td>4 Wrath of God</td>
<td>01</td>
<td>0.59</td>
</tr>
<tr>
<td>5 Past sins/ karma</td>
<td>01</td>
<td>0.59</td>
</tr>
<tr>
<td>6 Other</td>
<td>11</td>
<td>6.51</td>
</tr>
<tr>
<td>7 No Response</td>
<td>22</td>
<td>13.02</td>
</tr>
</tbody>
</table>

About 128 (75.74%) of the interviewed dwellers were aware about cough more than 2 weeks as a symptom suggestive of TB and 56 (33.14%) response obtained for fever more than 2 weeks.

Cough more than 2 weeks is a main symptom of TB was informed by 128 (75.74%) participants whereas 56 (33.14%) replied for fever more than 2 weeks. 28 (16.57%) dwellers didn’t respond for this question.

Among the participants, 132 (78.11%) responded for air inhalation of droplet nuclei as a mode of spreading Tuberculosis.

Table 4: Knowledge about Tuberculosis among urban slums dwellers

<table>
<thead>
<tr>
<th>Knowledge about TB (N= 169)</th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TB involve any other organ than lungs</td>
<td>51 (30.18)</td>
<td>102 (60.36)</td>
<td>16 (9.47)</td>
</tr>
<tr>
<td>2 TB spread from one person to another</td>
<td>137 (81.07)</td>
<td>09 (5.33)</td>
<td>23 (13.61)</td>
</tr>
<tr>
<td>3 TB can be prevented</td>
<td>124 (73.37)</td>
<td>13 (7.69)</td>
<td>32 (18.93)</td>
</tr>
<tr>
<td>4 TB is treatable</td>
<td>145 (85.80)</td>
<td>11 (6.51)</td>
<td>13 (7.69)</td>
</tr>
</tbody>
</table>

Most of the participants 137 (81.07%) knew that TB spread from one person to another and 124 (73.37%) knew that TB can be prevented whereas 145 (85.80%) pointed that TB is treatable disease. Very few dwellers 51 (30.18%) were having Knowledge that TB can involve any other organ than lungs.

Fig. 1: Place for the diagnosis and treatment for TB available (multiple responses allow)
Notably, 150(88.76%) participants indicated that government PHC/CHC/District Hospital is the place for diagnosis and treatment followed by 37(21.89%) responded towards private practitioners. Very few participants 05 (2.96%) were recognized medical colleges accessible place for TB management.

Association of gender and education status with overall TB awareness level: We assessed the awareness level of participants by scoring the six important questions such as i) Symptoms suggestive of TB, ii) Does TB spread from one person to another? iii) Mode of spreading, iv) Does TB involve any other organ than lungs? v) Does TB can be prevented and vi) Is TB treatable?

Total score is six for correct response. We considered, if score is ≥4 then awareness is satisfactory and ≤3 then unsatisfactory. It is observed that out of 110 male, 91 (82.73%) were having satisfactory awareness and out of 59 female, 40 (67.80%) were having satisfactory awareness. This Gender wise difference i.e. male were more aware about Tuberculosis was observed to be statistically significant. Awareness level was observed high among literate dwellers than illiterate and this difference was observed to be statistically significant.

Discussion

Main source of information in studied urban slums was family and friends, similar findings were observed in Mysore slum dwellers by Archana Basavaraju, et al. Another common source of information for these studied community was media which includes Television [News & advertisement], Radio and newspaper.

Health workforce can provide proper and definite information about TB. This present study observed that doctors and health workers contributed very less (only 15%) as a source of information, which can be increased by interaction between slum dwellers and health staff. Other studies conducted in India observed near about similar proportion of health professionals as a source of information.

In present study, participants identified cough more than two weeks as predominant symptom suggestive of TB followed by fever and then weight loss; whereas study conducted in Surat by Hetvi Mahida, et al, fever was recognized by participants as the most common symptom, followed by weight loss and then cough.

Gender wise difference was observed. In present study setting, satisfactory level of knowledge and awareness about TB was observed significantly more among male than female. When same determinant was studied in Pondicherry by Palanivel Chinnakali, et al similar gender wise awareness level difference was observed whereas, in Mysore, no such significant difference was observed.

Proportionately low literacy level was found among slum dwellers for higher secondary and above education. Overall TB awareness level was significantly satisfactory among the literate and same findings were noted in Mysore and Pondicherry slums. Literacy improves the knowledge as well as quality of life. Hence, awareness level can be increased in slum area by improving the education facilities and motivating the community for literacy. Female literacy can be promoted to increase the awareness level, so that gender wise gap of knowledge which was observed extensively can be abridged. Various IEC campaign and health awareness program were conducted in different part of India and has provided evidence for increase in knowledge among the beneficiaries.

When we compared the findings of present study (Wardha, Maharashtra) and some of the studies in Chhattisgarh, Mysore, Surat and Pondicherry among the slum dwellers, it is noted that more than 80% community from all these settings were aware that TB spread from one to another person. However, satisfactory proportions (91%) of slum dweller of Mysore were acknowledged about mode of spread as compare to the other study areas, including the present study. About half of the participants were aware about correct mode of TB spread in Surat. Awareness about TB prevention and treatment was observed to be satisfactory among slum community in Wardha, Chhattisgarh and Puducherry as compare to Mysore.

Pulmonary involvement is the most common mode of tuberculosis infection. Studied slum community was quiet sensitive about respiratory illness due to TB; however there is need to improve the awareness level about involvement of any other organ than lungs due to TB which is observed among very few participants.

Different types of Government health facilities such as Primary Health Center, Rural Hospital, Sub-district
Hospital and District Hospital were recognized as places for diagnosis and treatment of TB. This indicates that slum community was responsive towards the public health facilities and identified it as an approachable sector for TB. It is noted that about 50%-80% of the TB patients access the private health facilities for TB treatment.[14,15] Private sector was recognized by very less proportion of studied population, though it can equally contribute in TB management through Public Private Partnership.

Table 5: Comparative study findings in different urban slums

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms suggestive of TB-Cough &gt;2 wk</td>
<td>75</td>
<td>97</td>
<td>49</td>
<td>66</td>
<td>81</td>
</tr>
<tr>
<td>TB spread from one person to another</td>
<td>81</td>
<td>82</td>
<td>94</td>
<td>75</td>
<td>80</td>
</tr>
<tr>
<td>Mode of spread</td>
<td>78</td>
<td>63</td>
<td>91</td>
<td>58</td>
<td>80</td>
</tr>
<tr>
<td>TB can be prevented</td>
<td>73</td>
<td>68</td>
<td>36</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>TB is treatable</td>
<td>86</td>
<td>76</td>
<td>28</td>
<td>92</td>
<td>86</td>
</tr>
</tbody>
</table>

Conclusion

Knowledge and perception regarding a TB help these slum dwellers as well as the patients in taking right help at the right time which direct them to take preventive and control measures. In present study, although the level of knowledge was found to be relatively satisfactory, it was not absolute. Very few dwellers responded for Health stakeholders (doctors and health workers) as a source of information.

Slum dwellers are vulnerable to get infected with TB or converted to disease status owing to their lifestyle, socioeconomic and environmental conditions. There is scope to increase knowledge by conducting awareness activity or augmenting community visits by health workers in slum areas, which will again helpful to increase knowledge of habitat female group and illiterate which was observed to be significantly less satisfactory than male and literate respectively.

Ethical Clearance: Taken from Institutional Ethics committee of DMIMS (DU)

Conflict of Interest: None

Source of Funding: None

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A Rare Case of Expanded Dengue, Evans Syndrome, Hellp Syndrome & Multiorgan Dysfunction

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¹Professor, ²Assistant Professor, ³Senior Resident, ⁴Junior Resident, PG Department of Medicine, IMS and SUM Hospital, Siksha “O” Anusandhan University, K8, Kalinganagar, Bhubaneswar, Odisha, India

Abstract

Dengue virus infection is being recognised to manifest with various systemic impairments. WHO has coined ‘EXPANDED DENGUE’ to denote such complications and atypical presentations. Here we present a case of Dengue who presented with PUO, bleeding, pain abdomen, vomiting and itching. She was noted to have fever, tachycardia, anaemia, thrombocytopenia, deranged liver function, acute pancreatitis, urinary abnormalities, rhinorrhea and pruritus. Her hospitalisation period was a stormy one posing both diagnostic and therapeutic problem. While recovering she exhibited neutropenia suggesting concomitant Evans syndrome. The different haematological and biochemical parameters also mimic that of HELLP syndrome.

Introduction

Dengue fever caused by Dengue virus 1-4 presents with an initial febrile phase of 3-5 days which is followed by a critical phase of 1-2 days and a recovery phase of 2-3 days duration unless complications arise. WHO in 2009 classified the infection as dengue without warning sign, with warning signs and severe dengue. Latter refers to cases with significant bleeding(dengue haemorrhagic fever), compensated or profound shock(dengue shock syndrome). It also includes patients with expanded dengue syndrome a term coined by WHO in 2012 to include all such complications and atypical presentations involving nervous system, eyes, heart, liver, kidneys, skin, muscles(myositis), colon (acute inflammatory colitis), SLE, hemophagocytic syndrome etc. [1] The diagnosis of dengue infection is based on clinical features and confirmed by detection of dengue virus NS1 antigen or by RT-PCR during initial febrile period, thereafter by detection of dengue IgM antibodies from 5th day onwards in primary infection which remains positive upto 90 days. While primary infection confers life long immunity against the infecting serotype, it confers immunity only upto 3-4 months for other serotypes. [1] Since it’s recognition in 1946 in India dengue infection has spread to almost all parts of the country, from urban to rural areas, affecting adults more than children, has involved all serotypes and is manifesting more in increasing severity. The clinical presentations are being noted to be more atypical. (2)Cross-reactivity with chikungunya, malaria, typhus, leptospira, typhoid fever, H1N1 virus, HepatitisA, Zika virus is also being noted. (3)(4)

We are reporting a case of dengue who presented to us with prolonged fever, upper gastrointestinal bleed and pain abdomen. During her hospitalisation she had exhibited features of involvement of various systems/ organs such as heart (tachycardia) blood (anaemia, thrombocytopenia, leucopenia, neutropenia), Liver (deranged liver function), Kidney (urinary abnormality), pancreas (pain abdomen, ultrasound evidence of swollen pancreas), skin (urticaria) nose (rhinorrhoea, sneezing). The findings of haemolytic anaemia(anaemia, raised LDH, positive direct coomb’s test), immune thrombocytopenia and neutropenia refers to Evans syndrome. Haemolytic anaemia, elevated liver enzymes, low platelets would refer to HELLP syndrome. Though the hospitalisation period was a stormy one posing both diagnostic and therapeutic challenges, she recovered

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with supportive therapy after two weeks and is under regular follow up.

**Case report:** Mrs NS a 42 years old housewife from a rural area presented to us on 10 May 2017 with complaints of fever of 20 days duration, passage of black stool of two days duration and one episode of bilious vomiting in the morning same day. The fever was of moderate severity, remittent in character associated with headache, bodyache, muscle pain for which she was treated at home. Subsequently it became intermittent, mostly marked towards evening and early hours of the morning. At times it was associated with chills and temperature varied from 99 to 103°F for which she was treated at a hospital for about a week. When she noticed her stool to be black for two days she reported to us. Along with fever and malaena she felt diffuse pain all over the abdomen but more marked over the epigastrium and right hypochondrium. She had no past illness except that of polyarthralgia eight years back lasting for about two months. She had two uneventful home deliveries, no abortions. Last child was born 17 years back. Her periods are regular. Last mensturalflow was three weeks back. On examination she was a middle aged lady, thin built, height-158 cm, weight-46 Kg, BMI-18.4. She had pallor, no icterus/cyanosis/lymphadenopathy/thyromegaly/raised JVP/clubbing or oedema feet. Slightly pigmented patches were noted over both malar regions. Pulse-138/minute regular, BP-110/70 mmHg over right arm on lying position, temperature-102°F. Examination of heart-and lungs-unremarkable, Abdomen-soft but diffusely tender, more marked over epigastrum, other examination-no abnormality. With a provisional diagnosis of PUO with antipyretic induced upper GI bleed she was managed with IV pantoprazole, PRBC, fluids and a broad spectrum antibiotic. Investigations-Hb-7.9 gm/dl, TWBC-4290/cmm, Polymorph-55%, lymphocyte-37%, monocyte-7%, platelets-54000/cmm, peripheral smear-Bicypopenia, stool occult blood positive, urine-protein 70mg/dl, WBC-normal, plateletsreduced, reticulocyte count-0.3%, serum haptoglobin 133mg/dl (normal-16-200mg/dl), thyroid function tests normal, LFT-SGOT and PT INR-1:121 raised, Direct coomb’s test positive, ANA—negative, Antiphospholipidantibodies. IgA, IgG, IgM negative, AntiB2 glycoprotein IgA, IgG negative but IgM was positive(40.75 u/l, Normal<20u/l), Antiphospholipidantibodies. IgA, IgG, IgM negative, AntiB2 glycoprotein IgA, IgG negative but IgM was positive(40.75 u/l, Normal<20u/l), Antiphospholipidantibodies. IgA, IgG, IgM negative, AntiB2 glycoprotein IgA, IgG negative but IgM was positive(40.75 u/l, Normal<20u/l), Antiphospholipidantibodies. IgA, IgG, IgM negative, AntiB2 glycoprotein IgA, IgG negative but IgM was positive(40.75 u/l, Normal<20u/l), Antiphospholipidantibodies. 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which further supported the diagnosis of Evan’s syndrome. To confirm a repeat TWBC three days later showed a count of 4100/cmm with polymorphs 10% (Absolute neutrophil count-410), lymphocytes 67%, monocytes 18%. Since she was asymptomatic with stable vitals with normal LFT and urine report she was thought to have recovered from this spectrum of expended dengue and was discharged with advice of regular follow up. A repeat blood count 4 weeks later has shown Hb9.2gm/%, TWBC-4450/cmm, polymorphs-32.6% (ANC-1424) lymphocytes-57.65, thus qualifying the criteria of concommitant neutropenia of Evans syndrome.

Discussion

The patient with fever, bleeding and thrombocytopenia presenting during dengue endemic period and being positive for dengue IgM antibodies fits to be a case of dengue. The prolonged fever, late manifestation of bleeding(UGI and subconjunctival) with a platelet count of 54000/cmm and subsequent other systemic manifestations suggest expanded dengue syndrome under severe dengue category. These atypical presentations could be a spectrum of dengue related immune dysregulation. The factors responsible for thrombocytopenia in dengue are multifactorial like transient marrow suppression, platelet aggregation, hemophagocytosis and immune destruction.(1) Thus immune reaction initiated by dengue virus can explain persistence of fever, sustained thrombocytopenia (could be immature/ineffective also) which caused the bleed though the count of platelets were not that low. Immunoglobulin and complement, tumour necrosis factor alfa, interleukin-8 studies would have been helpful but could not be carried out. The anaemia in this case in absence any knowledge of pre-illness Hb value, being normocytic normochromic could be due to bleeding and/ or immune mediated. Autoimmune haemolytic anaemia (AIHA) is defined as a Hb level of 11gm/dl or less at diagnosis with features of haemolysis(low haptoglobin level and/or elevated LDH and/or bilirubin levels) and a Positive direct antiglobulin test (DAT).(5) Our patient had elevated LDH and a positive Direct antiglobulin test, thus qualifying as having AIHA. Immune thrombocytopenic purpura otherwise known as Idiopathic thrombocytopenic purpura(ITP) refers to acquired immune mediated destruction of platelets and possibly inhibition of release of platelets from the megakaryocytes. It is termed as secondary if associated with an infection.(6) Absence of splenomegaly, adequate number of megakaryocytes in bone marrow aspiration and presence of antiBeta-2GP IgG suggests immune destruction(7). In our case, the infection is dengue infection. During the course of the disease neutropenia had been noted. Immune neutropenia refers to a neutrophil count below 1500/cmm on two separate occasions at least a week apart without any obvious cause(5). Our patient had a neutrophil count of 410/cmm on 3rd week of hospitalisation and 1424/cmm a month later, thus qualifies to the definition.

Evans syndrome (ES) first described by RS Evans in 1951 is a rare autoimmune disorder characterised by simultaneous or sequential presence of autoimmune haemolytic anaemia, immune thrombocytopenic purpura and/or immune neutropenia. It classified as secondary when associated with other autoimmune disorder/ malignancy/infection. Hepatitis C has been reported to be associated with ES(5). It is a rare and dreaded disease and many a time refractory to treatment but spontaneous remission is known.(8) Our case is on spontaneous remission and will be followed up.

HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome is pregnancy related, the haemolysis is microangiopathic, LDH level is equal or higher than 600 iu/l.(9) Our patient was nonpregnant, haemolysis was autoimmune and had LDH level-598iu/l. Contrary to negative history occurrence of subclinical Eclampsia and HELLP during her pregnancies can not be denied. Amongst different pathogenetic mechanismsof HELLP syndrome genetic and epigenetic nature has been stressed(9). Elsewhere dengue infection in pregnancy with multiorgan failure has been reported to mimic HELLP syndrome.(10) Hence findings in our patient may be accepted as a mimic of HELLP syndrome and could be an epigenetic manifestation under influence of dengue related immune dysregulation of an inherited predisposing gene.(9)

Cardiac abnormalities in dengue have been reported as high as 36.7 % of cases in one study and comprised of sinus tachycardia, bradycardia, atrial fibrillation, first degree heart block, RBBB, Nonspecific ST-T changes, elevated troponin-I, CPK-MB, hypotension, pericarditis, myocarditis, myocardialinfarction, cardiomyopathy, S–A and A-V block. Our patient had sinus tachycardia.(11)

Gastrointestinal manifestations. Abdominal pain is an warning sign and has been a feature in 40% of cases. Our patient had prominent pain abdomen, diffuse
as well as epigastric and right hypochondriac. The gastric and duodenal erosions, hepatic involvement, renal involvement and acute pancreatitis (as evidenced by swollen pancreas on ultrasound) all contributed to pain abdomen in our case. Hepatic dysfunction in dengue has been reported to show raised SB in 25%, SGOT in 76%, Alkaline phosphatase in 43% of cases. It is different from other virus involvement in that here SGOT is increased more than SGPT. (12) Our patient had marginal derangement in SGOT and in PT _INR. It has also been suggested that elevated SGOT may serve as an early indicator of dengue infection. Other manifestations are fulminant hepatic failure, acalculous cholecystitis, acute pancreatitis, acute appendicitis, diffuse peritonitis and splenic rupture.

Renal manifestations described as AKI, IgA nephropathy, Rhabdomyolysis, Myoglobinuria acute renal failure, haemolytic uremic syndrome. Our patient had shown variable cellular and sedimentary findings which have been reverted to normal on recovery.

Dermatological manifestation—Our patient had itching which subsided on recovery.

Nose. The patient while in hospital during second week had running nose along with sneezing with pale nasal mucosa which recovered within 3-4 days.

Nervous system. Neurological manifestations are varied involving the neuroaxis, spinal cord, nerve root, peripheral nerves and muscles. (2) Our patient did not have any demonstrable involvement except that of myalgia.

**Conclusion**

Cases of dengue are presenting with many atypical features and complications. Our patient not only posed diagnostic and management problems but also exhibited varied manifestations of varied severity, Evans syndrome with spontaneous recovery as well as showed features to mimic HELLP syndrome.

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Strategies Influencing with Holding of Women Employees in IT Sector in Chennai, Tamil Nadu

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Abstract

The increasing rate of employee attrition and the problems the employers and the HR managers face in retaining ‘good’ and ‘performing’ employees in the absence of a set of women employee retention strategies are simply compounding in IT companies. Women executives are ambitious and, like men, say they are ready to make some sacrifices in their personal lives if that’s what it takes to occupy a top-management job. Many, however, are not sure that the corporate culture will support their rise, apparently with some justification. Although a majority of organizations we studied have tried to implement measures aimed at increasing gender diversity among senior executives, few have achieved notable improvements. This research article throws light on the need and importance of retaining women employees and the strategies enhanced to influence retaining women employees in Chennai IT Hub.

Keywords: Retention strategies, need and importance, IT hub in Chennai.

Introduction

Employee retention refers to the various policies and practices which let the employees stick to an organization for a longer period of time. Every organization invests time and money to groom a new joinee, make him a corporate ready material and bring him at par with the existing employees. The organization is completely at a loss when the employees leave their job once they are fully trained. Employee retention takes into account the various measures taken so that an individual stays in an organization for the maximum period of time.

Research says that most of the employees leave an organization out of frustration and constant friction with their superiors or other team members. In some cases low salary, lack of growth prospects and motivation compel an employee to look for a change. The management must try its level best to retain those employees who are really important for the system and are known to be effective contributors. It is the responsibility of the line managers as well as the management to ensure that the employees are satisfied with their roles and responsibilities and the job is offering them a new challenge and learning every day.

Need And Importance Of Retaining Female Employees: In a competitive business climate, retaining key employees is vital for the health of the company. But when these key employees are women, many corporations and industries continue to be befuddled as to how to retain this valuable cohort. Indeed, it’s surprising how many supposedly modern institutions are caught in a time-warp. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small.

The good news is, a few simple steps can vastly improve conditions for female employees. And the benefits of maintaining a women-friendly environment far outweigh the costs. Retaining employees male or female, is just good business sense when you consider both the obvious and hidden costs of a high rate of employee turnover. One of the more obvious steps is fair compensation. Indeed, it’s surprising how many supposedly modern institutions are caught in a time-warp. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small.

The good news is, a few simple steps can vastly improve conditions for female employees. And the benefits of maintaining a women-friendly environment far outweigh the costs. Retaining employees male or female, is just good business sense when you consider both the obvious and hidden costs of a high rate of employee turnover. One of the more obvious steps is fair compensation. It should go without saying that, after years of being treated as second-class employees, women first and foremost want to feel as equally valued as their male counterparts. Fair wages are just a start.

Fair compensation should also include bonuses and benefits. And women don’t want to feel like they will be punished for wanting a work/life balance. The lack of a flexible schedule is cited as the number one reason employees leave for other jobs, so companies should ensure they are able to accommodate their workers’ need to spend time with family or on other
projects. Telecommuting, a compressed work week, collaborative scheduling and self-scheduling can all factor into employee happiness and job satisfaction. Maternity benefits, childcare, and maternity leave should be included in employment packages.

Greater gender balance in the workplace, especially in leadership positions, can pave the way for women to feel that they too can succeed. When women see other women rising within a company, they realize that it is possible for them to rise to senior positions as well.

To this end, the smart employer will consider introducing mentorship programs to encourage high-potential female employees to aspire to senior leadership roles. Women’s networks can be critical retention tools as well, particularly for employees at their mid-career level. Retraining and reentry training for women who have temporarily left the workforce are also valuable tools in your retention box. Professional development, career coaching, and grooming for bigger projects and promotions, as well as guidance regarding each woman’s career trajectory, are invaluable in retaining female employees.

Executive presence training is one option to consider. A 2016 Forbes article cited a study by the non-profit New York organization Center for Talent Innovation that said being perceived as leadership material is essential to being promoted into leadership positions. The article went on to say that “the 268 senior executives surveyed said ‘executive presence’ counts for 26% of what it takes to get promoted”. Women who are trained to develop an executive-type persona in terms of gravitas—that is, confidence, poise under pressure and decisiveness—as well as communication and appearance become more confident and are better able to command a room, thereby clearing a path to high-stakes and high-visibility positions. By utilizing some or all of these ideas, companies can benefit from a healthier and more balanced work environment. It just makes sense.

Objectives Of The Study
1. To understand the existing strategies for retaining women employees in IT industry
2. To identify the organizational challenges faced by the women compelling them to discontinue career

Strategies For Retaining Women Employees:
- Work should never become monotonous and must offer a new learning each day. An employee should be able to upgrade his skills and enhance his knowledge at the workplace. Employees leave the organization whenever there are no chances of further growth. An individual must be made to do something which really excites him and most importantly matches his background. The
employees must be asked to accomplish the tasks in the most innovative way for them to enjoy their work. No one should be asked to do anything out of compulsion. The team leader must not force anyone to work. Let them accept assignments willingly. The moment work becomes a burden for the employees, they look for a change.

• Every individual should enjoy privacy at the workplace. The superiors must ensure that no employee interferes in each other’s work. Team members sitting at adjacent desks should not overhear their colleague’s conversation or check any confidential documents. These things lead to severe demotivation and prompt an individual to look for a change. Discussion is important but one should not irritate anyone. The team manager should also not make his team member’s life hell. Just give them deadlines and ask them to complete the assignments within the desired time frame. Motivate them to deliver their best but don’t be after their life. Remember everyone is mature enough to understand that work comes first, and everything later.

• Every employee should be treated as one irrespective of his designation. Sexual harassment is against the law and is a strict no no at the workplace. The male workers should respect their female counterparts and make them feel comfortable. Don’t ask any female employee to stay back late. Leg pulling, back stabbing, lewd remarks must be avoided at the organization to retain the employees.

• The management must formulate employee friendly policies. The employees must be allowed to take one or two leaves in a month so that they get time to rejuvenate. Don’t call the employees on weekends. Let them enjoy. The human resource department must take the initiative to celebrate birthdays of employees at the workplace. This way people come closer, make friends, develop trust and are thus reluctant to go for a change. Major festivals should also be celebrated at the organization for employees to get attached to the organization.

• Incentives, cash prizes, trophies, perks should be given to deserving employees to motivate them to perform up to the mark every time. The salaries of the high potential employees must be appraised from time to time as monetary dissatisfaction is one of the major reasons for employees quitting their jobs. The hard work of the workers must be appreciated. The slow learners must not be criticized but should be inspired to gear up for the next time.

• The performers must be made to participate in the decision making process. They should have a say in the major strategies of the organization for them to feel important and trust the management.

Have more women leaders: The first thing that gives a woman confidence at her workplace is having women leaders to look up to. This also indicates that the company offers them an environment conducive to scale the corporate ladder. It would be more beneficial if women leaders took on the role of mentors in mentorship programmes that are already at work in certain companies.

Empower Female Employees to Shape Company Culture: Startup land has become famous for offering a fraternity-like atmosphere: free beer, video games, and personalized hoodies. While it’s not fair to say women don’t like these perks, tech companies should include women on the teams that are shaping company culture. Expanding the activities beyond those evoking college dorm rooms will help attract talented women who don’t feel connected to those traditions.

Finally, it should go without saying that the best way to attract female talent is to offer competitive wages and excellent benefits that will support them in their life choices regardless of if they decide to have children or not. While the grand gesture of Facebook and Apple will surely help their recruitment efforts, our corporate culture as a whole needs to focus on making small, but important, everyday changes and sticking with them

Conclusion

The study throws light through valuable suggestion to increase the female employees’ retention in the organization. This study can help the management to find the weaker parts of the female employee feels towards the existing organization retention strategies and also helps in converting those weaker part in to stronger by providing the optimum suggestions or solutions.

Ethical Clearance: Nil

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Hospital Sector Reform through Human Resource Management: A Study On India

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Abstract

Purpose: The goal of the paper is to evaluate the human asset measurement of national wellbeing mission in India. It intends to report and investigate human asset administration (HRM) practices and make proposals to enhance representative and wellbeing framework results.

Method: The paper draws from a substantial report that utilized a blended techniques way to deal with evaluate execution of India’s Ministry of Health (MoH). It utilizes information gathered through record examination and top to bottom meetings of key witnesses involving approach creators, ranking staff of NHM and its partner associations and doctor’s facilities.

Findings: Public wellbeing segment HRM in India has discovered deficient arranging, poor organization and underutilization of staff. Absence of far reaching maintenance procedures and poor working conditions added to the inability to draw in and hold talented faculty.

Suggestion: Associations with both formal and casual conditions influenced HRM execution. While report audit was a noteworthy wellspring of information for this paper the shortcoming in the HRIS constrained accessibility of information. This exploration gives a framework—wide arrangement way to deal with wellbeing HRM in India. It adds to the writing and confirmation expected to control HRM approach choices and practices.

Keywords: National Health Mission, Human Resource Management, Institutional Theory, Public Health Sector.

Introduction

This paper looks to comprehend the human asset administration hones in the general wellbeing part in India (Odisha). As other poor state Odisha encounters various human asset challenges like perpetual staff lack, restricted abilities, and poor inspiration and maintenance are some of significant dangers to conveyance of administrations and generally execution of the wellbeing framework. Broadly the thickness of wellbeing work force per 10,000 populaces has been ceaselessly low by International standards. The World Health Organization sees staff as the most reproachful of all wellbeing framework assets. Nations with less wellbeing laborers can’t convey benefits adequately or scale up intercessions basic for accomplishing wellbeing objectives. HRM frameworks include the arrangements, techniques, forms, methodology and practices utilized in the administration of individuals in the working environment. There is broad confirmation that HRM hones affect hierarchical and worker execution in numerous segments. Nonetheless, the attention on HRM and its capability to add to enhanced execution of wellbeing frameworks, human services associations, patient and representative results is simply developing. There is a developing acknowledgment that HRM frameworks exist inside associations which are social elements. These associations and their outside surroundings impact the structure and working of the HRM frameworks. In the perspective of this reality, this paper utilizes institutional hypothesis as a focal point to
comprehend HRM in India’s wellbeing segment. Based on this hypothesis, it is presumed that HRM rehearses in the general population area wellbeing division to a substantial degree mirrors the qualities, standards and convictions of people in general segment and India as a bigger setting.

**Literature review:** Institutional Theory has been connected to HRM for over 10 years. This hypothesis allows a more sweeping, framework wide perspective of HRM inside wellbeing. Associations in Institutional hypothesis are seen as social substances that always adjust to their surroundings with a specific end goal to increase social acknowledgment (legitimacy). The situations are portrayed as involving rules, standards, benchmarks, and prerequisites that apply weight on associations affecting their structures, procedures and practices. These creators recognized three classes of Institutional weight: administrative, (for example, lawful and government prerequisites which tend to in the associations be considered “imagine”): intellectual which are “regular learning” and desires for gathering of experts in the associations and “regulating” which mirrors the qualities, convictions and standards of the more extensive society Meyer et. al 1983 contends that the qualities and conviction frameworks in the association’s outside surroundings are fantasies as in they depend for their adequacy and reality on the way that they are broadly shared by people and gatherings that have been given the privilege to decide such issues. A bunch contemplates have been led in the NHS on the HRM execution connect. A portion of these will be inspected here. Michael A West and J.F Dawson analyzed the connection between modernity of evaluation, complexity of preparing and level of staff working in groups and patient mortality in 61 intense healing facilities in England. By asking HR Directors inside the doctor’s facilities to finish a study they could set up doctor’s facility execution in medicinal services associations arrangement regarding these key factors. Analysis uncovered that complexity of examination had the most grounded negative association with quiet mortality, yet that level of staff working in groups and refinement of preparing likewise had noteworthy negative associations with tolerant mortality. This was the primary investigation to set up connections between HRM practices and execution in intense trusts in the NHS. The creators recognize a few restrictions including little example measure, cross sectional research outline and utilization of HR Directors as respondents.

**Understanding HRM Practices:** The regularizing and intellectual weights can be condensed as “casual” establishments that take care of the more profound and stronger part of social structures while administrative weight can be described more as “formal” foundations. The general wellbeing segment in India exists inside people in general administration which gives its prompt outside condition. The Directorate of Public Service Management (DPSM), which is a body under Ministry of state President set up through open administration demonstration of 1998 has the statutory duty regarding the administration of open administration. The DPSM obligation involves arrangement of strategy structure and creating and improving methodologies to open administration execution. In the perspective of relatedness, it tends to be presumed that the HRM rehearses in the general wellbeing segment are to a bigger degree an impression of more extensive open administration. Similarly people in general administration exists inside the country, state or society (Scott, 2004) which shows the more extensive financial and political setting which may likewise impact the HRM hones. The state as an element has power and specialist over associations. Its inborn real imagine power can assume a huge part in molding the general population benefit structure and conduct which thus impact HRM frameworks in the wellbeing segment.

While there are constrained HRM thinks about utilizing Institutional hypothesis in the general wellbeing segment in creating nations, investigation into business and improvement associations propose that there are two expansive institutional weights in the area. One is formal administrative condition vital for basic leadership and usage of strategy. This can be undermined by poor vote based process, absence of responsibility and acknowledgment of fantastic debasement. The second contains the casual institutional qualities of the network including the working of a casual economy, the resistance of frivolous defilement, not really including financial gain but rather organizing the enthusiasm of family or neighborhood network over the prerequisite of the working environment. Of significance for this exploration is that India is viewed as fair nation since autonomy India has an appropriate place for the execution and administration of viable HRM hones. This paper underscores the part of open administration and the state in molding the HRM hones in the general wellbeing segment.
Method

The part of the Human Resource technique that identifies with expanding quantities of key staff in consonance with IPHS and guaranteed administrations has just been displayed as a subcomponent of office fortifying. Numerous regions of expertise improvement are introduced as a major aspect of particular RCH and transferable and non-transmittable infection control programs. This segment centers around the general procedure for HR improvement. NHM will likewise center around making organizations for building limit at state and sub state and territorial levels. States will be upheld to create solid HR administration frameworks with enhanced practices for decentralized enrollment, reasonable and straightforward frameworks of postings, convenient advancements, money related and non monetary motivations for execution and administration in underserved zones, measures to decrease proficient seclusion by provisioning access to proceeding with restorative instruction and expertise up graduation programs, give profession chances to bleeding edge laborers and use the colossal adaptability accessibility under the mission.

NHM will bolster in-benefit programs, both private and through separation instruction mode on family solution, the study of disease transmission, general wellbeing administration and such different aptitudes and specializations as required. In benefit preparing will likewise underscore building authority aptitudes among key functionaries. Uncommon accentuation is required for family drug projects to enhance the pro holes at optional care levels and give a superior quality and scope of administrations at both essential and auxiliary levels.

NHM would empower improvement of extension courses for ASHA s to wind up ANMs/GNMs and for ANMs to end up medical attendants and attendants to end up nurture specialists. NHM will bolster advancement of a course for B.Sc in network wellbeing for mid-level clinical care supplier. Graduates from various clinical and paramedical foundations like drug specialists, B.Sc Nurses and so forth would likewise have the capacity to acquire this capability through fitting scaffold courses. The plan and length of the scaffold course would rely on an appraisal of the hole amongst present and wanted abilities. Local based determination, an extraordinary educational modules of preparing near where they live and work, contingent authorizing and a positive practice condition will guarantee this new unit is specially accessible where they are required most, i.e. in the underserved zones. Medical caretakers will fill in as the foundation of clinical offices and NHM will bolster the extension of their part as clinical care providers. NHM will bolster propelled preparing of attendants, including multi skilling and undertaking moving keeping in mind the end goal to empower and enable them to go up against more up to date benefit regions. They will likewise be upheld to get instructive headway through extension courses and other preparing.

NHM visualizes the utilization of telemedicine to help proceeding with medicinal and nursing training and at work support to suppliers working in proficient detachment in rustic and remote areas. NHM would likewise bolster methodologies to enlist and send talented wellbeing laborers in country and remote zones. These systems would incorporate money related and non-monetary impetuses, administrative measures, workforce administration and measures to lessen proficient and social confinement.

For the staff of program administration units, enhanced execution will be empowered through setting clear expectations, undertaking general execution checking and founding an appropriate examination framework. Furthermore preparing in view of holes distinguished through ability appraisal and strong supervision will empower specialist organizations to accomplish their execution objectives. One related issue is the irreconcilable situation circumstances that emerge when government specialists are likewise associated with private practice. This ought to be debilitated and appropriate motivating forces made accessible to such suppliers to invest additional energy out in the open administration in people in general healing center. Anyway numerous states would need to begin by concentrating on irreconcilable circumstance circumstances, for example, private practice on open time, cross referral to their own facilities and different deceitful practices.

Data Collection: Two wellsprings of information were utilized for the investigation: archive examination and key witness interviews. Archive examination included National improvement designs (NDPs), NHM vital and yearly execution designs and different types of reports, government and MOH approaches and related reports from different offices, for example, WHO. Key sources were purposely chosen and met. These contained strategy creators, senior administration and
staff of the MOH including nine resigned representatives distinguished through a snowballing procedure and senior officers from different partner associations, for example, the Ministry of Local Government, mission, healing centers, administrative bodies, proficient associations and worldwide offices working in India (Odisha).

Findings: HR strategy: The requirement for a thorough HR arrangement was recognized amid the 1983 hierarchical survey, with duty regarding its advancement relegated to the Department of Health

HR arranging

A utilitarian HR plan: The Ministry of Health tried noteworthy endeavors to create HR designs. The principal plan was produced in 1987 and the second in 1992\textsuperscript{10}. These designs were, be that as it may, condemned for inability to address enough the HR needs of the nation, the staffing needs of redesigned offices and to connect with wellbeing area advancement designs.\textsuperscript{9}

A HR data framework: The absence of powerful and productive wellbeing data frameworks that can give information to encourage arranging and basic leadership is a proceeding with issue\textsuperscript{9}. Deficiencies in the enrollment procedure both at NHM and services have been referred to as one of the contributing components to high opening rates. Availability and adequacy of HR maintenance methodologies. The general wellbeing division profits by fascination and maintenance techniques acquainted from time with time by the Government.

Conclusion

Regardless of the issues confronting HRM in India, there was no sign in any of the meetings that the wellbeing part was liable to political control. While the WHO structure HRM markers gave the structure to understanding the HRM framework in India, utilization of institutional hypothesis in the examination gave further bits of knowledge into the logical variables that shape HRM rehearses in the general wellbeing division. Considering the centrality of HRM to the workforce and wellbeing framework execution, wellbeing framework analysts need to embrace more research around there to advise HRM arrangement and basic leadership. In perspective of fitting hypothesis with robotic structures frequently utilized in contemplating HR matters in the wellbeing segments.

Ethical Clearance: Not Applicable

Source of Funding: Self

Conflict of Interest: Nil

Reference

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Prevalence of Type A Personality in Employees of Healthcare Institution

Yogita A. Pawar¹, Suraj B. Kanase²

¹Intern, ²Associate Professor, Department of Neurosciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India

Abstract

Background: Healthcare institution is a public or nonprofit organization that provides services for 24 hours per day and 7 days per week. So this work pattern has direct or indirect impact on their health. Stressful life style leads to many health problems. As personality plays a vital role in dealing with the stress and competition. It is essential to know your personality to prevent all the further complications associated with it for a better living. The study is done to find out these type of personalities and aware them about the further health problems.

Objectives: To find out the proportion of Type A personality individuals in particular institution. 2) To find out the association between the personality and related diseases.

Method: Ethical Clearance was obtained from the Institutional Ethical Committee. 100 consecutive individuals aged between 30 to 50 years both male and female were interviewed. They were selected according to the inclusion and exclusion criteria. They were allowed to fill the Questionnaire-OB-360-TYPE A BEHAVIOUR SCALE. According to which conclusion was made.

Result: A statistical analysis for type A personality was significant and for correlation between personality type and health diseases/disorders was not significant (p 0.417).

Conclusion: The majority of participants showed type A personality. The study concluded that there is no significant difference between personality type and health condition. The maximum number of female employees comparatively male employees were more prone for health conditions due to their personality type.

Keywords: Type A personality, employees, healthcare institution.

Introduction

Health is state of complete physical, mental and social well being and not merely absence of disease or infirmity.¹ Healthcare professionals play an important role in delivering quality healthcare service. The demand of these healthcare professionals has been increased.

Even the sensitivity of work at hospitals have increased the level of job stress on the individuals working in it.²

Due to such kind of occupation the health risk factors are increased among healthcare workers.³ Stressful work pattern make healthcare staff and doctors more susceptible to physical and emotional morbidity.⁴ Studies have revealed that the cause of stress among healthcare professionals include-emotional and physical needs of patients, inadequate staffing levels, long working hours, exposure to infectious diseases and hazardous substances leading to illness or death, demands of the job and lack of communication, career development, problems with patients, problem with work or home interface and social life, working environment and the workload.⁵,6,7,8,9

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The stressful things may vary in number and type and one’s physiological, psychological and social makeup are associated with stress, which stimulate and excite to some, whereas may feel stressed and burned.\textsuperscript{10} Individuals are with one temperament profile, which has different character outcomes. Personality development is characterized by relative stability alternating with more rapid transition to new adaptation.\textsuperscript{18}

There is difference in response to similar stressor under similar work conditions and situations which is attributed to the personality of the individual and particularly to the type of the personality.\textsuperscript{11} Personality is defined as a deeply ingrained pattern of behaviour that includes modes of perception, relating to and thinking about oneself and the surrounding environment.\textsuperscript{3} Personality combines the stability, organization of person’s characteristics, temperature, intellect and physique and adjustment to the environment.\textsuperscript{11}

There are many factors which lead to increase stress, anxiety and occupational health outcomes in different areas of medicines which contribute to the perception of job dissatisfaction and stress.\textsuperscript{12} Numerous lists of personality traits describing an individual’s behaviour have developed. Recent research has examined people using extensive lists of personality dimensions and has distilled them into big five.\textsuperscript{13}

Famous researchers Friedman and Rosenman divided people into two basic types of behavior or personality, type A and type B.\textsuperscript{14}

People who are more competitive, outgoing, ambitious, impatient, aggressive, rigidly organized, highly status conscious, anxious, concerned with time management are labeled as type A personality. People with type A personalities are often high achieving “workaholics”. They push themselves with deadlines and hate both delays and ambivalence.\textsuperscript{15} They are in hurry and appear to be driven.\textsuperscript{16} They always need to win and have rage ensues.\textsuperscript{1}

People who have type B personality do not appear to be driven. Their job ambitious do not dominate their entire lives. They are less aggressive, more relaxed and set fewer deadlines.\textsuperscript{16} They find time for their family and friends.\textsuperscript{15}

Type A behavior pattern was found that the coronary patients behave in similar pattern: they are extremely competitive, high achieving, impatient, restless. Type B more relaxed pattern of behavior and low risk of coronary heart disease.\textsuperscript{17}

Famous researchers Friedman and Rosenman divided people into two basic types of behavior or personality, type A and type B.\textsuperscript{14}

The main factors predicting occupational behavior-ability, motivation, intelligence and demographic factors. The relationship between personality and work-occupational variables (attitude to work, belief about work, behavior at work and psychological measures), personality characteristics (biological, cognitive dimension, decision and thinking style, coping patterns), organizational behavior (structure, selection procedure, approval procedure), and psychological process (mechanisms and phenomena).\textsuperscript{17}

**Aim:** To find out the proportion of Type A personality individuals in a particular institution.

**Objectives:** To screen the individuals of a Krishna Institution of Medical Sciences Deemed To Be University, Karad. To find out that how many of them lie in that category. To find out the association between the personality and related diseases.

**Need for Study:** Healthcare institution is a public or nonprofit organization within the state that provides health care and related services, including but not limited to be provision of inpatient and outpatient care, diagnostic and therapeutic services, laboratory services, medicinal drugs, nursing care, assisted living, elderly care and housing including retirement communities and equipment used or useful for the provision of healthcare and related services.

They provide services for 24 hours per day and 7 days per week. So this work pattern have direct or indirect impact on their health. Even in healthcare institution competition has increased now a days to maintain their status and fulfill their daily needs.
As world is changing at an extraordinary pace. And in today’s competitive landscape, there are survival skills that young people need to master so that a measure of success can be assured. To master these skills people are living stress full life.

Stressful life style leads to many health problems. As personality plays an vital role in dealing with the stress and competition. It is essential to know your personality to prevent all the further complications associated with it for a better living. The study is done to find out these type of personalities and aware them about the further health problems.

Materials and Methodology

Type of study- Observational study, Study design-Survey, Place of study-Krishna institute of medical sciences deemed to be university, Sample size-100, Sampling method-simple random method, Duration of study-3 months

Materials: Forms, Pens.

Inclusion criteria: The individuals of Krishna Institute of Medical Sciences Deemed to be University, Karad, Age group-30 to 50 years, Both males and females.

Exclusive Criteria: Individuals not willing to participate, Individuals with personality disorders.

Outcome measures: Questionnaire-OB-360-Type a behaviour scale

Procedure: 100 subjects aged between 30 to 50 years both male and female were selected for the study. Individuals not willing to participate and with personality disorders were excluded. Written consent was taken from subjects those willing to participate. The conclusion was done based on the Questionnaire-OB-360-TYPE A BEHAVIOUR SCALE filled by the subjects.

Findings

- Gender distribution in the study

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>49</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
</tr>
</tbody>
</table>

- Personality type obtained in the study

<table>
<thead>
<tr>
<th>Personality type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57</td>
</tr>
<tr>
<td>B</td>
<td>43</td>
</tr>
</tbody>
</table>

- Health diseases/disorders ratio

<table>
<thead>
<tr>
<th>Health Problems</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>85</td>
</tr>
</tbody>
</table>

- Gender distribution showing health diseases/disorders

<table>
<thead>
<tr>
<th>Gender</th>
<th>Type A</th>
<th>Type B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>16</td>
</tr>
</tbody>
</table>

- Correlation between personality type and health diseases/disorders.

<table>
<thead>
<tr>
<th>r value</th>
<th>r square value</th>
<th>p value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.082</td>
<td>0.0067</td>
<td>0.417</td>
<td>not significant</td>
</tr>
</tbody>
</table>
Results

The majority of participants showed type A personality. The study concluded that there is no significant difference between personality type and health disorders in males. The maximum number of female employees were more prone for health disorders due to their personality type.

Discussion

This study ‘PREVALENCE OF TYPE A PERSONALITY IN EMPLOYEES OF HEALTHCARE INSTITUTION’ was conducted to find out the type of personality in employees of healthcare institution and find out the association between the personality and related diseases.

Healthcare institution is a public or nonprofit organization within the state that provides health care and related services, including but not limited to provision of inpatient and outpatient care, diagnostic and therapeutic services, laboratory services, medicinal drugs, nursing care, assisted living, elderly care and housing including retirement communities and equipment used or useful for the provision of healthcare and related services.

They provide services for 24 hours per day and 7 days per week. So this work pattern have direct or indirect impact on their health. Even in healthcare institution competition has increased now a days to maintain their status and fulfill their daily needs.

As world is changing at an extraordinary pace. And in today’s competitive landscape, there are survival skills that young people need to master so that a measure of success can be assured. To master these skills people are living stress full life.

Stressful life style leads to many health problems. As personality plays an vital role in dealing with the stress and competition. It is essential to know your personality to prevent all the further complications associated with it for a better living. The study is done to find out these type of personalities and aware them about the further health problems.

The objectives of this study were to find the individuals of Krishna Institution Of Medical Sciences Deemed To Be University, Karad. To find out that how many of them lie in that category. To find out the association between the personality and related diseases.

The study was conducted with 100 subjects from Krishna institute of medical sciences deemed to be university, Karad. Subjects were selected according to the inclusion and exclusion criteria and written consent was taken. Both the males and females subjects were equally included for study. Subjects were explained about the procedure of the study. Then they were asked to fill the questionnaire accordingly. Survey was done according to the results obtained and hence conclusion was given.

The study shows 51% female and 49% male subjects participated. Personality type obtained in the study is 57% type A and 43% type B personality. In which type A personality included 22 males and 35 females and type B personality included 27 males and 16 females. The study shows 15 of them have health diseases/disorders and 85 do not have health diseases/disorders. In which 12 females have health diseases/disorders and 39 females do not have health diseases/disorders and 3 males have health diseases/disorders and 46 males do not have health diseases/disorders.

Earlier studies have shown the type A personality subjects correlate their personality pattern with hospitalized patients for coronary artery diseases. There are studies showing the correlation between job stress and job performance among house officers with type A personality characteristics is high.

The study shows there is negative correlation between personality and health conditions but it also shows the health conditions are more prone to female group of population. ($r$ value= 0.082, $p$ value= 0.417).

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of the present study.

Source of Funding: This study was self funded.

Ethical Clearance: The study was approved by the Institutional Ethics Committee of KIMSDU.

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Impact of Physiotherapy Treatment in Children with Cerebral Palsy Aged Between 6 Months to 5 Years

Sukanya V. Jadhav¹, Suraj B. Kanase²

¹Intern, ²Associate Professor, Department of Neurosciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India

Abstract

Background: Cerebral Palsy has various structural and functional impairments which can lead to inability to walk, move independently which impairs their overall growth and development physiotherapy treatment in these subjects is a routine practice. Its applicability and outcomes is still an upcoming research area. This treatment has a longer duration of application for better outcomes. It is a big challenge for parents to do so due to many reasons. The impact of physiotherapy should be found out for all the age groups irrespective of their pathology and presentations. This study is an effort to do so.

Objective:

1. To study the types of cerebral palsy.
2. To assess the children with cerebral palsy.
3. To study the impact of physiotherapy on levels of gross motor function in children with cerebral palsy.

Method: Ethical Clearance was obtained from the Institutional ethical committee. 64 cerebral palsy children were selected aged between 6 months to 5 years divided in 3 groups according to their age both girls and boys were selected. They were assessed using Gross Motor Function Classification System scale which was recorded for a duration of 3 months. According to which conclusion was derived with appropriate statistical method.

Result: Group A shows maximum in level IV, Group B shows maximum in level I and II and Group C shows maximum in level III.

Conclusion: We found that level of Gross Motor Function was improved in the age group of 2 to 4 years and above when compared with age below 2 years after receiving physiotherapy treatment.

Keywords: Gross Motor Function, Cerebral Palsy, Motor development.

Introduction

Development is termed as maturation of functions which is needed for attainment of variety of skills for optimal functioning of child. It mainly deals with maturation and myelination of the nervous system. Although sequence of the development is similar for all, rate of Development differs¹.

Gross motor, fine motor, social and language functions are four different domains in any child’s developmental process. Influence of multiple factors including prenatal maternal illness, bad obstetric history etc., may cause detrimental effect on child’s normal developmental process¹.

Developmental process can be broadly classified into four stages comprising of infancy, early childhood,
middle childhood and late childhood. Infancy is a stage starting from birth up to 1 year of child’s life. Early childhood lasts up to 6 years which includes Toddlers from 1 to 3 years and Preschool period of 3 to 6 years. Middle childhood is the school-going age between 6 to 12 years. Late childhood is the adolescent period ranging between 13 to 18 years.

**Cerebral Palsy (CP):** CP is a collection of disorders affecting the development of movement and posture leading to activity limitations that are credited to non-progressive disturbances occurring in the developing fetal or infant brain. CP is the commonest childhood neuromuscular condition occurring in about 2 to 2.5 per 1000 live births. Any injury or developmental abnormality of immature brain causes cerebral palsy.

**Gross Motor Function (GMF):** They are the ones which require whole body movements involving large muscles of the body to perform activities of daily living. Standing, walking, running and jumping, sitting are some of the gross motor functions. It also includes activities like throwing, catching, kicking requiring eye-hand coordination.

**The prognosis for GMF in CP very inconstant:** Motor development: Motor development includes dynamic movements requiring voluntary control. They help us to maintain an erect and stable posture based on the posture so that it aids to carry out other finer movements. Motor development is based on the growth and development of CNS, genetic factors and environmental factors.

**Aim:** To determine the impact of physiotherapy treatment in children with cerebral palsy.

**Objectives:** To study the types of cerebral palsy. To assess the children with cerebral palsy. To study the impact of physiotherapy on levels of gross motor function in children with cerebral palsy.

**Need for Study:** Gross Motor Functions are those which require whole body movements and which involve the large muscles of the body to perform everyday functions, such as standing and walking, running and jumping, sitting. They also includes eye-hand coordination such as throwing catching kicking.

Cerebral Palsy children have impairments such as inability to walk, vision impairment and even inability to sit independently at 2 years of age.

Children who has undergone physiotherapy treatment in past years, in those patients there is need to find the present status of the child. The amount of recovery who has undergone treatment should be noted and follow up must be done.

It is important to find out the exact level of impairment of gross motor function to avoid further complications and it will easy to set the treatment protocol accordingly.

Hence there is need to study the impact of Physiotherapy treatment in children with cerebral palsy aged between 6 months to 5 years.

**Materials and Methodology**

**Type of study:** Observational study, Study design - Analytic study, Place of study - Krishna institute of medical sciences deemed to be university, Sample size - 64, Sampling method - simple random method, Duration of study - 3 months

**Materials:** Assessment charts, Pens, computers.

**Inclusion criteria:** 1. Children diagnosed and received physiotherapy treatment for cerebral palsy. 2. Age group - 6 months to 5 years, 3. Both sex.

**Exclusion criteria:** Children with other neurological diseases, cardiovascular or musculoskeletal problems.

**Outcome measures:** Gross Motor Function classification system.

**Procedure:** 64 subjects aged between 6 months to 5 years both male and female were selected for the study. They were classified into A, B and C group according their age group. Children with other neurological, cardiovascular and musculoskeletal disorder were excluded. Written consent was taken from the parents of subjects. they were assessed as per the scale accordingly. The conclusion was done based on the Gross Motor Function Classification System.

**Findings:**

- Gender distribution in the study

**Table No. 1: Gender distribution**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>59</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
</tr>
</tbody>
</table>
• Gender distribution in three groups

Table No. 2: Gender distribution in group A

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>62</td>
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<tr>
<td>Female</td>
<td>38</td>
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</tbody>
</table>

Table No. 3: Gender Distribution in Group B

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
</tr>
</tbody>
</table>

Table No. 4: Gender Distribution in Group C

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
</tr>
</tbody>
</table>

• Gross motor function level in the study

Table No. 5: Gross motor function level in the study

<table>
<thead>
<tr>
<th>Gross Motor Function Levels</th>
<th>% of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>16</td>
</tr>
<tr>
<td>Level II</td>
<td>22</td>
</tr>
<tr>
<td>Level III</td>
<td>22</td>
</tr>
<tr>
<td>Level IV</td>
<td>26</td>
</tr>
<tr>
<td>Level V</td>
<td>14</td>
</tr>
</tbody>
</table>

• Gross motor function level

Table No. 6: Gross Motor function level

<table>
<thead>
<tr>
<th>Group</th>
<th>Level of Gross Motor Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Level IV</td>
</tr>
<tr>
<td>Group B</td>
<td>Level I And II</td>
</tr>
<tr>
<td>Group C</td>
<td>Level III</td>
</tr>
</tbody>
</table>

Conclusion

We found that level of Gross Motor Function was improved in the age group of 2 to 4 years and above when compared with age below 2 years after receiving physiotherapy treatment.

Discussion

This study “Impact of physiotherapy treatment on children with cerebral palsy aged between six months to five years” was conducted to study exact level of gross motor function in children with cerebral palsy who undergone physiotherapy treatment.

Gross Motor Functions are those which require whole body movements and which involve the large muscles of the body to perform everyday functions, such as standing and walking, running and jumping, sitting. They also includes eye-hand coordination such as throwing catching kicking. Cerebral Palsy children have impairments such as inability to walk, vision impairment and even inability to sit independently at 2 years of age. Children who has undergone physiotherapy treatment in past years, in those patients there is need to find the present status of the child. The amount of recovery who has undergone treatment should be noted and follow up must be done. It is important to find out the exact level of impairment of gross motor function to avoid further complications and it will easy to set the treatment protocol accordingly.

The objectives of the study are To study the types of cerebral palsy. To assess the children with cerebral palsy. To study the levels of gross motor function in children with cerebral palsy.

64 subjects were selected according to the inclusion and exclusion criteria. They were classified into A, B and C group according to their age group. Group A includes children aged before 2 years. Group B includes children aged between 2 to 4 years. And Group C includes children aged between 4 to 6 years. Both boys and girls were selected for the study. Then they were assessed as per the scale accordingly. Result was as on level of gross motor function of the child. Conclusion were made according to the result obtained.

The study shows different levels of gross motor function in the subjects. 16% children are under level I, 22% children are under level II, 22% children are under level III, 26% children are under level IV, and 14% children under level V participated in the study.

Comparison between the groups were done according to the level of gross motor function. Group A showed maximum IV level of gross motor function that is the poor prognosis is seen. Group B shows maximum II level of gross motor function that is the good prognosis. Group C shows maximum III level of gross motor function that is better prognosis.

Hence there is need to study the impact of Physiotherapy treatment in children with cerebral palsy aged between 6 months to 5 years.
Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of the present study.

Source of Funding: This study was self funded.

Ethical Clearance: The study was approved by the Institutional ethics committee of Krishna institute of medical sciences deemed to be university, Karad.

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Prevalence of Poly Cystic Ovarian Syndrome (PCOS) in Obese Females in a Tertiary Care Centre in South India-An Observational Study

Swetha T1, Yasodha S1, Prabhu Ravi2, Rajalakshmi Veda. S.3

1Assistant Professor, Department of OBG, 2Assistant Professor, Department of Surgery, 3House Surgeon, Department of OBG, Sri Lakshmi Narayana Institute of Medical Sciences (SLIMS), Affiliated to Bharath Institute of Higher Education and Research, India

Abstract

Background: Poly cystic ovarian syndrome (PCOS) is more common among obese females. It has many dimensions which is still being explode many studies have tried to characterise the exact presentation of the disease. This study analysed the prevalence of PCOS in obese females. Along with this, the prevalence of acanthosisnigricans which is a surrogate maker of insulin resistance and Hirsuitism has been simultaneously studied.

Methodology: It was a cross sectional study which is carried out among medical students in a tertiary care centre in South India for one year. Questionnaire was designed and study was done. It comprised sample size of 113 females. All these candidates had high Body mass index (BMI) and all of them fall under obese category. The candidates who were participating in this study were aware of the PCOS condition and a brief session on PCOS was given before the start of this study. Along with this, Cutaneous manifestations were also assessed based on the severity of the symptoms.

Results: This study found that the prevalence rate of PCOS among obese females was 85.8%. More than half of the study patients has acanthosisnigricans (57.5%) and Hirsuitism (59.2%). These results were based on Rotterdam criteria. In this 93.8% of hyperandrogenism, 57.5% had Acanthosisnegucans and 59.2% had hirsuitism. In this study 50.4% had fulfilled all three criteria according to Rotterdam criteria according to Rotterdam and 35.3% has fulfilled 2 out of 3 criteria and 14.1% faced to fulfillatleast 2 criteria(Figure 3). Thus from the above study we conclude that there is great prevalence rate for PCOS in obese females aged 18 to 22.

Conclusion: With 85.8% prevalence rate of PCOS among obese females, it strongly proves that there is a association between the two. Thus increase in BMI causes increased risk of PCOS among females.

Keywords: PCOS, obesity, BMI, Hirsuitism, hyperandrogenism, acanthosisnigricans, oligomenorrhea.

Introduction

In 1935, Irving Stein and Michael Leventhal, both working at the Department of Obstetrics and Gynecology, Michael Reese Hospital, Chicago, USA, described the clinical, the macroscopic characteristics and histological features of polycysticovarsyndromefor the first time. The definition of the polycysticovarymorphology has also varied over the years. The first definition was the one by Stein and Leventhal and they described the macroscopic appearance ofpolycysticovariess as usually bilateral, enlarged, tense ovaries that were often distinctly globular in shape. The histological description was that of the presence of multiple cysts, rarely larger than 15 mm and these cysts were lined by a hypertrophic theca cell layer. It was also noted that the tunica albuginea,
which is the collagen-rich stroma immediately below the ovarian surface epithelium, was much wider than in normal ovaries and that the ovaries were devoid of corpora lutea.

**Methodology:** Present work was a non comparative cross sectional study which was carried among medical students in a tertiary care centre in South India. It was done over a period of one year. It included a sample size of 113 patients. It is a questionnaire based study. Here we explained the candidates about PCOS, its clinical manifestation, investigation, diagnosis and management. Institute Human Ethics Committee (IEC) approval and informed consent was obtained. Entire information recorded was kept confidential, and patient was given full freedom to quit from the study at any point. The following are the criteria based on which study was carried out.

**Inclusion Criteria:**
1. Young female about 18-22 years willing to participate
2. Unmarried women
3. BMI more than 25kg/m²

**Exclusion Criteria:**
1. Pregnant and married women
2. Age less than 17 and more than 22

**Result**

In this study, with sample size of 113 obese females the prevalence of PCOS was 85.8% and all these people were diagnosed under Rotterdam criteria, 14.1% found without PCOS and were not fulfilling the Rotterdam criteria. (Figure 1).

Table 1 shows distribution of age and BMI calculation in mean and standard deviation is 20.43+2.58 and 28.36 + 4.27 respectively.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value in mean ± SD (N=113)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20.43 ± 2.58</td>
</tr>
<tr>
<td>BMI</td>
<td>28.36 ± 4.27</td>
</tr>
</tbody>
</table>

Table 2 shows presence and absence of signs and symptoms of PCOS in percentage. In our study, majority of people had oligomenorrhoea, Amenorrhoea, Acne, Acanthosisnigricans and Hirsutism. Most of the people had menstrual irregularities like oligomenorrhoea and amenorrhoea.

**Table 2: Shows symptoms and signs of PCOS**

<table>
<thead>
<tr>
<th>Menstrual Irregularities</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oligomenorrhoea</td>
<td>53(46.90%)</td>
<td>60(53%)</td>
</tr>
<tr>
<td>Amenorrhoea</td>
<td>51(45.9%)</td>
<td>62(54.8%)</td>
</tr>
<tr>
<td>Hyperandrogenism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acne</td>
<td>50(44.2%)</td>
<td>63(55.7%)</td>
</tr>
<tr>
<td>Acanthosisnigricans</td>
<td>64(56.6%)</td>
<td>49(43.3%)</td>
</tr>
<tr>
<td>Hirsuitism</td>
<td>66(58.4%)</td>
<td>47(41.5%)</td>
</tr>
</tbody>
</table>

**Fig 2: Rotterdam criteria**

In this study 92% were found to have menstrual irregularity and 93.8% were found to have features of hyperandrogenism. In which, 56.6% had Acanthosisnigricans and 58.4% had hirsuitism and 44.2% had acne. In this study 50.4% had fulfilled all three criteria according to and 35.3% has fulfilled 2 out of 3 criteria and 14.1% failed to fulfill at least 2 criteria (Figure 2). Thus from the above study we conclude that there is great prevalence rate for PCOS in obese females aged 18 to 22.

**Fig 1: Shows prevalence rate of PCOS**
Discussion

Poly cystic ovarian syndrome (PCOS) is traditionally thought of as a triad of oligomenorrhea, hirsuitism and obesity. But now it is recognized as a heterogenous disorder that results in overproduction of androgens, primarily from the ovary and is associated with insulin resistance. (1) The hypothesis of the origin of PCOS by environmental factors is based on the beneficial results observed by weight loss. This condition worsens with increase in weight.2

The Major criteria of PCOS proposed in the consensus of the National Institutes of Health in Bethesda were hyperandrogenism, oligoovulation, exclusion of other known disorders and possibly the characteristic morphology of polycystic ovaries on ultrasound.3

At the Rotterdam consensus, the presence of two out of three following criteria was considered as diagnostic for PCOS Oligoovulation or anovulation, clinical and/or low chemical signs of hyperandrogenism, and polycystic ovaries by ultrasound, after exclusion of other related disturbances.4

PCOS is a common gynecologic condition with an estimated prevalence of 7% inwomen of reproductive age groups11, it is often not diagnosed for several years12. Hence, reports investigating the prevalence of PCOS in adolescents are rare. The prevalence of diagnosed PCOS in Northern California of adolescents aged 15–19 years was 0.81%13. In an Iranian study, the prevalence of PCOS regardless of diagnosis was estimated to be 3% based on a questionnaire assessing PCOS symptoms14. However in our population, the prevalence was 0.76% for diagnosed PCOS and 0.56% for diagnosed and confirmed PCOS. However, the prevalence of PCOS was 1.14% when combining diagnosed and undiagnosed PCOS with clinical features and phenotypes based on NIH criteria.

PCOS has a strong association with obesity. The prevalence of PCOS varies between populations, as does the strength of association between PCOS and obesity. Findings from some small clinical studies, in Northern california suggest that the metabolic risk associated with PCOS is mostly due to obesity and that PCOS does not independently increase the metabolic risk of adolescents15. Obese adolescents or women may be more commonly associated with the diagnosis of PCOS leading to a potential bias in studies based on diagnosis codes that may result in an overestimation of the association with obesity. On the other hand, women without obesity and different metabolic risk seem to be less likely to be diagnosed which may bias studies aiming to identify potential high metabolic risk phenotypes of PCOS if criteria other than diagnosis codes cannot be used.

Abdominal visceral adipose tissue has been identified as a better marker of metabolic health than body weight which suggest that adipose tissue and tissue-specific inflammation play a crucial role in the development of PCOS. Because White women tend to have significantly higher visceral fat than Black women16.

The key pathophysiologic components may appear to include androgen excess, abnormal gonadotropin dynamics, and IR. Excess androgen production in the ovary affects follicle maturation, leading to follicular atresia and decreased reproductive function. In addition, the resultant hyperandrogenemia may produce clinical hyperandrogenism and underlying primary hypothalamic defect in the gonadotropin releasing hormone (GnRH) pulse generator or a secondary effect of low levels of progesterone resulting from oligo-or anovulation17.

Insulin also plays a central role in PCOS pathophysiology, acting to increase androgen levels by direct and indirect mechanisms19. Insulin resistance in women with PCOS is independent of body mass. However, obesity in PCOS is associated with greater insulin resistance and a higher incidence of dyslipidaemia6. Many mechanisms have been proposed for insulin resistance in PCOS women. These mechanisms were peripheral target tissue resistances, reduced hepatic clearance or increased pancreatic sensitively7. In obese individuals, free fatty acids and tumour necrosis factor alpha released from adipose tissue may play a key role in pathogenesis of insulin resistance.8

If PCOS is suspected, a complete medical history, physical examination, blood tests, and a pelvic ultrasound should be performed[20] which includes weight gain, menstrual cycle abnormalities, male-pattern hair growth, skin changes, and elevated blood pressure (BP). Blood is drawn to assess hormone, glucose, and lipid levels, and a
pelvic ultrasound is performed to scan for ovarian cysts. During the assessment period, other potential causes associated with reproductive, endocrine, and metabolic dysfunction should be excluded. Physicians should rule out adrenal hyperplasia, Cushing’s syndrome, and hyperprolactinemia before a PCOS diagnosis is confirmed.

After PCOS is diagnosed, studies show that more than 50% of patients develop prediabetes or diabetes, and there is an increased risk of myocardial infarction (MI), dyslipidemia, hypertension, anxiety, depression, endometrial cancer, and sleep apnea. Moreover, pregnant women with PCOS should be informed of the increased rates of miscarriage, gestational diabetes, pre-eclampsia, and premature delivery.

Since the primary cause of PCOS is unknown, symptomatic treatment is always better. Few treatment approaches improve all aspects of the syndrome, and the patient’s desire for fertility may prevent her from seeking treatment despite the presence of symptoms. Treatment goals should include correcting anovulation, inhibiting the action of androgens on target tissues, and reducing insulin resistance. Weight reduction for obese patients with PCOS is beneficial in many ways. Weight loss helps to decrease androgen, luteinizing hormone (LH), and insulin levels. It also helps to regulate ovulation, thereby improving the potential for pregnancy.

To manage patient with PCOS, it is recommended that 30 min of exercise on at least 5 days of the week to maintain weight and for healthy lifestyle. Recent studies showed that 60-75 min of moderate to high intensity of physical activities promotes a greater long term (i.e.) up to 12 months, weight loss compared with the conventional recommendation for optimum health. Dietary modifications are also recommended. In which dairy products like cheese should be avoided and more vegetables and fruits should be included.

Apart from this, many drug therapies are used for the treatment of PCOS including Gonadotropins, antidiabetic agents, aromatase inhibitors, antiandrogens, OCP’s, and statins are also tried.

**Conclusion**

In this study we conclude that as physicians, we should be aware of our role in not only treating this PCOS clinical features but also to remove the stress and emotional instability of the patient which arises due to this complex clinical presentation. Thus our first line treatment should be encouraging the patient to do regular exercise. We must also recommend the patient to have a healthy lifestyle modification which involves dietary modifications. Certain drugs can provide promising results whereas treatment of long term consequences of PCOS should also be kept in mind. As a result, future studies on PCOS in adolescent girls should also be considered in order to get the best outcome results.

**Conflict of Interest:** No

**Source of Funding:** Self

**Ethical Clearance:** Yes

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To Study the Morphological Changes of Coracoacromial Arch in Various Shoulder Disorders

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Abstract

Objective: To determine the morphological changes of coracoacromial arch in various shoulder disorders.

Method: An observational study was done, which included 100 subjects. They were selected by simple random sampling method as per the inclusion and exclusion criteria of the study. The inclusion criteria were, all clinically diagnosed shoulder disorders. The exclusion criteria were, coracoacromial ligament injury, post-traumatic stiffness of shoulder, post-operative conditions, recurrent dislocations and subluxations. The study was conducted at physiotherapy OPD of Krishna institute of medical sciences deemed to be university karad for a duration of 6 months. The ethical clearance for the study was taken from institutional ethical committee of KIMSDU Karad.

Result:

1. Shape of acromion-out of 100 subjects 34 subjects were having flat morphology, 35 subjects were having curved morphology and 31 subjects were having hooked morphology.

2. Acromion angle-In this study 34 subjects with flat morphology were studied and 100% subjects showed alteration in acromion angle. 100% subjects were having acromion angle greater than 12 degrees where normal range is 0-12 degrees. 35 subjects with curved morphology were studied and 91% subjects showed alteration in acromion angle. 91% subjects were having angle more than 27 where normal range is 12-27 degrees. 31 subjects with hooked morphology were studied and 16% subjects showed alteration in acromion angle. 16% subjects were having angle less than 27 where normal range is more than 27.

3. Lateral acromion angle-amongst 100 subjects 79% subjects showed alteration in lateral acromion angle. 79% subjects showed more than 99 degrees of lateral acromion angle where normal range is 64-99 degrees.

4. Acromion index-out of 100 subjects 92% subjects showed acromion index less than 0.7 where normal value is more than 0.7.

Conclusion: The results of this study conclude that morphological changes of coracoacromial arch causes various shoulder disorders. The study further conclude that 79% subjects showed altered lateral acromion angle, 92% subjects showed altered acromion index. 100% subjects with flat morphology showed altered acromion angle, 91% subjects with curved morphology showed altered acromion angle, 16% subjects with hooked morphology showed altered acromion angle.

Keywords: Coracoacromial arch, Shape of the acromion, Acromion angle, Lateral acromion angle, Acromion Index.

Introduction

Coracoacromial arch is formed by coracoid process, the acromion and inferior surface of acromio-clavicular joint. It forms osteoligamentous vault over humeral head and protects from superior translatory forces thus preventing it from dislocation superiory. Although
beneficial to joint stability, contact of humeral head with the undersurface of the arch can simultaneously cause painful impingement or mechanical abrasion of structures within the subacromial space.

The supraspinatus tendon is particularly vulnerable because of its location beneath all of the potentially impinging structures except the coracoid process. Suprahumeral space has been quantified by measuring the sup-to-inferior acro-humeral interval on radiographs. As the acromiohumeral interval decreases, it must accommodate the soft tissue structures within it, as well as the articular cartilage and the capsuloligamentous structures. For this reason, Flatow & Colleagues suggested that even during normal motion into humeral elevation, there is some contact of rotator cuff with the coracoacromial arch(2).

The morphology of the acromion has been considered the main cause of subacromial disease (impingement syndrome, tendinitis and rotator cuff pathologies) (3,4,5). Bigliani et al(6) described the existence of three forms of acromion (flat, curved, hooked), associating the morphology found in the lateral radiographic view with the prevalence of subacromial disease. The vector resulting from the force which originates in the lateral projection of acromion which, in turn, related to the deltoid insertion, causing the humeral head to rise up and impinge against the subacromial surface during the abduction of upper limb.(7,8,9)

According to the study by Bigliani et al (6) showed that 70% of rotator cuff injuries were associated with type II acromion, and 80% were associated with hooked type of acromion. And he found no injury in type I acromion (4,6). Snyder et al reported that acromion thickness, in its anterior third, to an etiological role in the subacromial disease. (10)

There are certain shoulder disorders in which morphological changes are noticed. It is necessary to know what exact changes occur in shoulder disorders. So as to plan for a particular targeted treatment for certain shoulder disorders. Hence the present study is conducted to study the morphological changes of coracoacromial arch in various shoulder disorders.

**Materials and Methodology**

An observational study was conducted on 100 subjects selected with simple random sampling method as per the inclusion and exclusion criteria of the study. The inclusion criteria were all clinically diagnosed shoulder disorders. The exclusion criteria were coracoacromial ligament injury, post-traumatic stiffness of shoulder, post operative conditions, recurrent dislocations and subluxations of the shoulder joint. The study was conducted at physiotherapy OPD of Krishna institute of medical sciences deemed to be university karad for a duration of 6 months. The ethical clearance for the study was taken from institutional ethics committee of KIMS DU karad.

**Procedure:** Ethical Clearance was obtained from institutional ethical committee KIMS DU, Karad. Subjects diagnosed clinically by Orthopaedic surgeons with shoulder disorders were included in the study. Shoulder disorders–impingement syndrome, adhesive capsulitis, rotator cuff tear, bursitis, tendinitis were studied in this study. Diagnostic tools used were AP view of shoulder X-ray. The acromion index and the angle of lateral projection were calculated through the angular and geometric measurements, using a goniometer, determined by measurements on the radiographs, according to Nyffeler et al (7) and Banas et al (9), respectively. The values were compared with normal ranges.

Materials used for this study are X-ray of shoulder and data collection sheet. AP view of shoulder is taken for this study.

**Normal ranges are**-

1. Shape of acromion-Type I-Flat
   - Type II-Curved
   - Type III-Hooked
2. Acromion angle-type I-0-12 degrees
   - Type II-13-27 degrees
   - Type III-More than 27 degrees
3. Lateral acromion angle-64-99 degrees
4. Acromion index-GA/GU= more than 0.7

Any deviations from normal range are noted.

**Result and Statistical Analysis**

1. Shape of acromion-out of 100 subjects 34 subjects were having flat morphology, 35 subjects were having curved morphology and 31 subjects were having hooked morphology.
2. **Acromion angle**—In this study 34 subjects with flat morphology were studied and 100% subjects showed alteration in acromion angle. 100% subjects were having acromion angle greater than 12 degrees where normal range is 0-12 degrees.

35 subjects with curved morphology were studied and 91% subjects showed alteration in acromion angle. 91% subjects were having angle more than 27 where normal range is 12-27 degrees.

31 subjects with hooked morphology were studied and 16% subjects showed alteration in acromion angle. 16% subjects were having angle less than 27 where normal range is more than 27.

3. **Lateral acromion angle**—amongst 100 subjects 79% subjects showed alteration in lateral acromion angle. 79% subjects showed more than 99 degrees of lateral acromion angle where normal range is 64-99 degrees.

4. **Acromion index**—out of 100 subjects 92% subjects showed acromion index less than 0.7 where normal value is more than 0.7.

**Discussion**

This study was conducted to study whether various shoulder disorders cause morphological changes in coracoacromial arch or not. Coracoacromial arch provides stability to shoulder joint, also protects the shoulder superiorly from direct trauma. Arch also acts as physical barrier to superior translator forces acting on humeral head, preventing it from dislocating superiorly (1). Due to tremendous force and repetitive stress, coracoacromial arch is prone for damage and dysfunction of shoulder joint.

The objective of this study was divided into 4 parts, firstly to the shape of acromion process, secondly to study the acromion angle according to its morphology, thirdly to study the lateral acromion angle and lastly to study the acromion index. 100 subjects were included in this study. Out of 100 subjects there were 44 males and 56 females. All clinically diagnosed shoulder disorders were taken with no age limitations. Subjects with coracoacromial ligament injuries, posttraumatic conditions, postoperative conditions, recurrent shoulder subluxations and dislocations were excluded from the study.

Prior informed consent was taken from the subjects. They were explained with necessary information before handing them with the forms. The form consisted 2 sections firstly demographic data, information, outcome measures, secondly the consent form. The outcome measures used in this study was radiograph of the shoulder. AP view of radiograph was selected. Shape of the acromion, acromion angle, lateral acromion angle and acromion index were measured on the radiograph. These values were measured to study the morphological changes of coracoacromial arch. Shape of the acromion was studied and subjects were categorized into flat, curved and hooked category of morphology (6). 34 subjects with flat morphology were studied in that 100% subjects showed alteration in acromion angle, having ranges more than 12 degrees where normal range is 0-12 degrees (11). 35 subjects with curved morphology were studied in that 91% subjects showed acromion angle more than 27 degrees where normal range was 13-27 degrees (11). 31 subjects with hooked morphology were studied in that 16% showed acromion angle less than 27 where normal range was more than 27 degrees (11).

Lateral acromion angle was measured and 79% subjects showed alteration in angle that was more than 99 degrees where normal range is 64-99 degrees (11). Acromion index was measured and 92% subjects showed altered acromion index which was less than 0.7 (normal range more than 0.7). in this study 66 subjects with adhesive capsulitis, 27 subjects with tendinitis, 3 subjects with impingement syndrome, 3 subjects with rotator cuff tear and 1 subject with bursitis were studied. This study found that changed morphology of coracoacromial arch is one of the causes for various shoulder disorders. An also changed morphology of coracoacromial arch is the predisposing factor for shoulder dysfunction. Study showed that morphological changes cause various shoulder disorders.

**Conclusion**

The results of this study conclude that morphological changes of coracoacromial arch causes various shoulder disorders. The study further conclude that 79% subjects showed altered lateral acromion angle, 92% subjects showed altered acromion index. 100% subjects with flat morphology showed altered acromion angle, 91% subjects with curved morphology showed altered acromion angle, 16% subjects with hooked morphology showed altered acromion angle.

**Conflicts of interest:** Nil

**Source of Funding:** This study was self funded.
References


Quality of Life of Patients Underwent Midfoot Amputation at a Tertiary Care Hospital in Kochi

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Abstract

Midfoot amputations are commonly seen among patients with diabetic foot ulcers, which may cause impaired physical mobility and can affect their quality of life. The purpose of this study was to assess the quality of life of patients who underwent midfoot amputation.

Materials and Method: A quantitative approach with descriptive research design was used for the study. It was conducted among 55 patients who underwent midfoot amputation and were attending the endocrine and podiatry OPD of a tertiary care hospital. Sample selection was done using non-probability convenience sampling technique. The socio-demographic and clinical data were collected by a semi-structured questionnaire and the quality of life was assessed using SF-36 questionnaire. Analysis was done using chi square test.

Results: Majority of the subjects (98%) had poor quality of life with a mean score of 31.18±6.62. Among the 8 domains of quality of life, role limitation due to physical health was the poorest with a mean score of 8.19±14.47. Physical component summary (PCS) and mental component summary (MCS) of SF-36 were also poor with mean scores of 29.35±8.60 and 30.72±11.85 respectively. No significant association was found between the quality of life and selected demographic variables of the midfoot amputated patients.

Conclusion: The result of the study highlights poor quality of life among midfoot amputated patients. It was also found that the major problem that led to poor quality of life was the role limitation due to physical health. Therefore, there should be more focus on the rehabilitation of patients after midfoot amputation to improve their quality of life.

Keywords: Quality of life, midfoot amputated patients.

Introduction

Amputation is the removal of whole or part of an extremity. It can cause loss of function, body image disturbances, and psychosocial disruption. Diabetic foot and other vascular complications are the most common causes of surgical amputation. Amputation of the limbs has been reported to be a significantly stressful event for an individual. 1

Statistics say that the main causes of limb loss are vascular disease including diabetes mellitus and peripheral vascular diseases, trauma, and cancer. It was also projected that the amputee population will be more than double by the year 2050.2,3

A study was conducted on body image and self-esteem in lower limb amputees in Austria. The purpose of the study was to analyze the impact of lower-limb amputations on aesthetic factors such as body image and self-esteem as well as quality of life. This cross-sectional study in three centers included 298 patients. This study showed that lower-limb amputations significantly influence the patient’s body image and quality of life.4,5
Majority of the non-traumatic lower limb amputations occur in people diagnosed with diabetes. Most of the amputations can be prevented by educating the patients about foot care and lifestyle modification which will help to prevent diabetic foot ulcer.

A recent study says that the knowledge and self-care practice of diabetic patients should be improved to reduce complications such as amputation. An amputation can disturb the physical and mental capability of human body. It can affect the quality of life due to problems with mobility, pain, and appearance of the amputated part.

Materials and Method

The study was conducted among 55 midfoot amputated patients and the research design used was non-experimental descriptive research design. The subjects were selected by non-probability convenience sampling technique based on inclusion criteria and rapport was established with them. After obtaining permission from institutional ethical committee, researcher explained the purpose of the study and obtained informed consent from them and the tools were administered. The demographic data was obtained from the subjects themselves and the clinical data was collected from the medical records. SF-36 questionnaire was used to assess the quality of life of midfoot amputated patients. The factors assessed in quality of life mainly included general health, physical problems, emotional problems, pain, etc. The data obtained was analyzed using descriptive and inferential statistics and the association was assessed using chi square test.

Results

Most of the subjects in this study were within the age group of 50-60 (41%). In that, most of them were males (75.5%), 83.6% of patients were married. Majority (96.4%) of the subjects underwent midfoot amputation due to diabetic foot ulcer. None of them were using prosthesis.

Description of quality of life of patients underwent midfoot amputation

The figure shows that 98% (54) of the subjects have poor quality of life and only 2% (1) have good quality of life.

Table I: Distribution of mean and standard deviation of quality of life of midfoot amputated patients

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Component</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General health</td>
<td>35</td>
<td>90</td>
<td>60.91</td>
<td>10.32</td>
</tr>
<tr>
<td>2</td>
<td>Physical function</td>
<td>0</td>
<td>55</td>
<td>12.18</td>
<td>13.49</td>
</tr>
<tr>
<td>3</td>
<td>Role limitation due to physical health</td>
<td>0</td>
<td>50</td>
<td>8.19</td>
<td>14.47</td>
</tr>
<tr>
<td>4</td>
<td>Role limitation due to emotional problem</td>
<td>0</td>
<td>100</td>
<td>10.91</td>
<td>24.04</td>
</tr>
<tr>
<td>5</td>
<td>Energy and Fatigue</td>
<td>0</td>
<td>60</td>
<td>41.39</td>
<td>11.24</td>
</tr>
<tr>
<td>6</td>
<td>Emotional Wellbeing</td>
<td>0</td>
<td>64</td>
<td>39.85</td>
<td>15.70</td>
</tr>
<tr>
<td>7</td>
<td>Social function</td>
<td>0</td>
<td>100</td>
<td>49.59</td>
<td>18.87</td>
</tr>
<tr>
<td>8</td>
<td>Pain</td>
<td>10</td>
<td>100</td>
<td>67.68</td>
<td>20.44</td>
</tr>
</tbody>
</table>

The table I shows that the general health of midfoot amputated patients was good with a mean score of 60.91 with SD of 10.32. The pain experienced by most of them was less with mean score of 67.68 with SD of 20.44. All the other components in the quality of life of the subjects were poor. And lowest mean score was observed in role limitation due to physical health was 8.19 with SD of 14.47.
Table II: Distribution of mean and standard deviation based on Physical Component Summary

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Name of the Component</th>
<th>Minimum score</th>
<th>Maximum Score</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical Function</td>
<td>0</td>
<td>55</td>
<td>12.18</td>
<td>13.498</td>
</tr>
<tr>
<td>2</td>
<td>Role limitation due to physical health</td>
<td>0</td>
<td>50</td>
<td>8.19</td>
<td>14.475</td>
</tr>
<tr>
<td>3</td>
<td>Pain</td>
<td>10</td>
<td>100</td>
<td>67.68</td>
<td>20.446</td>
</tr>
</tbody>
</table>

The table II shows that among the components of physical component summary the majority didn’t express much pain whereas most of them had role limitation due to physical health.

Table III: Distribution of mean and standard deviation based on Mental Component Summary

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Name of the Component</th>
<th>Minimum score</th>
<th>Maximum Score</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Role limitation due to emotional problem</td>
<td>0</td>
<td>100</td>
<td>10.91</td>
<td>24.049</td>
</tr>
<tr>
<td>2</td>
<td>Energy and fatigue</td>
<td>0</td>
<td>60</td>
<td>41.39</td>
<td>11.249</td>
</tr>
<tr>
<td>3</td>
<td>Emotional wellbeing</td>
<td>0</td>
<td>64</td>
<td>39.85</td>
<td>15.700</td>
</tr>
</tbody>
</table>

The table III shows that among the mental components majority had role limitation due to emotional problem with a mean score of 10.91±24.04 whereas the other two components such as energy and fatigue and emotional wellbeing also was poor with mean scores of 41.39±11.24 and 39.85±15.70 respectively.

Association between demographic variables and quality of life: The demographic variables such as age, gender, education, occupation, income, duration of amputation, and reason for amputation did not show any association with the quality of life of midfoot amputated patients.

Discussion

Results of the present study shows that the majority of samples are males (74.5%), the cause of amputation is diabetes mellitus, and the quality of life of the subjects is poor. The PCS and MCS scores of the subjects are also poor. A study conducted in Egypt showed that most of the participants were males (59%) and the major cause of amputation was diabetes mellitus. Most of the subjects had a change in quality of life after amputation and also the most affected aspects were the physical and mental components. Another study conducted by Johannesson et al. also showed that the individuals with diabetes mellitus have an increased rate of amputation than the general population.

In our study there was no significant relation between the quality of life and demographic variables such as age, gender, education, occupation, and cause of amputation.

In a study conducted in Egypt showed that there was no statistical significance with educational level, work, or cause of amputation, but there was significant association between quality of life and gender. The result obtained in our study might be because of the smaller sample size.

In the present study, the lower physical and mental component scores contributed to the poor quality of life among midfoot amputated patients. Physical function, role limitation due to physical and emotional problems, energy and fatigue, emotional wellbeing, and social function were the areas found to have more problems experienced by the participants. It is related to the results of a study conducted in a rehabilitation center which showed that the SF-36 physical component and mental component scores were significantly lower for amputees when compared with general population.

Conclusion

Amputations are not uncommon nowadays. However, minor amputations also have a larger impact on the quality of life of the individuals. The result of the study highlights poor quality of life among midfoot amputated patients. It was also found that the major problem that led to poor quality of life was role limitation due to physical health. It is important to consider the physical as well as the mental functioning after the amputation. For that, the health care workers should give importance on rehabilitation of the patients and also provide education to the family members about the importance of psychological support that needs to be given to them.
Conflict of Interest: There is no conflict of interest among the authors.

Source of Funding: This study was done by self-funding from the authors.

Ethical Clearance: It was obtained from the institutional ethical committee of AIIMS, Kochi.

Source of Support: Nil

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Bronchoscopic Study in Diagnosing of Carcinoma of Lungs in Telangana Population

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Abstract

In the Bronchoscopic study of lung carcinoma 39 adult patients aged between 28 to 65 years old, of both sexes were studied. The history was 13 (33.3%) were smokers, 12 (30.7%) were former smokers, (9.23%) were exposed to dust, 5 (12.8%) were non-smokers. The types of lesion were 16 (14%) had partial endotracheal obstruction, 11 (28.2%) had complete endotracheal obstruction, 8 (20.5%) had mucosal irregularities, 4 (10.2%) had external compression. The histopathological observation were 17 (43.5%) had squamous cell carcinoma, 7 (17.9%) had small cell carcinoma, 13 (33.3%) had adeno carcinoma, 2 (5%) had mixed cell carcinoma. This various Bronchoscopic presentations of Bronchogenic carcinoma will be quite useful to chest and pulmonary physician, pathologist and onco-surgeon to treat such patients efficiently and prevents the morbidity and mortality of the patients because early detection of carcinoma can be treated and increase the survival of such patients.

Keywords: Ca= Carcinoma, FOB=Fiber optic Bronchoscopy, histopathology, Telangana.

Introduction

According to the National cancer institute (ministry of health) Ca of lung is most common neoplasm and highest mortality rate(1)(2). It is estimated that, death due to lung ca is 1.2 million globally (including both sexes) every year(3). The most affected were adults. In industrialized countries, the lung ca an epidemic disease among men. However it has become more common in woman also. The principle risk factor is smoking, which causes 10-30 times greater risk of developing lung neoplasm, other traditionally accepted factors are exposure to dust, chimneys of industry in urban areas, family history of lung cancer are aggravating factors to cause ca of lung(4).

Most diagnoses are confirmed when the disease become advanced, locally or disseminated, since early stage tumours do not usually produce symptoms that warrants investigations. This indicates that, early detection measures are particularly important since surgical resection, which constitutes, the only therapeutic approach that offers a potential cure, is effective only in early clinical stages. Hence attempt was made to study the lung ca with FOB and histopathologically to detect the lung ca at various stages causes obstructions at various degrees.

Material and Method

39 adult patients of both sexes aged between 28 to 65 years who were regularly visiting chest and pulmonary OPD of Mediciti Hospital of Ghanpur, Medchal-501401, Telangana.

Who were diagnosed bronchogenic carcinoma, histopathologically were selected for study. The age, gender, smoking history of every patient was recorded individually. Apart from routine blood examination, CT.BT(Clotting and bleeding time). ECG was also studied and atropine 0.6mg IM and Inj phenergan 25mg IV was given. Bronchoscope was performed with flexible, fiber optic Bronchoscopy (FOB), through trans–nasal or trans oral route under tropical anesthesia (2% xylolcaine) multi para monitor was attached to heart rate, Blood pressure, respiratory rate, ECG and oxygen

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saturation. During and soon offer procedure oxygen was administrated to maintain oxygen saturation more than 90%. Samples were collected from bronchoscopic aspiration, brushing and biopsy obtained and sent for further confirmation.

The HIV, HBsAg patients and patients with cardiac neurological problems were excluded from the study. The clinical features, history of patient, bronchoscopic findings and histo-pathological observation were grouped with percentage to correlate the types and degree of carcinoma. The ratio of male and female were 3:1

During the study was about three years

Observation and Results

Table 1. History of bronchogenic carcinoma patients 13(33.3%) were smokers 12(30.7%) were former smokers 9(23%) were exposed to dust, 5(12.8%) were non-smokers

Table 2. Types of endobronchial lesions 16(41%) had partial endotracheal obstruction, 11(28.2%) had complete endotracheal obstruction, 8(20.5%) had mucosal irregularities, 4(10.2%) had external compression

Table 3. Histo-pathological study of bronchogenic carcinoma Patients-39

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particular</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Squamous cell carcinoma</td>
<td>17</td>
<td>43.5%</td>
</tr>
<tr>
<td>2</td>
<td>Small cell carcinoma</td>
<td>07</td>
<td>17.9%</td>
</tr>
<tr>
<td>3</td>
<td>Adeno carcinoma</td>
<td>13</td>
<td>33.3%</td>
</tr>
<tr>
<td>4</td>
<td>Mixed cell carcinoma</td>
<td>02</td>
<td>05.1%</td>
</tr>
</tbody>
</table>

Discussion

The present study of Bronchoscope in the diagnosing of carcinoma of lung in Telangana population. The history of lung ca patients was 13(33.3%) were smokers 12(30.7%) were former smokers 9(23%) were exposed dust, 5(12.8%) were non-smokers (Table-1). The endobronchial lesions were 16(41%) had partial endotracheal obstruction, 11(28.2%) had complete endotracheal obstruction, 8(20.5%) had mucosal irregularities, 4(10.2%) had external were, 17 (43.5%) had squamous cell Ca 7(17.9%) had small cell ca 13(13.3%) had adeno Ca, 2(5%) had mixed cell Ca (Table-3). These present values were more or less in agreement with previous studies (5)(6)(7).

It was observed that higher prevalence of lung Ca in males than females, because in India males are more smokers than females(8) moreover adult of both sexes were more prone for lung Ca. In the study of endobronchial lesion the right lower lobe bronchus followed by right lower lobe was common site of lesion but most of the foreign studies have right upper lobe was common site of lesion(9). However right lung was common site of any infection including tuberculosis or Ca because of short and straight bifurcated trachea towards right side while left bifurcated trachea was long and oblique hence left lung is rare to get infected.

In the histo pathological study squamous cell Ca, was highest in present study (43.5%) but in some other studies of Indian studies adeno-carcinomawas highest but in abroad study squamous cell Ca was quite common(10). In general adeno-carcinoma and squamous cell Ca were quite common globally.

It has been also reported that, passive exposures to cigarette smoke were also more prone for lung Ca because passive smoke contains a complex mixture of various mutagenic and carcinogenic agents(11). It has been postulated that, endogenous and exogenous estrogens play a role in the development of adno-carcinoma.
As the common symptoms of the lung Ca concerned 54% of the patients reported cough as initial manifestations of the disease. Although hemoptysis is common, it is rarely severe. Early dyspnea or chest discomfort affected 60% of the patients at the time of diagnosis\(^{(12)}\). But in India cough and dyspnea or chest discomfort are thought to be common symptoms of respiratory tract infection and rarely go to physician to get treatment hence Ca will be almost pre dominant during treatment of lung Ca, other correlative factors like body weight loss, fever were also taken as common phenomena due malnutrition and frequent changes in climatic conditions and reduced immunological factors.

**Summary and Conclusion**

The present bronchoscopic diagnosis of Ca of lungs in Telangana population will be quite helpful to the chest and pulmonary physician, pathologist and oncological surgeon for resection of broncho pulmonary segments for long survival of patients but for delayed diagnose of Ca, both patients and doctors to be blamed because exact cause and mechanism of Ca is yet to be known.

This research paper was approved by ethical committee of Mediciti Institute of medical Sciences, Ghanpur, Medchal-501401, (Telangana).

**No conflict of interest**

**No funding**

**References**


Study of Different Feeding Patterns in Children of Telangana

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¹Assistant Professor, ²Associate Professor Department of Pediatrics, Mediciti Institute of Medical Sciences Ghanpur, Medchal, Telangana

Abstract

80 (Eighty) school children aged between 6 months-18 months were selected for the study of different pattern of feeding. The inception of first feeding were in 38(47.5%) was (< 6 hrs 22(27.5) were 7-12 hours. 11(13.7%) were 13-24 hrs 7(8.75%) were 25-48 hrs 2(2.5%) were 49-72 hrs. In the pre-lacteal feeding 18(22.5%) used honey, 39(48.7%) sugar solution (water added with sugar), 14(17.5%) plain water, 9(11.2%) milk. The causes of stoppage of breast feeding was 24(30%) insufficient breast milk, 18(22.5%) maternal sickness, 15(18.7%) infant sickness, 14(17.5%) maternal employment, 9(11.2%) subsequent pregnancy.

This pragmatic study of different patterns of feeding, inception of first feeding and various cases of stoppage breast feeding will be quite useful to pediatrician to treat such children efficiently to prevent morbidity and mortality in children.

Keywords: Feeding, lactation, breast feeding, Telangana.

Introduction

Understanding children eating attitudes and behavior is important in terms of children’s health. Dietary habit acquired in childhood persists throughout to adulthood (1)(2). Globally under nutrition is one of the most important public challenges. Under nutrition is associated with more than one third of global disease. It is estimated that 35% death in children due to under nutrition associated with in appropriate feeding practices during early childhood(4). Poor feeding result into repeated infection suboptimal breast feeding leads to ill-health in children. Maximum infants’ children deaths due to diarrhea and pneumonia were observed in excluded breast fed(5). The first two years of life is the critical window of opportunity for the child growth. It was observed that, there is hindrance in the child growth in India and abroad well. Hence attempt was made to study the children at different age of months and their feeding pattern, types of diet and various causes of stoppage of breast feeding.

Material and Method

80 (Eighty) children aged between 6 months-18 months, regularly visiting pediatric OPD of Mediciti Institute of Medical Sciences Ghanpur, Medchal-501401, Telangana were selected for study. The detailed history of feeding pattern was collected from their mothers. The different feeding patterns, pre-lacteal feeding time of inception, causes of stoppage of breast feeding, were studied with percentage.

The children having congenital anomalies, low birth weight were excluded from the study. The ratio of male and female kid was 2:1. The duration of study was about two years.

Observation and Results

Table-1—Study of inception of first feeding in children 38 (47.5%) < 6 hours, 22(27.5%) 7-12 hours, 11(13.7%) 13-24 hours, 7(8.75%) 25-48 hours, 2(2.5%) 49-72 hours.

Table-2—Study of pre-lacteal feeding in children: 18(22.5%) honey, 39(48.7%) sugar solution (water+ sugar) 14(17.5%) plane water, 9(11.2%) milk.

Table-3—Causes of stoppage of breast feeding in children 24(30%) insufficient breast milk, 18(22.5%) subsequent pregnancy.
maternal sickness, 15(18.7%) infant sickness 14(17.5%) maternal employment 9(11.2%) subsequent pregnancy.

**Table 1: Study of inception of first feeding in children No of Patients-80**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 6 hrs</td>
<td>38</td>
<td>47.5</td>
</tr>
<tr>
<td>2</td>
<td>7-12 hrs</td>
<td>22</td>
<td>27.5</td>
</tr>
<tr>
<td>3</td>
<td>13-24 hours</td>
<td>11</td>
<td>13.7</td>
</tr>
<tr>
<td>4</td>
<td>25-48 hours</td>
<td>7</td>
<td>8.75</td>
</tr>
<tr>
<td>5</td>
<td>49-72 hrs</td>
<td>2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Table 2: Study of pre-lacteal feeding children No of Patients-80**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Honey</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td>2</td>
<td>Sugar solution (water added sugar)</td>
<td>39</td>
<td>48.7</td>
</tr>
<tr>
<td>3</td>
<td>Plane water</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td>4</td>
<td>Milk</td>
<td>09</td>
<td>11.2</td>
</tr>
</tbody>
</table>

**Table 3: Causes of stoppage of breast feeding No of Patients-80**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insufficient breast milk</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Maternal sickness</td>
<td>15</td>
<td>18.7</td>
</tr>
<tr>
<td>3</td>
<td>Infant sickness</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td>4</td>
<td>Maternal employment</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td>5</td>
<td>Subsequent pregnancy</td>
<td>09</td>
<td>11.2</td>
</tr>
</tbody>
</table>

**Discussion**

The present study of different feeding pattern, in Telangana children. In the study of inception of first feeding in children 38(47.5%) < 6 hrs, 22(27.5%) 7-12 hours 11(13.7%) 13-24 hrs, 7(8.75%) 25-48 hrs, 2(2.5%)49-72 hrs (Table-1). In the study of pre-lacteal feedings in children 18(22.5%) was honey, 39(48.7%) was sugar solution (water added with sugar), 14(17.5%) plane water, 9(11.2%) milk (Table-2). The causes of stoppage of breast feeding 24(30%) Insufficient milk, 18(22.5%) maternal sickness, 15(18.7%) Infant sickness, 14(17.5%) maternal employment 09(11.2%) subsequent pregnancy (Table-3) This findings were more or less in agreement with previous studies\(^6\)(\(^7\))(\(^8\)).

Breast milk alone is capable of meeting all children’s requirements up to 6 months, but after this period it must be complemented with adequate foods in order to supply nutritional requirement and prevent infant’s mortality and morbidity including malnutrition and over weight\(^9\). Any food other breast milk that is given to breast feeding child is defined as complimentary food.

From nutritional point of view premature introduction of complimentary food can be disadvantages because it reduces the duration of breast feeding, interferes with absorption of important nutrients from breast milk and it increases, the risks of contamination and allergic reactions, on the other hand by complimentary food has disadvantages because children energy requirements will not be met, resulting in deceleration in growth and increased risk of malnutrition and micro nutrients deficiencies\(^10\).

Excessive milky diets have been identified as one of the causes of anemia during first years of life. Liquid cow milk is itself poor source of iron and can also inhibit absorption of the iron present in some other foods if given concomitantly, in addition to provoking micro-hemorrhages in the intestinal mucosa of children less than 1 years old\(^11\). It was also noted that both parents and children diet consisted many unhealthy snacks food such as crisps, chocolate and biscuits.

**Summary and Conclusion**

The present study of different feeding pattern in children of Telangana is useful to pediatrician, nutrition expert because apart from frequency of feeding, nutritious digestible food is also necessary for proper growth of children in their early life, during breast feeding mother must consume nutritious, balanced diet which be suitable for infants heath and body growth.

But this study demands further awareness building programmes about child care and feeding practices must be included in antenatal care, postnatal care, because blind beliefs and superstition are still prevailing regarding feeding patterns and diets in children due to illiterate and orthodox parents, society which keeps away the children from nutritious and balanced-diet.

This research paper was approved by ethical committee of Mediciti Institute of Medical Sciences Ghanpur, Medchal-501401 (Telangana)

**Conflict of Interest: No**

**Source of Funding:** No
References


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7. Singhal P, Garg S K, Chopra H-Status of infants and young child feeding practices with special emphasis on breast feeding in on urban area of meerut IOSR–JDMS. Vol.7(4) M68ay-June 2013, 7-11


Study of Urinary Tract Infections in Patients with Catheter a Teaching Hospital Study

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Abstract

96 patients (all males) aged between 50-80 years with urinary tract infection with indwelling catheters for more than 2 weeks were studied. The reasons for catheterization - 62(64.5%) had BPH, 7(7.2%) had cancer of prostate, 9(9.3%) had urethral stricture, 11(11.4%) had CVA, 2(2%) had penile cancer, 2(2%) had poly trauma, 3(3.1%) had C.V.D. Only those with monomicrobial isolates were selected for the study. The isolated organism from urine culture in a calibrated wire loop delivering 10/41 urine sample was used to inoculate blood, Mac conkey and agar plates and incubated aerobically at 37 c for 24-48 hours. Isolated colonies were biochemically identified. All isolates were tested for susceptibility to commonly used antibiotics on Mueller-Hinton agar by standard Kirby–Bauer disc diffusion method. There were 57(59.3%) e.coli, 15(15.6%) Klebsiellaspp, 7(7.2%) Enterobater sp., 5(5.2%) Acinetobacter, 12(12.5%) p. Aeruginosa infections. The susceptibility of isolated bacteria to antibiotics was studied. This practical study of urinary tract infections associated with catheterization will help the urologist to treat such patients efficiently to avoid the risk of morbidity and mortality.

Keywords: BPH= Benign prostate Hyper trophy, catheter, MacConkey and CLED, Kirby-Bauer Disc.

Introduction

Urinary tract infection (UTI) is the most common site of nosocomial infection accounting for more than 40% of nosocomial infections in India and abroad. (1) Incidence can be as high as 60 to 86% depending upon method and duration of catheterization, the quality of catheter care and host susceptibility. (2) Host factors which appear to increase the risk of acquiring catheter associated UTI include advanced age, debility and immunity as well as reason for the need of catheter. Catheter associated UTI are caused by a variety of pathogens, including E. coli, Klebsella, proteus, enterococci, pseudomonas, enterobacter, serratia, and Candida. Many of these microorganisms are part of the patients endogenous bowel flora but they are also be acquired by cross contamination from other patients or hospital personnel or by exposure to contaminated solutions or non–sterile equipments (3). Moreover Catheter associated UTI in healthy patients is often asymptomatic and is likely to resolve spontaneously with the removal of catheter. Occasionally infection persists and leads to such complications as prostatitis, epidyymitis, cystitis, pyelonephritis, and gram negative bacteriacemia particularly in high risk patients. Hence attempt was made to study the microbial pathogens associated with UTI in catheterized patients and determine their susceptibility patterns to commonly used antibiotics.

Material and Method

96 patients (all males) aged between 50 to 80 years who regularly attended urology department or admitted in different wards of Srinivas Institute of Medical Sciences hospital, Suratkal, Mangalore between july 2012 to june 2016 were selected for the study. Catheters were usually changed after 2 or more weeks or changed when there were clinical symptoms of fever, dysuria, cloudy urine, blockage or other symptoms of urinary tract infection (UTI). Catheters were removed when they were deemed no longer necessary.
By using aseptic technique urine sample was collected form distal end of catheter into a sterile container. A calibrated wire loop delivering 10 ml urine sample was used to inoculate blood, MacConkey and CLED agar plates and incubated aerobically at 37°C for 24-48 hours. Isolated colonies were biochemically identified using recommended guidelines.\(^4\)

Only those with monomicrobial isolates were selected for the study. All isolates were tested for susceptibility to commonly used antibiotics on Muller Hinton agar by standard Kirby Bauer disc diffusion method. The zone diameter of inhibition for each antibiotic was interpreted according to National committee for clinical laboratory standards (NCCLS) Interpretive table. The patients with symptoms or proven UTI prior to catheterization were excluded from the study. The organisms resistant to particular antibiotics were classified and treated accordingly.

**Observation and Results**

**Table-1**  Age group classification of patients -16(16.6%) were between the age group of 50-60 years, 45(46.8%) were between 60-70 years of age and 35(36.4%) were above 70 years of age.

**Table-2**  Clinical diagnosis of diseases of patients with catheter i.e. infections - 62(64.5%) had BPH, 7(72%) had cancer of prostate, 9(9.3%) had urethral stricture, 11(11.4%) had CVA, 2(2%) had cancer of penis, 2(2%) had poly trauma and 3(3.1%) had CVD.

**Table-3**  prevalence of isolated organism in urine culture -57(59.3%) were E.coli, 15(15.6%) were Klebsiella, 7(7.2%) were Enterobacteria sp, 5(5.2%) were Acinetobacter sp, 12(12.2%) were p. aeruginosa.

**Table-4** susceptibility of antibiotics to isolated gram negative bacilli.

**Table 1: Age distribution of patients**

<table>
<thead>
<tr>
<th>Age group</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-60</td>
<td>16</td>
<td>16.6%</td>
</tr>
<tr>
<td>60-70</td>
<td>45</td>
<td>46.8%</td>
</tr>
<tr>
<td>70-80</td>
<td>35</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

**Table 2: Clinical manifestation of diseases cased catheteric infection**

<table>
<thead>
<tr>
<th>Sl</th>
<th>Clinical manifestation</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BPH</td>
<td>62</td>
<td>64.5</td>
</tr>
<tr>
<td>2</td>
<td>Ca prostate</td>
<td>07</td>
<td>7.2</td>
</tr>
<tr>
<td>3</td>
<td>Urethral stricture</td>
<td>09</td>
<td>9.3</td>
</tr>
<tr>
<td>4</td>
<td>CVA</td>
<td>11</td>
<td>11.4</td>
</tr>
<tr>
<td>5</td>
<td>Cancer of penis</td>
<td>02</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Poly trauma</td>
<td>02</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>CVD</td>
<td>03</td>
<td>3.1</td>
</tr>
</tbody>
</table>

CVD = cardio vascular Disease, Ca= carcinoma, BPH = Benign prostate hypertrophy, CVA=cerebro vascular accident

**Table 3: Prevalence of isolated organisms in the urine culture**

<table>
<thead>
<tr>
<th>Sl</th>
<th>Name of organism</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E.coli</td>
<td>57</td>
<td>59.3</td>
</tr>
<tr>
<td>2</td>
<td>Klebsiellaspp</td>
<td>15</td>
<td>15.6</td>
</tr>
<tr>
<td>3</td>
<td>Enterobacter</td>
<td>07</td>
<td>7.2</td>
</tr>
<tr>
<td>4</td>
<td>Acinetobacter</td>
<td>05</td>
<td>5.2</td>
</tr>
<tr>
<td>5</td>
<td>p. aeruginosa</td>
<td>12</td>
<td>12.5</td>
</tr>
</tbody>
</table>

**Table 4: Antibiotic susceptibility of isolated gram negative bacilli**

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>E. coli</th>
<th>Klebsiella</th>
<th>Enterobacter</th>
<th>Acinobacter</th>
<th>P. aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>4.1%</td>
<td>0%</td>
<td>0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Amp/sul</td>
<td>40.2%</td>
<td>37.6</td>
<td>32.3%</td>
<td>27.2%</td>
<td>-</td>
</tr>
<tr>
<td>Amoxi/clav</td>
<td>35.2%</td>
<td>45.2%</td>
<td>16.6%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Piper/taz</td>
<td>45.7%</td>
<td>45.2%</td>
<td>32.2%</td>
<td>56.2%</td>
<td>68%</td>
</tr>
<tr>
<td>Cefazoline</td>
<td>18.2%</td>
<td>22%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cefuroxine</td>
<td>20.2%</td>
<td>29.2%</td>
<td>15.5%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cefazidime</td>
<td>30.8%</td>
<td>37.5%</td>
<td>48%</td>
<td>26.5%</td>
<td>-</td>
</tr>
<tr>
<td>Cefaperazone</td>
<td>37.2%</td>
<td>52.4%</td>
<td>65.5%</td>
<td>27.5%</td>
<td>29%</td>
</tr>
<tr>
<td>Cefepime</td>
<td>43.3%</td>
<td>60.4%</td>
<td>82.2%</td>
<td>40.5%</td>
<td>68%</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>43.5%</td>
<td>45.2%</td>
<td>32.2%</td>
<td>27.5%</td>
<td>18%</td>
</tr>
<tr>
<td>Meropenem</td>
<td>85.2%</td>
<td>83.5%</td>
<td>98%</td>
<td>70.2%</td>
<td>68%</td>
</tr>
</tbody>
</table>
Discussion

The present study is of UTI in patients with catheter, in teaching hospital of Srinivas Institute of medical sciences Mukka, suratkal–Mangalore.

96 patients (all males) aged between 50 to 80 years with urinary tract infections associated with catheters were studied. 62(64.5%) had BPH, 7(7.2%) had ca prostate 9(9.3%) had urethral stricture, 11(11.4%) had CVA, 2(2%) had cancer of penis, 2(2%) had poly trauma, 3(3.1%) had CVD (Table-2). The isolated organisms in the urine culture of the patients were 57(59.3%) E.coli, 15(15.6%) were Klebsiella, 7(7.2%) Enterobacteria, 5(5.2%) were Acinetobacters, 12(12.5%) were p. Aeruginosa. Antibiotics susceptibility to gram negative bacteria were also studied (Table-3). These present findings were more or less in agreement with previous studies.(6)(7)(8)

Urinary catheterization is generally indicated to relive urinary tract obstruction and urinary retention, to permit urinary drainage in patients with neurogenic bladder dysfunction, to aid urologic surgery and to obtain accurate measurement of urinary output in critically ill patients. If the Catheter is placed for more than one week, the rate of colonisation can be as high as 80 to 90%.9) Hence more attention should be placed on the catheter care and in the prevention of errors in the closed drainage. Also, use of catheter should be limited to carefully selected patients so as to reduce the size of population at risk. The majority of UTI are due to gram negative bacteria and many of these pathogens are part of the patient’s endogenous bowel flora but some may have been a acquired by cross-contamination from other patients or hospital personnel or by exposure to contaminated solution and unsterile equipment or even the hospital environment. Catheter associated UTI is frequently polymicrobial.10) The antimicrobial susceptibility pattern confirms that most of the UTI isolates in our environment are resistant to the commonly used antibiotics including broad spectrum antibiotics. This high resistance pattern could have resulted from poorly guided antibiotic prophylaxis after catheterization and empiric therapy of catheter associated with UTI. In particular the high resistance of the gram negative isolates to the fluoroquinolones is worrisome as these are reserve drugs for treating resistant infections. This may be due to rampant misuse of these drugs with consequent development of resistance. Hence indwelling urinary catheters should be used only when absolutely necessary and they should be removed as soon as possible. Catheter should be inserted only by adequately trained personnel. Urinary catheters should be aseptically inserted utilizing proper sterile technique. Personal care should be taken for catheterized patients.

Summary and Conclusion

The present study of UTI in patients with Catheter will be quite useful to the urologists and other doctors as well as other hospital personnel since bacteriuria is almost inevitable on long term catheterization.

Though prophylactic systemic antibiotics have been known to delay onset of bacteriuria in catheterized patients, all the possible preventive measures have to be taken during catheterization. This study demands further histopathological, immunological and microbiological study because little is known about exact proliferation, mechanism and activation of these organism which cause morbidity and mortality if untreated or if there is delay in treating.

This research paper was approved by ethics committee of Srinivas institute of medical sciences Mukka, Suratkal, Mangalore–574146 (Karnataka).

Conflict of Interest: No

Source of Funding: No
References

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5. Clinical and laboratory standards institute performance standards for antimicrobial susceptibility testing. 17th international supplement CLSI document M100-517 CLSI, 2007, 27(1) 22-29
Evaluation of Multi Drug Resistance Tuberculosis During the Study of Pulmonary TB in Telangana Population

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1Associate Professor; 2Assistant Professor Department of Pulmonary Medicine Mediciti Institute of Medical Sciences, Ghanpur, Medchal, Telangana

Abstract

Out of 89 adults (aged between 25 to 75 years old) of both sexes of pulmonary Tuberculosis 4 (4.4%) were multi drug TB patients detected. The 89 patients history was 24(26.9%) were Tobacco smokers, 19(21.3%) had exposed to air-pollution, 11(12.3%) had high dosage of cortico steroids, 6(6.7%) had haemodialysis, 7(7.8%) were diabetes mellitus, 8(8.9%) had alcohol use, 5(5.6%) had chronic liver diseases, 9(10.1%) were HIV positive. Reasons for discontinuation of TB treatment was, 29(32.5%) had false sense of cure, 12(13.4%) had non-co-operation of paramedical staff, 11(12.3%) had domestic problems, 14(15.7%) had migrated for labor, 9(10.1%) cost of transport, 14(15.7%) had adverse drug reactions. The rate of resistance in single and poly drug therapy was. Rifampicin, pyrozinamide, ethambutol streptomycin had 0% rate resistance. Ioniazide + streptomycin, Isoniazide + streptomycin + rifampicain, Ethambutol + streptomycin had 0.5% resistance rate. Isonizide + Ethmubutol had 2.2% resistance rate. Isonizide had 1.8% resistance. This study of pulmonary tuberculosis with MDRTB patients with different history and different rates of immunity will be quite useful to pulmonary medicine physician to treat such patients efficiently because pulmonary tuberculosis is one of the main causes of morbidity and mortality in India and abroad.

Keywords: PT=Pulmonary Tuberculosis, MDRTB=Multi Drug Resistant tuberculosis, immunity, Telangana.

Introduction

Pulmonary Tuberculosis is one of the immune-compromised disease because due to urbanization there will be more exposed to polluted air, lack of nutritious food, poverty, migration to urban cities are the key factors for the PT. The prevalence of PT is estimated about 35%, globally (including India and china)(1). The to most potent anti TB drugs are Isonizide (H) and Rifampicin (R). MDR-TB, treatment response is poor and the mortality rate is high in adult as compared to children(2)(3). It could be due to the drop-out of treatments and this in complete treatment may leads to MDRTB(4).

Poor adherence to prescribed treatment increases the risk of morbidity, mortality and spread of disease in the community (5). Though TB/DOT services are provided by free of charge by government yet many patients are not successfully treated. Hence attempt was to study the patients of PT having different history and resistance, so that this study comprise of various rates of immunity will be helpful to chest physician to prevent the morbidity, mortality and spread of the disease.

Material and Method

89 adult patients aged between 25 to 75 years of both sexes visiting to mediciti medical college hospital Ghanpur Medchal-501401, Telangana, having pulmonary tuberculosis were selected for study. Out of 89 patients 4.4% patients diagnosed as MDRTD. All 89 patients belongs lower-middle socio-economic status. Every patients of PT were studied thoroughly with their past and present history, so that there should not be any recurrence of disease. Radiological, pathological biochemical investigation were done to confirm PT.
The patients with cardiac and neurological complication were excluded from the study. The ratio of male and female was 2:1.

The duration of study was adult five years,

Every patients, history, clinical manifestation, Drug resistance were classified and grouped with percentage.

Observation and Results

Table-1. History of PTin Telangana populations were 24(26.9%) were tobacco-smokers, 19(21.3%) were exposed to air-pollution 11(12.3%) had high dosage of cortico-steroids, 6(6.7%)had hemo dialysis, 7(7.8%) had D.M, 8(8.9%) had alcohol use, 5(5.6%) had chronic liver disease, 9(10.1%) had HIV positive.

Table-2. Reasons for discontinuation of TB treatment at TB/DOTS center Patients-

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Reasons</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>False sense of cure</td>
<td>29</td>
<td>32.5%</td>
</tr>
<tr>
<td>2</td>
<td>Non-Cooperation of para medical staff</td>
<td>12</td>
<td>13.4%</td>
</tr>
<tr>
<td>3</td>
<td>Domestic problems</td>
<td>11</td>
<td>12.3%</td>
</tr>
<tr>
<td>4</td>
<td>Migration for labour</td>
<td>14</td>
<td>15.7%</td>
</tr>
<tr>
<td>5</td>
<td>Cost of transport</td>
<td>09</td>
<td>10.1%</td>
</tr>
<tr>
<td>6</td>
<td>Adverse Drug reaction</td>
<td>14</td>
<td>15.7%</td>
</tr>
</tbody>
</table>

Table-3. Study of single and poly drug resistance rates in the patients of MDRTB

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Drugs</th>
<th>Resistance rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rifampicin</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Pyrazinamide</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Ethambutol</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Streptomycin</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Isoniazid + Streptomycin</td>
<td>0.5</td>
</tr>
<tr>
<td>6</td>
<td>Isoniazid + Streptomycin + Rifampicin</td>
<td>0.5</td>
</tr>
<tr>
<td>7</td>
<td>Isoniazid + Ethambutol + Streptomycin</td>
<td>0.5</td>
</tr>
<tr>
<td>8</td>
<td>Isoniazid + Rifampicin Ethambutol + Streptomycin</td>
<td>0.5</td>
</tr>
<tr>
<td>9</td>
<td>Isoniazid + Ethambutol</td>
<td>2.2</td>
</tr>
<tr>
<td>10</td>
<td>Isoniazid</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Table-4. Comparison of present study of MDRTB with previous workers

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the Author &amp; Year</th>
<th>Place</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chandershekar S. etal (1990)</td>
<td>Bangalore (Karnataka)</td>
<td>1.1</td>
</tr>
<tr>
<td>2</td>
<td>Naranga P. etal (1992)</td>
<td>Wardha (Maharashtra)</td>
<td>5.3</td>
</tr>
<tr>
<td>3</td>
<td>Paramsvian CN. etal (1993)</td>
<td>Pondicherry (U T)</td>
<td>0.8</td>
</tr>
<tr>
<td>4</td>
<td>Gupta P.R. etal (1993)</td>
<td>Jaipur (Rajasthan)</td>
<td>0.9</td>
</tr>
<tr>
<td>5</td>
<td>Paramsvian etal (2000)</td>
<td>Tamil Nadu</td>
<td>3.4</td>
</tr>
<tr>
<td>6</td>
<td>Ramachandran R-etal(2009)</td>
<td>Gujarat</td>
<td>2.4</td>
</tr>
<tr>
<td>7</td>
<td>Jain A etal (2008)</td>
<td>Luck new</td>
<td>13.2</td>
</tr>
<tr>
<td>8</td>
<td>D.souza DT etal (2009)</td>
<td>Mumbai (Maharashtra)</td>
<td>24</td>
</tr>
<tr>
<td>9</td>
<td>Present study (2018)</td>
<td>Hyderabad (Telangana)</td>
<td>4.4</td>
</tr>
</tbody>
</table>

The present study was more or less in agreement with previous studies.
Discussion

The present study of evolution MDRTB in PT Telangana population. The history of PT patients was 24(26.9%) were smokers, 69(21.3%) were exposed to air pollution, 11(12.3%) had high dosage of corticosteroids 6(67%) had haemodialysis, 7(7.8%) were DM, 8(8.9%) were alcoholic, 5 (5.6%) had chronic liver disease, 9(10.1%) were HIV positive patients (Table-1). The reason for discontinuation of TB treatment at TB/ DOTS, center was 29(32.5%) were at false sense of cure 12(13.4%) were due to non-cooperative of para-medical staff 11(12.3%) had domestic problems, 14(15.7%) migrated for labour, 9(10%) cost of transport, 14(15.7%) adverse drug reactions (Table-2). The rate of resistance in single and poly drug study, Rifampician, pyrazamidse ethambutol, streptomycin were 0%while Isonized + streptomycin, Rifampicin Isonized + streptomycin were 0.5% Isconoized + Ethambutol rate of resistance was 2.2% and Isonized was 1.8% (Table-3) This present prevalence of MDRTB study was 4.4% (Table-4). These obtained values were more or less in agreements with previous studies(6)(7)(8).

MDR-TB Caused by mycobacterium tuberculosis that is resistant both isonized and Rifampicin with or without resistant to other drugs is a phenomenon that is threatening to destabilize global tuberculosis control (9).In the present study ratio male and female was 2:1, hence it is important to evolve gender specific motivation strategies to reduce the default(10). Moreover default has been linked to length and complexity of treatment. It has been also any new tuberculosis chemotherapeutic agents which can further reduce the length of treatment will ultimately improve global tuberculosis treatment success rates(11).

The major hindrance of present study is the small size of patients hence not representing populations at large but Indian scenario is, it stands 22nd ranks high TB burden country(12). The risk or aggravating factors are genetic HIV infection. Diabetes mellitus, use of immune nodular drugs has been associated with the development of fatal TB in rheumatoid of arthits, tobacco smoking, poverty, economic attitude towards the nutritious food which creates immunity against such fatal diseases.

Summary and Conclusion

The present study of evolution MDR-TB in the study of PT will be useful to chest or pulmonary physician to present morbidity and mortality. It is suggested long and complex way treatment has to be reduced and simplified on the other hand awareness about fatal TB disease has to be created among people but this study warrants further pharmacological, genetic, histopathological, immunological study because exact formation of mycobacterium tuberculosisbacilli and their mechanism of spreading, gravity of resistance is still unclear.

This research paper was approved by ethical committee of Medicit Medical Sciences Ghanpur Medchal-501401 (Telangana)

Conflict of Interest: No

Source of Funding: No

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Study of Different Sites of Fractures of Mandible in Andrapradesh Population

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Abstract

96 patients (78 males and 18 females) aged between 18 to 45 years had fractures of mandible -62(64.5%) had road accident, 17(17.7%) had assault, 12(12.5%) sports injury, 5(5.2%) due to falls. The anatomical sites of fractures were 32(33.3%) had symphysis menti and parasymphysis, 15(15.6%) had body of mandible, 13 (13.5%) had angle, 10(10.4%) had ramus, 7(7.29%) had condyles, 19(19.7%) had alveolar fractures. 46(47.9%) had isolated fractures and 50(52.0%) had multiple fractures. Types of treatment method were 3(3.1%) were un-treated, 19(19.7%) had IMF (inter maxillary fixation 5(5.2%) had circummandibular wire with an occlusal splint, 9(9.3%) had Risdon wining 46(47.9%) had MPO= mini plate osteo synthesis. 14(14.5%) had reconstruction plates. This study will be quite use full to oral and maxilla facial surgeon because morpho metric study of mesoderm is un-certain

Keyword: IMF= Inter maxillary fixation, MPO= mini plate osteo synthesis, Isolated fractures Multiple fractures.

Introduction

Fractures of mandible do occur and form a significant part of facial bone fractures encountered by the practicing dental surgeons. The occurrence of facial injuries tends to be high compared to injuries in other body areas because face is without any protective covering, and the mandible is one of the prominent bone of the face. deporting on the direction and force of the trauma, fractures of the mandible commonly occur at different sites, one classification of fractures by anatomic location. However the presence of teeth in the mandible is the most important anatomical factor which makes its fracture different from fractures elsewhere in the body. Hence attempt was made to study the fractures of mandible at different sites in the adults because adults are more prone for accidents, sports injury etc.

Material and Method

96 patients (78 males 18 females) aged between 18 to 45 years had mandibular fractures were brought to Nimra institute of medical sciences hospital Nimra Nagar Ibrahim patnum. Jupidi Vijaywada (District) Andrapradesh–521456 were selected for study

The anatomical sites of fractures were noted X-ray MRI was taken, Blood examination was also done to rule out Routine blood examination RBS (Random blood sugar) and to know any previous diseases like Rhumatoid arthritis, cardiac diseases. etc. History of each patient was studied in detail.

The patients were classified as per the anatomical sites of fractures and treated with different suitable method. Ratio of the male sand females were 4:1 HIV, congenital heart diseases patients were excluded from the study. The duration of this study was about three years.

Observation and Results

Table-1 Distribution of causes of mandibular fractures 62(64.5%) had road accidents 17(17.7%) had assault 12(12.5%) during sports, 5(5.2%) due to falls
Table-2: Anatomical sites of mandibular fractures
32(33.3%) symphysis menti and parasympysis menti 15(15.6%) body of mandible, 13(13.5%) angle 10(10.4%) ramus 45 mandible 7(7.29%) condyle, 19(19.7%) alveolar

Table-3: Study of types of fractures of mandible
46(47.9%) isolated fractures, 50(52%) multiple fractures

Table-4: types of treatment method in mandibular fractures
1) 3(3.1%) untreated and kept on observation
2) Conservative treatment a) IMF (inter maxillary fixation)
b) Circummandibular wire with an occlusal splint
C=Ridson’s wiring
3) Open Reduction a=MPO (Mini plate osteosynthesis) b) reconstruction plates

Discussion
In the present study, of different sites of fractures of mandible, in Andrapradesh population. 62(64.5%) had fractures due to road accident, 17(17.7%) had assault, 12(12.5%) had sports injury, 5(5.2%) due to falls. (Table-1). The Anatomical sites of mandible fractures were 32(33.3%) symphysis menti and parasympysis menti 15(15.6%) body of mandible 13(13.5%) angle, 10(10.4%) ramus, 7(7.29%) had condyles, 19(19.7%) had alveolar (Table-2). Types of fractures were 46(47.9%) isolated, 50(52%) multiple fractures (Table-3) Types of treatment method were 3(3.1%) untreated and kept on observation, 19(19.7%) had IMF, 5(5.2%) circummandibular wire with an occlusal splint, 9(9.3%) had ridson wiring. 46(47.9%) had MPO (mini plate osteosynthesis) 14(14.5%) had reconstruction plates (Table-4). These findings were more or less in agreement with previous studies.

The present study the patients were aged between 18 to 45 years old who had fracture of mandible the reason could be un-aware of traffic rules or no fear of penalty or punishment, drunk and ride, bad roads, hurry and worry moreover assaults, sports are also common factors in young and adults age only. The conservative approach to the fractures of the mandible is justified because in the young’s and adults there is adequate blood supply to heal the fractures A soft diet is necessary so that mastication must be minimal during conservative treatment

The condylar process of the mandible and symphysis menti and parasympysis menti are weakest

Table 1: Distribution of causes of mandible fractures

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Etiology</th>
<th>No of patients with fracture</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Road accident</td>
<td>62</td>
<td>64.5</td>
</tr>
<tr>
<td>2</td>
<td>Assault</td>
<td>17</td>
<td>17.7</td>
</tr>
<tr>
<td>3</td>
<td>Sports injury</td>
<td>12</td>
<td>12.5</td>
</tr>
<tr>
<td>4</td>
<td>Falls</td>
<td>5</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Table 2: Anatomical sites of mandibular fractures

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Anatomical site</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Symphysis menti and parasympysis</td>
<td>32</td>
<td>33.3</td>
</tr>
<tr>
<td>2</td>
<td>Body of mandible</td>
<td>15</td>
<td>15.6</td>
</tr>
<tr>
<td>3</td>
<td>Angle</td>
<td>13</td>
<td>13.5</td>
</tr>
<tr>
<td>4</td>
<td>Ramus</td>
<td>10</td>
<td>10.4</td>
</tr>
<tr>
<td>5</td>
<td>Condyle</td>
<td>7</td>
<td>7.29</td>
</tr>
<tr>
<td>6</td>
<td>Alveolar</td>
<td>19</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Table 3: Types of fracture Mandible

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Types of fractures</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Isolated fracture</td>
<td>46</td>
<td>47.9</td>
</tr>
<tr>
<td>2</td>
<td>Multiple fracture</td>
<td>50</td>
<td>52.0</td>
</tr>
</tbody>
</table>

Table 4: Types of treatment method in mandibular fracture patients (No of patients 46)

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Types of treatment</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Un-treated and kept on observation</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>2</td>
<td>Conservative treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. IMF (inter maxillary fixation)</td>
<td>19</td>
<td>19.7</td>
</tr>
<tr>
<td></td>
<td>b. Circummandibular wire with an occlusal splint</td>
<td>5</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>C=Ridson’s wiring</td>
<td>9</td>
<td>9.3</td>
</tr>
<tr>
<td>3</td>
<td>Open Reduction a=MPO (Mini plate osteosynthesis)</td>
<td>46</td>
<td>47.9</td>
</tr>
<tr>
<td></td>
<td>b= reconstruction plates</td>
<td>14</td>
<td>14.5</td>
</tr>
</tbody>
</table>
point of the mandible hence more prone for fracture. Condylar processes are independent parts because they have to articulate with cranium to form Temporo-mandibular joint while symphysis menti is a meeting point of two independent bone hence symphysismenti or parasymphyssis are the weakest point of mandible tooth-bearing portion form 2/3rd of the mandible while non-tooth bearing portion forms remaining 1/3rd part of the mandible. The alveolar part is also major part of the fracture because of position of the patients during accidents assault or falls.

The patients were successfully treated between three to eight weeks with regular follow-up. In weak or mal-nutritious patients calcium supplements were also given to enhance rapid healing of fractures

**Summary and Conclusion**

The present study of fracture of mandible indicated that tooth bearing, symphysis menti body, ramus are most commonly prone for fractures. Hence awareness of traffic rules. Construction of good and safe roads, severe punishment for culprits, moreover night journey and long journey in rainy season should be avoided

This research paper was approved by ethical committee of Nimra institute of medical sciences Nimra Nagar Ibrahimpatnum Jupidi Vijaywad Andrapradesh–521456

**Conflict of Interest:** No

**Source of Funding:** No

**References**

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Evaluation of Impaired Renal Function in Critical Care Units of Telangana Population

P. Dasharatham¹, Sudhirchalasani²

¹Associate Professor, ²Associate Professor Department of General Medicine Mediciti Institute of Medical Sciences Ghanpur Medchal Telangana

Abstract

42 patients (30 males and 12 females) aged between 30 to 65 years having renal impaired functions were studied the clinical manifestations were 16 (38%) had fatigue, 9(7.1%) had clubbing, 9(21.4%) had anemia, 2(4.7%) had cyanosis, 5(11.9%) had joint pain 4(p.5%) had dyspnea with excretion, 3(7.1%) had dyspnea without excretion. The associated diseases were 11(26.1%) had hypertensive, 19(45.2%) had diabetes mellitus, 8(19%) had cardiac diseases, 4(9.5%) had urinary tract infections. The GIT manifestations were 4(9.5%) had mouth ulcer, 9(21.4%) had change in taste, 11(26.1%) had anorexia, 6(14.2%) had nausea, 7(16.6%) had vomiting, 5(11.9%) had hiccup. The CNS and PNS manifestations were in 12(28.5%) conscious state, 9(21.4%) were in confused state (poor attention), 7 (16.6%) had slurred speech, 6(14.2%) had ataxia, 5(11.9%) had tremours, 3(7%) had burning sensation of feet and hand. The GFR status according to cock‑craft Gault formula method 6(14.2%) were in stage I, 11(26.1%) were in stage II, 17(40.4%) were in stage III, 8(19%) were in stage IV. This study of analysis of impaired functions of kidney will be quite useful to physician, Uro‑surgoen, to treat such patients efficiently to prevent morbidity and mortality because about 90000 Indian patients develop renal failure every year.

Keywords: GFR= Glumulo Filtration Rate, DM= Diabetes mellitus HTN= Hypertension, UTI= Urinary tract infection.

Introduction

Kidneys bear a huge responsibility in the survival of human body. They keep our internal environment in balance and play on essential role in the maintenance for normal homeostasis. It therefore comes as no surprise that renal impairment results into decline in kidney function can seriously affect essentially every organ of the body system. GFR is the best quantification of kidney function can be measured by estimating the concentration of serum or urinary clearance of filtration marker. The impairment of renal disease has multiple clinical manifestation which involves cardio-vascular, hormonal, Central and peripheral nervous system GIT, skeleto-muscular system etc. which especially affects older adults because there is a progressive decline of renal function with advance of age. Hence attempt was made to study the various clinical manifestation in adults so that, physician can take pre-cautionary measures to avoid wide-spectrum of clinical complications like congestive heart failure(1) And anemia of chronic kidney disease may reflect dys-regulated erythropoietin release and loss of peritubular cells which leads to un-corrected hypoxia.(2) Ends into mortality of patients.

Material and Method

42 patients (30 males and 12 females) aged between 30 to 65 years admitted at mediciti institute of medical sciences Ghanpur medical Telangana. Most of the patients belonged to middle socio-economic status. Every patients history was studied in detail. The USG, KUB, X-Ray, blood and urine investigation was done to rule out s. creatinine, Blood urea, RBS, and lipid profile was also carried out in Hypertensive patients. Estimated GFR (e GFR) was calculated using cock croft
Gault formula (CG/e GFR CG). And chronic kidney disease Epidemiology collaboration equation (CKD–EPI/e GFR CKD-EPI) equation the mGFR-24 hr urine-cr-cl was calculated as follows:

\[
\text{Creatinine clearance} = \frac{U \times V}{p} \times 1.73/A
\]

\(U\) = urine creatinine, (mg/dl)

\(V\) = urine volume/minute ie total volume/24*60

\(P\) = plasma, serum creatinine (mg/dl), 1073= avarage body weight

\(A\) = height 0.73 (cm) * weight (kg) * 7.1*10^{-3}

11 the eGFR was calculated using eGFR CG, eGFR MDRD. And eGFR CKD-Ep equation

\[
\text{Ccr} = \frac{(140-\text{age}) \times \text{weight}/72 \times \text{scr} \times (0.85 \text{ in females})}{\text{where creatinine clearance (cer) is expressed in milliliters per minute age in years, weight in kilograms and serum creatinine (Scr) in milligrams per decilitre}}
\]

HIV and congenital kidney anomalies patients were excluded from the study

The duration of the study was about two years

**Observation and Results**

**Table-1** clinical manifestations of patients with renal impairments–16(38%) had fatigue, 3(7.1%) had clubbing, 9(21.4%) had anemia, 2(4.7%) had cyanosis, 5(11.9%) had joint pain, 4(9.5%) had dyspnnea with exertion 3(7.1%) dyspnnea without exertion

**Table-2** Associated diseases in impaired renal function patients

**Table-3** Gastro-intestinal clinical manifestations in renal impaired patients

**Table-4** Central nervous system and PNS manifestation (total no of patients 42)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fatigue</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Clubbing</td>
<td>3</td>
<td>701</td>
</tr>
<tr>
<td>3</td>
<td>Anemia</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>4</td>
<td>Cyanosis</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>5</td>
<td>Joint pain</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td>6</td>
<td>Dyspnnea with exertion</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>7</td>
<td>Dyspnnea without exertion</td>
<td>3</td>
<td>701</td>
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<table>
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<th>No of patients</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Hypertensive</td>
<td>11</td>
<td>26.1</td>
</tr>
<tr>
<td>2</td>
<td>Diabetes mellitus</td>
<td>19</td>
<td>45.2</td>
</tr>
<tr>
<td>3</td>
<td>Cardiac disease</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>4</td>
<td>Urinary tract infection</td>
<td>4</td>
<td>9.5</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Month ulcer</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>2</td>
<td>Change in food taste</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>3</td>
<td>Nusea</td>
<td>6</td>
<td>14.2</td>
</tr>
<tr>
<td>4</td>
<td>Vomiting</td>
<td>7</td>
<td>16.6</td>
</tr>
<tr>
<td>5</td>
<td>Hiccough</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td>6</td>
<td>Anorexia</td>
<td>11</td>
<td>26.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conscious</td>
<td>12</td>
<td>28.5</td>
</tr>
<tr>
<td>2</td>
<td>Confused state</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>3</td>
<td>Slurred speed</td>
<td>7</td>
<td>16.6</td>
</tr>
<tr>
<td>4</td>
<td>Ataxia</td>
<td>6</td>
<td>14.2</td>
</tr>
<tr>
<td>5</td>
<td>Tremors</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td>6</td>
<td>Burning sensation feet and hand</td>
<td>3</td>
<td>7.1</td>
</tr>
</tbody>
</table>
Table 5: GFR status of renal impairment according to cock-craft gaunt formula method (Total No of patients 42)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stage-I</td>
<td>06</td>
<td>14.2</td>
</tr>
<tr>
<td>2</td>
<td>Stage-II</td>
<td>11</td>
<td>26.1</td>
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<tr>
<td>3</td>
<td>Stage-III</td>
<td>17</td>
<td>40.4</td>
</tr>
<tr>
<td>4</td>
<td>Stage-IV</td>
<td>08</td>
<td>19</td>
</tr>
</tbody>
</table>

**Discussion**

The present study of evaluation of impaired renal function of Telangana population the clinical manifestation of patients were 16(38%) had fatigue, 3(7.1%) had clabbing, 9(21.4%) had anemia, 2(4.7%) had cyanosis, 5(11.9%) had joint pain, 4(9.5%) had dyspnea with excretion, 3(7.1%) had dyspnea without excretion. (Table-1). The associated diseases were 11(26.1%) had HTN, 19(45.2%) D.M, 8(19%) had cardiac disease, 4(9.5%) had urinary tract infection (UTI) (Table-2) GIT manifestation were 4(9.5%) had mouth ulcer (9.5%) 9(21.4%) had change in food taste, 6(14.2%) had nausea, 7(16.6%) had vomiting 5(11.9%) had hiccough, 11(26.1%) had anorexia (Table-3). The central nervous system (CNS) and peripheral nervous system (PNS) manifestation were 12(28.5%) were conscious, 9(21.4%) were in confused state, 7(16.6%) had slurred speech, 6(14.2%) had ataxia, 5(11.9%) had tremors 3(7.1%) had burning sensation of feet and hand (Table-4). The GFR status according to cock-craft Gault formula 6(14.2%) were in stage-I 11(26.1%) were in stage II 17(40.4%) were in stage III, 8(19%) were in stage IV, (Table-5). These findings were more or less in agreement with previous studies. (5)(6)(7)

The patients have renal function impairment associated with multiple diseases like HTN, DM, Anemia, CVD, malnutrition, UTI hence it is imperative to the clinician to rule out the kidney disease at the beginning so that morbidity and mortality of such patients can be prevented. (8) The kidney disease may reflect stronger influence of the other factors such as use of ACE inhibitors. Because use of ACE inhibitors in progression of kidney disease is fairly established (9) Because kidney disease of patients having ischemic heart disease (IHD) and other CVD risk factors have been reduced considerably by the use of ACE inhibitors because stage IV or Vth (Table-5). The serum creatinine may not be as strong marker for the mortality of the patients moreover patients having associated complication (Table-2). Can be put for dialysis.

Anemia of renal impairment arises primarily from progressive failure of kidney endocrine function, peritubular cells in the kidney cortex function as oxygen sensors controlling red cell mass. Renal tissue hypoxia triggers hypoxia inducible factor signaling which in turn, up-regulates erythropoietin production. (10) To stimulate division and differentiation of red cell precursors. Anemia of kidney disease leads to left ventricular hypertrophy, congestive cardiac failure (CCF), coronary artery disease, and untreated anemia of kidney also cause progressive renal impairment.

**Summary and Conclusion**

The present study of renal function impairment evaluation will be quite useful to predict the complications of kidney disease because early diagnose of kidney disease will present the morbidity and mortality. But the present study demands farther patho-physiological, genetic, nutritional, embryological and immunological study because little is known about exact mechanish, duration and filtration rate (Glumulo filtration).

This research paper is approved by ethical committee of mediciti institute of medical sciences Ghanpurmedical, Telangana

**Conflict of Interest:** No

**Source of Funding:** No

**Reference**

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Study of Tympanoplasty in Vijaywada Population

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Abstract

33 males and 12 female patients were selected for tympanoplasty either righter left harvesting of the tragal cartilage graft with a thickness between 0.2 to 0.4 mm and techniques used were underlay techniques and lateral to the hand of malleus supported by gel foam on both sides. During the study mean value of diameters of external canal in 21 males (63.6%) was 1.2 mm, and 12 males (36.3%) it was 1-4mm. In females 7 females (58.3%) the diameters of external canal was 1.2mm and in 5 females (41.6%) it was 1.3mm. The size of perforating gap in tympanic membrane Air borne gap range and average range study. 20 males had 1-2 mm perforations, air borne range was 10-31 dB and average range was 22dB. In 10 males the perforation size was upto 1mm, air borne range was -0.25mm, the average range was 11dB.In 3 males air borne range 17-31dB and average range was 23 dB. In females study 7 females had 2-3mm perforation, air borne range was 14-36 and average was 24 dB, In 3 females perforation was upto 1mm, air borne range was 0-25 dB and average was 9 dB, In 2 females had 3-4mm perforation, air borne range was 17-31 dB and average range was 23 dB. This study of tympanoplasty by tragal cartilage will be certainly helpful to junior ENT surgeons and biotechnologist to invent such similar technique in future.

Keywords: Tympanoplasty, Tragal cartilage. Perforation, Air borne range.

Introduction

As tympanic membrane is developed from all three germ layers hence it is resistant to negative middle ear pressure, stable and elastic until it is not perforated hence long term aim of tympanoplasty its reconstruct the tympanic mechanism and the sound conducting mechanism since the introduction of tympanoplasty(1) numerous graft materials like skin, fascia lata, temporaries fascia, vein, perichondrium, durametre have been used for closure of the defective membrane(3)(4) but in most of the cases there were recurrent perforations reported due to severe attical and or posterior uncontrolled retraction pockets with cholesteatomatus formation, atelectasis of tympanic membrane, fascia and perichondrium have been shown to undergo atrophy and subsequent failure regardless of the placement of techniques used (5) In the present study used cartilage as grafting materials an account of its increased stability and resistant to negative middle ear pressure, even in the cases with chronic Eustachian tube dysfunction because cartilage is well tolerated by the middle ear and shows long term survival. Hence attempt was made to study tympanoplasty in Vijayawada Population of sexes and satisfactory result was observed.

Material and Method

45 patients aged between 22 to 35 years who were visiting to Nimra Institute of medical Sciences hospital Ibrahim PatnamVijayawada, AP–521456, were selected for study. The selected patients diagnosed clinically as chronic supportive to its media, with loss hearing, constant liability of infection Tinnitus and dizziness. Pre-operative assessment included a puretone audiogram and a tympanogram. They consented for cartilage tympanoplasty either right or left and harvesting of the tragal cartilage, graft with a thickness between 0.2 to 0.4mm and technique used were underlay technique and
lateral to handle of malleus supported by a gel form an both sides.

The patients had middle ear pathology viz tympanic sclerosis, cholesteatoma, fibrosis were excluded from the study. Out of 45, patients 12 were females. (the ration of male and female was about 3:1)

All the patients have minimum three month post operative tososcopical and audio metric follow up and if any complication treated immediately. The duration of the study was about three years.

Observation and Results

Table-1: In 21 males (63.6%) the mean value of external canal was 1.2 mm and in 12 males (36.3%), the mean value of external canal value was 1.4 mm. In females 7 females (58.3%) The mean value of external canal was 1.2 mm and 5 females(41.6%), the mean value of external canal was 1.3mm

Table-2: The study of size of perforation and airborne gap range and average range. In 20 males the perforation size was between 1-2 mm, air borne range was 10-31dB and average was 22 dB. In 10 males it was upto 1mm, the airborne range was 0.25dB and the average range was 11 dB. In 3 males the size of perforation was 3 to 4 mm, the airborne range was 17-31 dB and average was 23 dB. In 3 females the perforation of tympanic membrane was upto 1mm, air borne was 0.25dB and average range was 9 dB. In 2 females the perforation size was 3 to 4 mm, the air borne range was 17-31 dB and average range was 23 dB.

Table 1: Study of diameter of External canal in both sexes (Total No. of patients: 45)  

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Sex</th>
<th>Mean Value of diameter of external canal</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>a-21 1.2 mm</td>
<td>63.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b-12 1.4 mm</td>
<td>36.3</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>a-7 1.2 mm</td>
<td>58.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b-5 1.3 mm</td>
<td>41.6</td>
</tr>
</tbody>
</table>

Table 2: Showing size of perforation and air borne gap range (Total No. of patients: 45)  

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Sex</th>
<th>Perforation size</th>
<th>Air-borne range</th>
<th>Average range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>a-20 1.2 mm</td>
<td>10-31 dB</td>
<td>22 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b-10 Up to 1mm</td>
<td>0-25 dB</td>
<td>11 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c-03 3 to 4 mm</td>
<td>17-31 dB</td>
<td>23 dB</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>A-7 2 to 3 mm</td>
<td>14-36 dB</td>
<td>24 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B-3 Up to 1mm</td>
<td>0-25 dB</td>
<td>09 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-2 3 to 4 mm</td>
<td>17-31 dB</td>
<td>23 dB</td>
</tr>
</tbody>
</table>

Discussion

In the present study of 33 males and 12 females of Vijayawada population were studied. The mean value external canal was in 21 males (63.3%) was 1-2 mm and 12 males (36.3%) the mean value of external canal was 1-4 mm. In females study 7 females (58.3%), the mean value of external canal was 1-2 mm and in 5 females (41.6%), the mean value of external canal was 1-3 mm (Table-1). These findings were more or less in agreement with previous studies[6][7]

In the present study of size of perforation of Tympanic membrane, air borne range and average range study 20 males had perforation size was 1-2 mm, air borne range was 10-32 dB and average range was 22dB. In 10 males the perforation size was upto 1mm, air borne range was 0-25 dB and average range was 11dB. In 3 males the size of perforation was 3-4mm, airborne range was 17-31dB and average range was 24 dB. In 3 females the perforation of tympanic membrane was upto 1mm, air borne was 0.25dB and average range was 9 dB. In 2 females the perforation size was 3 to 4mm, air borne range was 17-31 dB and average range was 23 dB. These findings were also more or less in agreement with previous studies[8][9]

To avoid the failure of the graft, dry remnant tympanic membrane was avoided, because it was vascular, hence graft was not adhering to the remnant tympanic membrane. All dry preparation was converted to subtotal perforation by removing atrophic portion of tympanic membrane. Overall graft take rate was 99.30% was successful. It was in previous studies also[10][11] but the procedures may vary in different countries.
Summary and Conclusion

The present study of tympanoplasty in both sexes of Vijayawada Population is quite helpful to junior surgeon to follow moreover further studies should be conducted to ascertain the effect of demographic characteristics on audiology cal outcomes after cartilage tympanoplasty. This study also demands further histo-pathological, embryological and bio-mechanical study because grafted cartilage is being mesodermal and received tympanic membrane is developed from all three germ layers hence stability of tymponoplasty remains ambiguous.

This research paper is approved by ethical committee of Nimra Institute of Medical Science Ibrahim Patnam Vijayawada-8.

Conflict of Interest: No

Source of Funding: No

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Study of Depressive (Psychiatric) Problems in Elderly Population of Telangana

Sudhir Chalasani1, P. Naveen Chandra Reddy1

1Associate Professor, Department of General Medicine, Mediciti Institute of Medical Sciences, Ghanpur, Medchal, Telangana

Abstract

In the present study 95 male and 83 female elderly Depressive (psychotic) patients aged between 65 to 75 years studied in males 45(47.3%) were dementia, 25(26.3%) had depressive illness, 11(11.5%) were manic, 10(10.5%) were anxiety, 4(4.2%) had paranoid psychosis. In female 36(43.3%) had dementia 20(24) had depressive illness 8(9.6%) had paranoid 4(4.8%) had hallucination 9(10.8%) had anxiety. Apart from this disease associated with geriatric psychotic patients were also studied in males. 20(21%) D.M, 26(25.2%) had osteo–arthritis, 7(7.3%) had constipation 22(23.1%) had family conflicts, 1(13%) had death of life partners or close relatives. 9(9.4%) had a sudden loss in business. In Female geriatrics 30(36.1%) D.M, 23(27.7%), 22(26.5%) had family conflicts, 8(9.6%) had death of life partner or close relative. In the study of suicidal tendencies due to severe depression 65(68.4%) of males, 60(72.2%) female had suicidal ideation, and 30(31.5%) male 23(27.7%) females were attempted for suicide. This study of various psychotic patients will certainly help the psychiatrist to treat the old aged patients efficiently and meticulously, and it conveys a massage to surgeons, and physicians to take opinion of psychiatrist during the treatment of geriatric patients so that they can be cured physically and mentally and live with confident and face the challenges of the geriatric problems.

Keywords: Dementia, depression Geriatric, Anxiety.

Introduction

35 to 48% elder patients suffer with psychiatric problems. Their psychiatric disorders were mainly dementia and depression is the most common problems. The elderly patients is no different from younger individuals however, in the respect of both can develop acute psychiatric or medical disturbances that may be superimposed on a chronic medical or mental condition. (1) during evaluation a geriatric patient/present confusing array of symptoms to the physician. The patients past and present history it may be long rambling tale with frequent disgression. Dementia is a chronic process with a loss of intellectual abilities that interferes with social or occupational functioning. Dementia a evidence of organic etiology or the disorder does not fit the criteria for other organic mental disorder. (2)

Depression is one of the most common problems of aged next to dementia. The geriatric patients are debilitated because of severe depression. Majority of the patients were misdiagnosed depressed elderly patients usually experience fatigue, listlessness, constipation and decreased appetite; They typically have disturbed sleep and may actually appear to be quite sad. Their sadness may be overlooked by young healthy care taker who believes that, any one would be sad about being that old. One can reveal their problems with brief conversation that, They have recurrent thought of death, illness and hopelessness. They see their lives as futile and separation from their families as lonely and unending. (3) Hence attempt was to study the various psychiatric problems in elderly population of both sexes.

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Phone +91-9848045814
Material and Method

1. 95 males 83 females aged between 65 years to 75 subtending with psychiatric illness who were regularly visiting General medicine OPD of mediciti institute of medical sciences Ghanpur Medichal–50140 Were selected for study. In addition to this most of male and female geriatrics were referred by medicine surgery orthopedic due to their anxiety disorders, These patients were councilled thoroughly and evacuated their past and present history of disease and diagnosed and treated accordingly, viz dementia, psychosis, mood disorder includes depression, mania, generalized anxiety disorders associated with medical and surgical (pre and post surgical). The duration of this study was about two years.

Observation and Results

Table-1 Study of different psychiatric illness in male geriatric patients out of 95.45(47.3%) were dementia, 25 (26.3%) were under major depression 11(10.5%) were suffering with anxiety 4(4.2%) had paranoid psychosis

Table-2 Study of different psychiatric illness in female geriatric patients out of 83, 36(43.3%) had dementia, 20(24%) were under depression 8(9.6%) had paranoid psychosis, 4(4.8%) had hallucination 6(7.2%) were manic anxiety

Table-3 Diseases associated with psychotic geriatric male patients out 95 20(21%) were diabetic mellitus, 24(25.2%) had osteoarthritis 7(7.3%) had constipation 22(21.1%) had family conflict 13(13.6%) death of life partner or close relatives 9(9.4%) sudden or unexpected loss in business

Table-4 Diseases associated with psychotic geriatric female patients out of 83, 30(36.1%) were diabetic mellitus 23(27.7%) had arthritis, 22(26.5%) had family conflicts 8(9.6%) had problem of death of their life partners or close relatives

Table-5 Study of social tendencies due to major depression in geriatric patients of both sexes, a) in males out 95, 65 (68.4%) and in females out 83, 60(72.2%) had suicidal ideas frequently. B) in males out of 95 30(31.5%) and in females out of suicide but did not succeed.

| Table 1: Study of different psychotic problems (illness) in male geriatric patients (No of patients-95) |
|---------------------------------------------------------------|-------------------|-----------------|
| No of patients | Types of psychotic illness | Percentage (%) |
| 45 | Dementia | 47.3 |
| 25 | Depression | 26.3 |
| 11 | Manic | 11.5 |
| 10 | Anxiety | 10.5 |
| 4 | Paranoid | 4.2 |

| Table 2: Study of different psychotic illness (problems) in female geriatric patients (No of patients 83) |
|---------------------------------------------------------------|-------------------|-----------------|
| No of patients | Types of psychotic illness | Percentage (%) |
| 36 | Dementia | 43.3 |
| 20 | Depression | 24 |
| 8 | Paranoid | 9.6 |
| 4 | Hallucination | 4.8 |
| 6 | Manic | 7.2 |
| 9 | Anxiety | 10.8 |

| Table 3: Diseases associated with psychotic geriatric patients in males (No of patients 95) |
|---------------------------------------------------------------|-------------------|-----------------|
| No of patients | Types of psychotic illness | Percentage (%) |
| 20 | Diabetic mellitus | 21 |
| 24 | Osteoarthritis | 25.2 |
| 7 | Constipation | 7.3 |
| 22 | Family conflicts | 23.1 |
| 13 | Death of life partner or close relative | 13.6 |
| 9 | Sudden loss in business | 9.4 |

| Table 4: Diseases associated psychotic geriatric female patients (No of patients 83) |
|---------------------------------------------------------------|-------------------|-----------------|
| No of patients | Types of psychotic illness | Percentage (%) |
| 30 | Diabetic mellitus | 36.1 |
| 23 | Osteoarthritis | 27.7 |
| 22 | Family conflicts | 26.5 |
| 8 | Death of life partner or close relative | 9.6 |

| Table 5: Suicidal tendencies due to depression geriatric patients of both sexes male patients 95 female patients 83 |
|---------------------------------------------------------------|-------------------|-----------------|
| Sex | No of patients | Suicidal tendency | Parentage (%) |
| Male | 65 | Suicidal ideas | 68.4 |
| Female | 60 | Suicidal ideas | 72.2 |
| Male | 30 | Suicidal attempt | 31.5 |
| Female | 23 | Suicidal attempt | 27.7 |
Discussion

In the present study of psychiatric problems in elderly patients of Telangana population of both sexes. In males Dementia were 45(47.3%) depressive illness 25(26.3%) manic 11(11.5%) anxiety 10(10.5%) and paranoid psychotic were 4(4.2%) (Table-1) in female patients also dementia were 36(43.3%) depressive illness were 20(24%) paranoid psychosis were 8(9.6%) hallucinated 4(4.8%) manic 6(7.2%) and anxiety were 9(10.8%) (Table-2) The diseases associated with male psychotic patients of old age were diabetic mellitus 20(21%) osteo orthotic 24(25.2%) constipation 7(7.3%) family conflicts 22(23.1%) death of life partner or close relative 13(13.6%) sudden loss in business 9(9.4%) (Table-3). In female psychiatric patients associated diseases were diabetic mellitus 30(36%) osteoarthritis 23(27.7%) family conflicts 22(26.5%) death of life partner or close relative 9(9.6%) (Table-4).These findings are more or less in agreement previous studies.[4][5] Due to sever or major with depression these psychotic elderly patients have suicidal ideations or/and commit suicidal attempts in males 65(68.4%) had suicidal ideations in females 60(72.2%) had also suicidal ideations. Moreover 30(31.5%) males and 23(27.7%) attempted for suicide (Table-5)

Dementia is a chronic organic mental disorder characterized by a) impairment of memory, b) intellectual function c) deterioration of personality with lack of personal care d) there is impairments of judgment, impulse control, and impairment of abstract thinking. In the dementia there are degenerative brain damage if defuse may lead to dementia. There will be enlarged cerebral ventricle widened cerebral sulci and shrinkage of cerebral cortex. When viewed gross anatomically but in microscopic study senile plaques, neuro fibrillary tangles, cortical nerve cell loss and granulo vacuolar degeneration, moreover there is marked decrease in brain choline acetyl transferes with similar decrease in brain acetylcholinesterage (Ach E).[6] Manic or hypomania patients in present study ie, 11(11.5%) in males, 6(7.2%), (Table-1 & 2) near half of the patients give the history of manic attach episodes in the earlier year During the manic period the patient was elated, expansive or irritable, hyperactivity, pressure of speech, flight of ideas, inflated self esteem and decreased need for sleep were features of manic episodes. The patients often exhibited grandiose delusions and some time persecutory delusions, paranoid psychosis or reaction in the present study was 4.2% in males and 9.6% in females (Table-1 & 2). Female are more prone to this psychotic disease than males. It is due to lack of family cohesion and feelings of loneliness are significant features observed in the present study. Moreover paranoids associated with several bizarre complaints and hallucinations of voices, smell, but intelligent is usually well preserved.[7][8] Anxiety disorder 10(10.5%) males 9(10.8%) in female (Table-1 & 2) Anxiety in old age often mixed with depression and hopelessness anxiety may occur due to anticipation of yet additional onis fortunes, guilt feelings might arouse anxiety. If the planned ventures, were not fulfilled anxiety may occur but chronic neurotic anxiety carryover from earlier years. The patient suffer from anxiety such as restlessness, term or of hands and poor sleep suicidal ideas may be present in the severe cases of delusion of nihilism, hypochondriasis is and depressive with physical illness.[9] Depressive ideation had 3 common types of disorders, a) Hopelessness-due to pessimism b) helplessness feeling lonely c) worthlessness feeling of inadequacy, inferiority, guilty feelings, self approach. Although depression was common in both sexes but quite obvious in females widowed and belongs to lower socio-economic groups. Death of spouse was the most stress full event often leading to radical changes in lifestyle, loss of personal care and general loss of life satisfaction. Elderly man suffer reduction in income due to retirement or inability to work due to health reasons. poor socio-economic results multiple stresses such as in adequate diet, deficient and poor medical care and family disorganization, all these combine to produce depression.[10] Social isolation or living alone is one of the important factor causing depression in elderly. It may be due to retirement and lack of social contact or due to physical illness and inability to move about or due to children moving away from the family for the reason of employment.[11]

Summary and Conclusion

The present study of psychiatric/depression problems in elderly populations of Telangana will certainly help the physician to diagnose the patients with different, present and past family history because a behavioral problem in elderly patient is too often diagnosed a being a natural result of old age. Hence every surgeon or physician must take an opinion from psychiatrist during treatment of aged patients because most of the diseases are non organic and result of depression, or psycho-somatic factors. However this study demands farther genetic study because most of anxiety, depression schizophrenic are genetic hence they can be treatable not curable.
This research paper is approved by ethical committee of Mediciti institute of medical science. Ghanpur. Medchal-50140 Telangana.

**Conflict of Interest:** No

**Source of Funding:** No

**Reference**


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Study of Umbilical Hernia in the Patients of Andrapradesh

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Assistant Professor, Department of General Surgery, Nimra Institute of Medical Sciences, Nimra Nagar Jupudi (v), Ibrabimpatnam, Krishna (Dist) Andhrapradesh

Abstract

63 adult patients (40 males and 23 females) aged between 30 to 70 years of umbilical hernia were studied. 13(20.6%) were alcoholic, 10(15.8%) were HTN, 7(11.1%) were smokers, 9(14.2%) had coronary artery diseases, 11(17.4%) were DM, 8(12.6%) were DM, 8(12.6%) were obese, 5(7.9%) were tobacco chewers, the clinical manifestation was 17(26.9%) had severe pain, 16(25.3%) had abdominal distention, 20(31.7%) had swelling, 8(12.6%) had irreducible hernia, 2(3.1%) had vomiting. Blood investigation study included sodium in 45mm/dl (66.6%) patients had 134‑136, mg/dl, 21(33.3%) had 137‑138. mm. In serum albumin study‑39 (61.9%) mg/dl patients had 3.2 to 5.1 mm and 24(38%) had 6.1 to 7 mg. In serum creatinine study 44(69.8%) patients had 1.2 to 1.3 mg/α and 19(30.1%) had 1.5 mg/d In serum Bilirubin study 48(76.1%) patients had 1.8 to 1.5 mg/dl and 15 (23.8%) had 2.2 to 2.4 mg/dl In WBC count study 43(68.2%) patients had 6.2 to 6.9 20(31.7%) had 7.1 to 9.2. In platelet count study 44(69.8%) patients had 145.7 to 149, and 19(30%) had 150 to 160 the percentage of post operative infection were 11(17.4%) had wound infections in anatomical group, 8(12.6%) patients had wound infections in mesh group, 9(14.2%) had seroma in anatomical repair, 7(11.1%) had seroma in mesh repair. The percentage of recurrence of umbilical hernia were 9(14.2%) had anatomical repair, 8(12.6%) had mesh repair.

Keywords: Necrotic mass, strangulated hernia, Mesh repair, HTN= Hyper tension.

Introduction

Hernia is a word derived from a Greek word heron, meaning a branch or protrusion. Hernia is the bulging of the part of the normal contents of the abdominal cavity through a weakness in the abdominal wall.(1)

Hernias of the abdominal wall that arise room 3cm above to 3cm below the umbilicus are defined as umbilical hernia.(2) Cirrhosis of liver is one of the major cause of umbilical hernia, as cirrhosis leads to rise in intra abdominal pressure while obesity in females causes herniation.(2) The treatment with cirrhotics with umbilical hernia is quite complicated because umbilical hernia is associated with ascetic fluid, peritonitis, evisceration, incarceration of the content of hernial sac. (3) Moreover weakness of the muscles of the anterior abdominal wall secondary to poor nutrition and recanalised umbilical vein includes restoration of supraumbilical fascial defect. (4) Long standing as citis will lead to umbilical hernia. Hence attempt was made to evaluate the practical challenges and complications of umbilical hernias at different ages in both sexes, because umbilical hernia has tendency to be associated with high morbidity and mortality in comparison with inguinal hernia because of higher risk of incarceration and strangulation that requires emergency repair.

Material and Method

63 adult patients with umbilical hernia aged between 30 to 70 years, including both sexes (40 males and 23 females). Who were regularly visiting to department of general Surgery. Nimra Institute of medical sciences, Nimra Nagar Jupudi (v) Ibrahimpatnum, Krishna (dist) – 521456, Andhrapradesh were selected for study. History of every patient was recorded. Radiological and blood investigation was carried out to know the severity of hernia and to study the associated clinical manifestations of the patients.
Out of 63 42 were necrotic mass and 21 were strangulated umbilical hernia and pathologically benign. Small defects of hernia were sutured and larger defects were closed by mesh repair

HIV and malignant patients having umbilical hernia were excluded from the study. The duration of the study was about four years

**Observation and Results**

**Table 1:** Base line characteristics of (63) umbilical hernia in adults (Total No of patients 63)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alcoholic</td>
<td>13</td>
<td>20.6</td>
</tr>
<tr>
<td>2</td>
<td>Hypertensive</td>
<td>10</td>
<td>15.8</td>
</tr>
<tr>
<td>3</td>
<td>Smokers (cough)</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>4</td>
<td>Coronary Artery disease</td>
<td>9</td>
<td>14.2</td>
</tr>
<tr>
<td>5</td>
<td>Diabetes mellitus</td>
<td>11</td>
<td>17.4</td>
</tr>
<tr>
<td>6</td>
<td>Obesity</td>
<td>8</td>
<td>12.6</td>
</tr>
<tr>
<td>7</td>
<td>Tobacco chewers</td>
<td>5</td>
<td>7.9</td>
</tr>
</tbody>
</table>

**Table 2:** Age distribution of the patients of umbilical hernia (Total No of patients 63)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30-40</td>
<td>14</td>
<td>22.2</td>
</tr>
<tr>
<td>2</td>
<td>41-50</td>
<td>29</td>
<td>46.0</td>
</tr>
<tr>
<td>3</td>
<td>51-60</td>
<td>15</td>
<td>23.8</td>
</tr>
<tr>
<td>4</td>
<td>61-70</td>
<td>5</td>
<td>7.9</td>
</tr>
</tbody>
</table>

**Table 3:** Clinical manifestations of umbilical hernia patients (Total No of patients 63)

<table>
<thead>
<tr>
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<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pain</td>
<td>17</td>
<td>26.9</td>
</tr>
<tr>
<td>2</td>
<td>Abdominal distention</td>
<td>16</td>
<td>25.3</td>
</tr>
<tr>
<td>3</td>
<td>Swelling</td>
<td>20</td>
<td>31.7</td>
</tr>
<tr>
<td>4</td>
<td>Irreducible</td>
<td>8</td>
<td>12.6</td>
</tr>
<tr>
<td>5</td>
<td>Vomiting</td>
<td>2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

**Table 4:** Blood investigation of umbilical herniated patents (Total No of patients 63)

<table>
<thead>
<tr>
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<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Serum sodium (mm/L)</td>
<td>a- 134-136 b- 137-138</td>
<td>66.6 33.3</td>
</tr>
<tr>
<td>2</td>
<td>Serum albumin (mg/dl)</td>
<td>a- 3.2 to 5.1 b- 6.1 to 7</td>
<td>61.9 38.0</td>
</tr>
<tr>
<td>3</td>
<td>Serum creatinine (mg/dl)</td>
<td>a- 1.2 to 1.3 b- 1.4 to 1.5</td>
<td>61.8 30.1</td>
</tr>
<tr>
<td>4</td>
<td>Serum Bilirubin (mg/dl)</td>
<td>a- 1.8 to 1.9 b- 2.2 to 2.4</td>
<td>76.1 23.8</td>
</tr>
<tr>
<td>5</td>
<td>WBC count</td>
<td>a- 6.2 to 6.9 b- 7.1 to 9.2</td>
<td>68.2 31.7</td>
</tr>
<tr>
<td>6</td>
<td>Platelet count</td>
<td>a- 145.7 to 149.4 b- 150 to 160.19</td>
<td>69.8 30.1</td>
</tr>
</tbody>
</table>
Table 5: Post operative infections in umbilical hernia (Total No of patients 63)  

<table>
<thead>
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<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wound infections in Anatomical group</td>
<td>11</td>
<td>17.4</td>
</tr>
<tr>
<td>2</td>
<td>Wound infection in mesh repair</td>
<td>8</td>
<td>12.6</td>
</tr>
<tr>
<td>3</td>
<td>Seroma in anatomical repair</td>
<td>9</td>
<td>14.2</td>
</tr>
<tr>
<td>4</td>
<td>Seroma in mesh repair</td>
<td>7</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Table 6: Recurrence of umbilical hernia (Total No of patients 63)  

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anatomical repair</td>
<td>9</td>
<td>14.2</td>
</tr>
<tr>
<td>2</td>
<td>Mesh repair</td>
<td>8</td>
<td>12.6</td>
</tr>
</tbody>
</table>

Discussion  
In the present study of umbilical hernia in the patients of Andrapradesh. 63 adult patients of different age groups. Among them 13(20.6%) were alcoholic, 10(15.8%) were HTN, 7(14.2%) had coronary artery disease 11(17.4%) had diabetes mellitus (DM) 8(12.6%) were obese 5(7.9%) were tobacco chewers (Table-1). 14(22.2%) patients were aged between 30-40 years, 29(46%) patients were between 41-50 years 15(23.8%) were aged between 51-60, 5(7.9%) were aged between 61-70 years of age (Table-2). The clinical manifestations of these patients with umbilical hernia (UL) was–17(26.9%) had severe pain, 16(25.3%) had abdominal distention 20(31.7%) had swelling 8(12.6%) U.L. were irreducible, 2(3.1%) had vomiting (Table-3) blood investigation of U.L patients the serum sodium level in 42(66.6%) had 134-136 mm/L 21(33.3%) had 137-138 (mm/l). the serum albumin level in 39(61.9%) had 3.2 to 5.1, 24(38%) had 6.1 to 7. S.creatinine. 44(69.8%) had 1.2 to 1.3, 19(30%) had 104 to 105, In S.Bilirubin study 48 (76.1%) had 108 to 1.9, 5(23.8%) had 2.2 to 2.4 in mean WBC count study 43(68.2%) had 6.2 to 6.9, 20(31.7%) had 7.1 to 9.2. in platelet count study 44(69.8%) had 145.7 to 149, and in 19(30.1%) 150 to 160 (Table-4) The postoperative infections in UH was 11(17.4%) in wound infection in anatomical group 8(12.6%) wound infections in mesh repair, 9(14.2%) in seroma in anatomical repair, 7(11.1%) in seroma in mesh repair (Table-5) Recurrence of U.H–9(14.2%) in anatomical repair 8(12.6%) in mesh repair (Table-6). These obtained values were more or less in agreement with previous studies. 

Hernias commonly cause pain and are distressing to patients more aesthetically. These concerns, and the risk of incarceration, are the most common reasons patients seek surgical repair of hernia. The treatment U.H in cirrhotic is quite challenging. Control of ascites forms the main stay of treatment as this leads to reduced hernia recurrence and post operative complications like wound dehiscence, infection evisceration and peritonitis. Use of diuretics, paracentesis at regular intervals and transjugular intrahepatic port system shunt (TIPS) are often necessary to control ascites TIPS done preoperatively in these patients may allow better control of ascitis and in turn make them more amniable for herniorraphy. The laboratory values of the present study showed high levels of morbidity and preoperative sepsis and treated with antibiotics moreover large with wide openings are difficult to manage by anatomical repair, as it may result into recurrence due to undue tension resulting in tissue necrosis such hernias asw treated with prosthetic mesh repair. In which material was implanted in the abdominal wall that could add strength, and avoiding excessive tension created by large and wide UH. These large and wide UH. Defects bridged by prosthetic mesh. This mesh repair has low morbidity and less recurrence rate. The mesh bridge has laparoscopic approach.

Summary and Conclusion  
The study of umbilical hernia in the patients of Andrapradesh is quite useful to the surgeon because wide and large umbilical hernias(UH) were closed by mesh repair which method has lower recurrence because UH has recurrence is quite common. Owing to intra-abdominal pressure and muscles of the abdomen are antigravity muscles but this study demands further biomechanical, patho-physiological, nutritional,myological study because umbilicus is a meeting point of many systems of the body. Hence it is more weakened and easily allow the herniation. and little is known about the degree of intra-abdominal pressure and strength of muscle which prevent the herniation.

This research paper is approved by ethical committee of Nimra institute of medical sciences Nimra Nagar Jupidi (V) Ibrahimpatnum (M) Krishna (district) Andrapradesh–521456

Conflict of Interest: No
Source of Funding: No
References.


6. Fady sales, All an okrainec seam p. clearly-management of umbilical hernias in patients with ascites development of nomogram to predict mortality the Am-J of surg. 2015, 209, 302-301


Correlative Study of Prolactin Level and Hypothyroidism in Both Primary and Secondary Infertility in Females of Uttar Pradesh

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Abstract

In the present study, 40 females of primary infertility and 40 females of secondary infertility aged between 18-40 years were studied, primary infertility females grouped as group-A and secondary infertility females grouped as group-B. In group A, the duration of marriage of 21 (52.5%) was 1 to 5 years, 12 (30%) had 6 to 10 years, 7 (17.5%) had more than 10 years. In group B, 11 (27.5%) had 1-5 years of marriage duration, 16 (40%) had 6-10 years and 13 (32.5%) had more than 10 years of marriage period. The menses history in group A was: 13 (32.5%) had regular menses, 19 (47.5%) had oligomenorrhea, 5 (12.5%) had amenorrhea and 3 (7.5%) had menorrhagia. In group B, 12 (30%) had regular menses, 17 (45.5%) had oligomenorrhea, 9 (42.1%) had oligomenorrhea, 9 (22.5%) had amenorrhea and 2 (5%) had menorrhagia. In group A, serum prolactin level in 17 (42.5%) females was 0-20mg/ml, 23 (57.5%) was 21-100mg/ml. In group B, 26 (65%) had 21-100mg/ml and 1 (2.5%) had >100 mg/ml. In group A, TSH level in 3 (7.5%) was <0.4, 27 (67.5%) females had 0.4-4.7, 10 (25%) females had >4.7 µIU/ml. In group B, 2 (5%) females had <0.4 µIU/m, 33 (82.5%) females had 0.4-4.7 µIU/m, 5 (12.5%) females had >4.7 µIU/ml. This correlative study of S. prolactin and TSH hormones will be quite useful to obstetrics and gynecologist, endocrinologist, to rule out proper cause and treat the infertility efficiently, because due to increased rate of infertility majority of couples are finding surrogative mothers which are quite expensive and may lead to legal complications.

Keywords: Serum Prolactin, Thyroid stimulating Hormone.

Introduction

Infertility is defined as the failure of a couple to achieve conception (regardless of cause) after one year of unprotected and adequately timed inter course(1). It could be primary i.e. a couple has never conceived despite cohabitation and exposure to sexual activity over a period of years, secondary infertility is when couples have achieved a pregnancy, previously but regular unprotected sexual intercourse has not resulted in second pregnancy (2). Human infertility is a complex problem, which has numerous consequences depending on the society and cultural background, gender, lifestyle, sexual history of the people it affects. Infertility is a global public health concern. This is partly due to complexity in aetiology as well as difficulty in preventing, diagnosing and treating it.

Hormonal disorder of female’s reproductive system is comprised of a number of problems resulting from aberrant dysfunction of hypothalamic-pituitary-ovarian axis. These relatively common disorders often lead to infertility (3). Measurement of prolactin and thyroid hormones especially TSH has been considered an important component of infertility work up in females (4).

Hence attempt was made to study these both hormonal assays and correlate their profile in both primary and secondary infertile females.

Material and Method

80 infertility woman aged between 18 to 40 years who were regularly visiting Obstetrics and Gynecology department, G.S. Medical College, NH24, near petrol...
pump, Peeplabandapur, Pilkhuwa-245304 (UP) were selected for study. Among 80, 40 were primary infertility and 40 were secondary infertility hence primary infertility females were, grouped as A and secondary infertile were grouped as B group.

Complete haemogram, ESR, USG perineum and abdomen, chest x-ray, thyroid function test, serum prolactin test, Histosalpinography and diagnostic laparoscopy was carried out whenever indicated.

Blood examination was done for hormone probably on 3rd day of menstrual cycle. TSH and prolactin assay levels were measured using Beckman coulter Access-II Immune assay analyzers.

Male factor infertility-congenital anomaly of urogenital tract, diabetes mellitus patients with cardiac and neurological disease were excluded from the study. The duration of study is about two years (from September 2016 to December 2018)

For the patients of group A and group B, duration of marriage, menses history, hormonal level assay were classified in percentage and studied.

Observation and Results

Table-1 Study of duration of marriage of infertile females in both groups

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Duration of year of marriage</th>
<th>Group-A (40)</th>
<th>Group-B (40)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>1-5 years</td>
<td>21</td>
<td>52.5</td>
</tr>
<tr>
<td>2</td>
<td>6-10 years</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>&gt;10 years</td>
<td>07</td>
<td>17.5</td>
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</table>

Table-2 Study of history of menses in both groups

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particular of Menses</th>
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<th>Group-B (40)</th>
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<tr>
<td></td>
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<td>%</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Regular menses</td>
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<td>32.5</td>
</tr>
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<td>Oligomenorrhea</td>
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<td>Amenorrhea</td>
<td>05</td>
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</tr>
<tr>
<td>4</td>
<td>Menorrhagia</td>
<td>03</td>
<td>07.5</td>
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Table 3: Study of prolactin level in infertility females Total No Patients-80

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particular</th>
<th>Group–I (40)</th>
<th>Group–II (40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>0-20 mg/ml</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td>2</td>
<td>21-100 mg/ml</td>
<td>23</td>
<td>57.5</td>
</tr>
<tr>
<td>3</td>
<td>&gt;100 mg/ml</td>
<td>0</td>
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</table>

Normal Values of S.Prolactin-2-25 mg/ml

Table 4: Study of TSH in infertile females Total No Patients-80

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particular</th>
<th>Group–I (40)</th>
<th>Group–II (40)</th>
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<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>&lt;0.4</td>
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<td>0.4-4.7</td>
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<td>67.5</td>
</tr>
<tr>
<td>3</td>
<td>&gt;4.7</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

Normal TSH is 0.5-4.7 µIU/m

Discussion

In the correlative study of prolactin level and hypothyroidism in both primary and secondary infertility females of Uttar Pradesh, in group A, the duration of marriage of 21 (52.5%) was 1 to 5 years, 12 (30%) had 6 to 10 years, 7 (17.5%) had more than 10 years. In group B, 11 (27.5%) had 1-5 years of marriage duration, 16 (40%) had 6-10 years and 13 (32.5%) had more than 10 years of marriage period (Table-1). The menses history in group A was: 13 (32.5%) had regular menses, 19 (47.5%) had oligomenorrhea, 5 (12.5%) had amenorrhea and 3 (7.5%) had menorrhagia. In group B, 12 (30%) had regular menses, 17 (45.5%) had oligomenorrhea, 9 (21.5%) had oligomenorrhea, 9 (22.5%) had amenorrhea and 2 (5%) had menorrhagia (Table-2). In group A, serum prolactin level in 17 (42.5%) females was 0-20mg/ml, 23 (57.5%) was 21-100mg/ml. In group B, 26 (65%) had 21-100mg/ml and 1 (2.5%) had >100 mg/ml (Table-3). In group A, TSH level in 3 (7.5%) was <0.4, 27 (67.5%) females had 0.4-4.7, 10 (25%) females had >4.7 µIU/ml. In group B 2 (5%) females had <0.4 µIU/m, 33 (82.5%) females had 0.4-4.7 µIU/m, 5 (12.5%) females had >4.7 µIU/ml (Table-4). These findings were more or less in agreement with previous studies (5)(6)(7).

Hyper prolactin adversely affects the fertility potential by impairing pulsative secretion of GnRH and hence interfering with ovulation (12). This disorder has been implicated in menstrual and ovulatory dysfunctions like amenorrhea, oligomenorrhea, anovulation, in adequate corpus luteal phase and galactorrhea.

Summary and Conclusion

The present correlative study of serum prolactin
level and hypothyroidism in both primary and secondary infertility of females in Uttar Pradesh will be quite useful for obstetrics and gynecologist endocrinologist physician to treat such infertility. Hence assessment of serum TSH and prolactin levels must be mandatory in the treatment of infertile women especially those presenting with menstrual irregularity. But this study further warrants, genetics nutritional, neurological, endocrinological study because exact quantum of hormonal secretion, mechanism of stimulating factors which exactly increase or decrease the hormonal secretion is still unclear.

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Conflict of Interest: No

Source of Funding: No

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Study of Haemorrhoids, Comparison between Electrotherapy Rubber Band and Haemorrhoidectomy in Patients of Andrapradesh Population

Ravi Dasyam

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Abstract

90 adult patients (48 males and 42 females) aged between 25 to 50 years were studied pre-operative clinical manifestation were 35(38.8%) had protruded hemorrhoids, 18(20%) had bleeding, 17(18.8%), had painful hemorrhoids, 11(12.2%) had hemorrhoids with discharge 9(10%) had hemorrhoids with pruritis.

In the comparison of grade-II with grade-III MXSP mean value of grade-II was 102 and grade-III was 120 (p<0.01) and t test was–109, MSP of grade-II mean value was 73 and grade-III was 96.5 (p<0.01) and t test was–147. In RBL study before and after treatment all parameters like MXRP MXSP MRP MSP, VFS MXTV were highly significant (p<0.01). In monometric study of electro therapy before and after electro therapy all the parameters viz MXRP, MRP, MSP, VFS, MXTV. Were found to be highly significant p value (p<0.01). In the study of haemrroidectomy before and after haemorroidectomy all the parameters viz, MXRP, MRP, MSP, VFS, MXTV were found to be highly significant (p<0.01).Post operative conditions of haemorroidectomy, RPL and electrotherapy were compared. Post operative pain was severe (6%) at haemorroidectomy moderate (4%) at RBL and mild (2%) at electrotherapy. Thrombosized external haemorrhoids was 1% at haemorroidectomy, 2% at RBL and nil at electro therapy. Urinary retention was highest (5%) at haemorroidectomy, 1% at RBL and nil at electro therapy. Post–operative discharge was 3% at haemorroidectomy, 2% at RBL and nil at electrotherapy. This comparative study has pragmatically proved that, electro therapy approach for grade–II and grade–III haemorroid treatment is safer than other method

Keywords: RBL= Rubber Band ligation, Electro therapy, Haemorrhoidectomy manometer.

Introduction

Hemorrhoids are abnormally enlarged and cushions containing intravenousatreo-venous anastomosis, traditionally described as occurring in 3.7, and 11 ‘o’ clock positions. The vascular supply is from branches of superior rectal artery, which are drained by veins (internal venous plexus) emptying into superior rectal vein. Internal hemorrhoids, which originate from above the dentate line of the anal canal, occur when these and cushions are dragged down the canal. They affect millions of people around the world, and represent medical and socio-economic problem. Multiple factors have been claimed to be the etiologies of haemorrhoidal development, including constipation and prolonged straining. With advancement of age connective tissue replaces the matrix of the muscle, there by leads to loss of elasticity, and tonicity of muscle to anchor the blood vessels. Which form anal cushion will be lost and leads to protrusion of blood vessels which are abnormally enlarged. The risk factors of hemorrhoids are constipation, straining and also diarrhea, straining which sitting for long in a toilet with an unsupported and relaxed perineum leads to engorgement of the anal cushions and increases the downward shearing force upon them. Along with loss of supporting muscle fibers the venous plexus distends causing the hemorrhoids to bulge. Hemorrhoids are common in the later stage of pregnancy and may be due to the gravid

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uterus causing compression on the pelvic venous system may be the aggravating factor. It is established fact that, anorectal physiology changes with the development of hemorrhoids and associated with abnormally raised resting and squeezing pressure.\(^{(4)}\) Treatment modalities also can change the physiological parameters. Hence attempt was made to compare these resting and squeezing pressure before and after treatments of RBL, electrotherapy and haemorroidectomy so that surgeon can predict the risk factors and adopt the safest method to approach hemorrhoids.

**Material and Method**

90 adult patient (48 males and 42 females) aged between 25 to 50 years suffering with haemorroids, regularly visiting surgery department. Nimra institute of medical sciences. Nimra nagar. Jupidi. (v) Ibrahimprtrum(m) Krishna (district) Andrapradesh‑521456 were selected for study. The diagnosis and grading of haemorroids was confirmed by history, physical examination, and anoscopy. 45 patients had grade-II and 45 patients had grade-III haemorroids grade-II haemorroids had prolapse with spontaneous reduction, bleeding, seepage, grade-III had prolapse with bleeding, seepage. 30 patients selected for RBL (rubber band ligation), 30 for electrotherapy, 30 for haemorroidectomy, The manometric readings of these three groups were recorded, pre- and post treatment and were compared statistically. Moreover clinical manifestation of the patients before and after the treatment were also recorded.

The HIV and malignant patients suffering with haemorroids were excluded from the study. The duration of the study was about four years.

**Observation and Results**

**Table 1** Pre-operative clinical manifestation of patients of haemorroids-35 (38.8%) had protruded haemorroids, 18 (20%) had haemorroids with bleedings, 17 (18.8%) had painful haemorroids, 11 (12.2%) had discharging haemorroids 9 (10%) had haemorroids with pruritis.

**Table 2** Mean value of MRP in grade-II haemorroids was 34.62 (SD±0.61) and mean value of MRP in grade-III was 53.19 (SD±0.94) t test value was -109 and p value (p<0.01) was highly significant, in MSP study mean value of Grade-II was 73.3 (SD±0.63) and grade-III was 96.5 (SD±0.84) t test value was -147 and p value (p<0.01) was highly significant. In MXSP study mean value of grade-II haemorroids was 102.2 (SD±0.48), and grade-III was 120.5 (SD±0.97), t test value was -111.9 p Value was (p<0.01) was highly significant.

**Table 3** Study of manometric changes in RBL. (Before and after RBL) treatment. In MXR study mean value before RBL was 78.5 (SD±0.94) and after RBL was 82.00 (SD±1.23) t test value was 11.6 and p value was highly significant (p<0.05). Mean value of MXSP before RPL was 117.7 (SD±1.26) and after RPL was 114.2 (SD±1.14) t test value was 7.08 p value was highly significant (p<0.01). MXRP mean value Before RBL 52.8(SD±0.94) t test value was 17.5 and p value was highly significant (p<0.01). In MSG study mean value RBL was 99.46(SD±1.01) and after RBL was 119.8 (SD±0.69) t test value was 85 and p value was highly significant VFS mean value before RPL was 29.9 (SD±0.54) and after was 30-9 t test value was 9.87 and p value was highly significant in MXTV study mean value before RPL was 121.3 (SD±0.51) t test value was 134.8 and p value was highly significant (p<0.01).

**Table 4** Manometric changes at Electrotherapy (Before and after) in MXR study mean value before electrotherapy was 78.7(SD±0.63) and after electrotherapy 75.9 (SD±0.63) t test value was 16.2 and p value was highly significant (p<0.01). In MXP study mean value before electro therapy was 120 (SD±0.85) After electro therapy 114(SD=1.0) t test value was 26.4 and p value was highly significant (p<0.05) in MRP study mean value before electrotherapy was 50.7 (SD±0.78) and after electrotherapy 46(SD±0.69) t test value was 25.7 and p value is highly significant (p<0.05) in MSP study mean value before electrotherapy was 93.8 (SD±0.52) and after electrotherapy 88.9 (SD±0.57) t test value was 33.3 and p value was highly significant. In VFS study mean value before electro therapy 29(SD±0.42) and after electro therapy 27.9(SD±1.02) t test value was 5.31 and P value was highly significant in MXTV study mean value before electro therapy was 116(SD±0.76) and after therapy 119.8(SD±0.67) t test value was 19.4 and p value was highly significant.

**Table 5.** Manometric changes at haemorroidectomy (before and after). In the MXR study mean value before haemorrectomy was 86.6(SD±0.78) and after haemorroidectomy 73.7(SD±0.59), t test value was 73.9 and p value was highly significant (p<0.01) in MXP study mean value before haemorroidectomy was 126.4 (SD±0.58) and after haemorriedectomy 110.7 (SD±0.89) t test value was 106.2 and p value was highly significant (p<0.01) in MRP study mean value...
before haemorroidectomy 57.7(SD±0.48) and p value was highly significant (p<0.01) in MSP study mean value before haemorroidectomy was 103.4 (SD±0.67) after haemorroidectomy 118.5(SD±0.9) t test value was 20.5 and p value was highly significant (p<0.01) In MXTV study, mean value before haemorroidectomy 122.7 (SD±0.76) after haemorroidectomy 122.2(SD±1.16) t test value was 2.15 and p value was significant (p<0.05).

Table-6 Post operative condition of haemorroidectomy RPL and electrotherapy were compared (1) severe pain (6%) at haemorroidectomy, moderate pain (4%) at RBL and mild (2%) at electrotherapy, (2) urinary retention was observed 5% in haemorroidectomy patient and 1% at RBL but none at electrotherapy post–operative discharge was observed 3% at haemorroidectomy and 2% at RBL but none at electrotherapy.

Table 1: Preoperative clinical manifestations of patients of hemorrhoids (No of patients 90)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Protrusion</td>
<td>35</td>
<td>38.8</td>
</tr>
<tr>
<td>2</td>
<td>Bleeding</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Pain</td>
<td>17</td>
<td>18.8</td>
</tr>
<tr>
<td>4</td>
<td>Discharge</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>5</td>
<td>Pruritis</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2: comparison of manometric changes in Grade-II and Grade-III Haemorrhoids

<table>
<thead>
<tr>
<th></th>
<th>Grade II (n=45)</th>
<th>Grade III (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRP (mmHg)</td>
<td>Mean 34.62</td>
<td>Mean 53.19</td>
</tr>
<tr>
<td></td>
<td>SD 0.61</td>
<td>SD 0.94</td>
</tr>
<tr>
<td></td>
<td>t test -109.59</td>
<td>t test -109.59</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
<tr>
<td>MSP (mmHg)</td>
<td>Mean 73.39</td>
<td>Mean 96.55</td>
</tr>
<tr>
<td></td>
<td>SD 0.62</td>
<td>SD 0.84</td>
</tr>
<tr>
<td></td>
<td>t test -147.89</td>
<td>t test -147.89</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
<tr>
<td>MXSP (mmHg)</td>
<td>Mean 102.29</td>
<td>Mean 120.52</td>
</tr>
<tr>
<td></td>
<td>SD 0.48</td>
<td>SD 0.97</td>
</tr>
<tr>
<td></td>
<td>t test -111.90</td>
<td>t test -111.90</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
</tbody>
</table>

Statistically MRP,MSP and MMHG values of Grade II are significantly less than values of Grade III (P<0.01)

Table 3: Manometric changes in RBL (Rubber Band ligation) before and after treatment

<table>
<thead>
<tr>
<th>Electrotherapy</th>
<th>Before (n=30)</th>
<th>After (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXRP (mmHg)</td>
<td>Mean 78.72</td>
<td>Mean 75.98</td>
</tr>
<tr>
<td></td>
<td>SD 0.63</td>
<td>SD 0.63</td>
</tr>
<tr>
<td></td>
<td>t test 16.25</td>
<td>t test 16.25</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
<tr>
<td>MXSP (mmHg)</td>
<td>Mean 120.11</td>
<td>Mean 114.02</td>
</tr>
<tr>
<td></td>
<td>SD 0.85</td>
<td>SD 1.02</td>
</tr>
<tr>
<td></td>
<td>t test 26.49</td>
<td>t test 26.49</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
<tr>
<td>MRP (mmHg)</td>
<td>Mean 50.79</td>
<td>Mean 46.05</td>
</tr>
<tr>
<td></td>
<td>SD 0.78</td>
<td>SD 0.69</td>
</tr>
<tr>
<td></td>
<td>t test 25.78</td>
<td>t test 25.78</td>
</tr>
<tr>
<td></td>
<td>P value p&lt;0.01</td>
<td>P value p&lt;0.01</td>
</tr>
</tbody>
</table>

Table 4: Manometric changes at Electrotherapy before and after treatment
## Discussion

In the present study of haemorrhoids and comparison between electrotherapy, Rubber band ligation therapy and haemorrhoidectomy in the patients of Andrapradesh population. The pre-operative clinical manifestation were 53(38.8%) had protruded haemorrhoids 18(20%) had bleeding haemorrhoids, 17(18.8%) had severe pain 11(12.2%) had discharge, 9(10%) had haemorrhoids with pruritis (Table-1) comparison of 45 grade-II and 45-grade-III were compared with manometric changes. MRP mean value in grade-II was 34.6(SD±0.61) and in grade-III was 53.1 (SD±0.94) t test was 109.5 and p value was highly significant MSP mean value in grade-II was 73.3(SD±0.62) and grade-III was 96.5 (SD±0.84) t test was-147.8 and p value was highly significant (p<0.01) (table-2) study of manometric changes in RBL before and after RBL was compared with various parameters like MXRP, MXSP, MRP MSP VFS, MXTV and found statically significant p value (p<0.01) similarly manometric changes before and after electrotherapy were studied and various parameters like MXRP, MXSP MRP, MSP, VFS, MXTV were compared statistically and highly significant p value was observed (p<0.01) (Table-3) study of manometric changes in RPL., Statistically MSP, VFS and MXTV values significantly increased after applying method (P<0.01). The post operative conditions of all three approaches to haemorrhoids were compared. Post-operative pain was severe (6%) in haemorrhoidectomy moderate (4%) at RBL and mild (2%) at electro therapy.

### Table 5: Manometric changes at Haemorrhoidectomy

<table>
<thead>
<tr>
<th>Haemorrhoidectomy</th>
<th>Before (n=30)</th>
<th>After (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MXRP (mmHg)</strong></td>
<td>Mean 86.69</td>
<td>73.73</td>
</tr>
<tr>
<td></td>
<td>SD 0.78</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>t test 73.95</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td><strong>MXSP (mmHg)</strong></td>
<td>Mean 126.41</td>
<td>110.76</td>
</tr>
<tr>
<td></td>
<td>SD 0.58</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>t test 106.27</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td><strong>MRP (mmHg)</strong></td>
<td>Mean 57.73</td>
<td>45.88</td>
</tr>
<tr>
<td></td>
<td>SD 0.48</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>t test 79.77</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td><strong>MSP (mmHg)</strong></td>
<td>Mean 103.44</td>
<td>118.57</td>
</tr>
<tr>
<td></td>
<td>SD 0.67</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>t test 74.79</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td><strong>VFS (cc)</strong></td>
<td>Mean 31.88</td>
<td>36.66</td>
</tr>
<tr>
<td></td>
<td>SD 0.89</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>t test 20.53</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td><strong>MXTV(cc)</strong></td>
<td>Mean 122.76</td>
<td>122.26</td>
</tr>
<tr>
<td></td>
<td>SD 0.76</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>t test 2.15</td>
<td>P&lt;0.05</td>
</tr>
</tbody>
</table>

Statistically MXRP,MXSP and MRP values significantly decreased while MSP, VFS and MXTV values significantly increased after Haemorrhoidectomy.

### Table 6: Post operative conditions of haemorrhoidectomy RPL and Electrotherapy

<table>
<thead>
<tr>
<th>S. no</th>
<th>Particulars</th>
<th>Haemorrhoidectomy</th>
<th>RBL</th>
<th>Electrotherapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Post-operative bleeding</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>2</td>
<td>Post operative pain</td>
<td>Severe (6%)</td>
<td>Moderate (4%)</td>
<td>Mild (2%)</td>
</tr>
<tr>
<td>3</td>
<td>Thromosed external haemorrhoids</td>
<td>1%</td>
<td>2%</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Urinary Retention</td>
<td>5%</td>
<td>1%</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Post operative discharge</td>
<td>3%</td>
<td>2%</td>
<td>-</td>
</tr>
</tbody>
</table>

Manometric changes in RPL., Statistically MSP, VFS and MXTV values significantly increased after applying method (P<0.01).
thromosized external haemorroids were observed in 1% in haemorroidectomy, 2% at RBL and nil at electrotherapy. Urinary retention was observed in 5% haemorroidectomy and 1% at RBL post–operative discharge was observed 3% in haemorroidectomy 2% RBL and nil at electrotherapy (Table-6) these observed values were more or less in agreement with previous studies(5)(6) The very purpose of this comparative study to compare the physiological changes after the treatment of haemorroidal disease using three different approaches. Raised anal pressure was documented in grade III and all three method before treatment due to prolapsed hemorrhoids causing vascular hypertension of and cushion(7)(8)

It was also observed that MXP MXSR decreased significantly after haemorroidectomy. Moreover grade II had significant lower MRP and MSP than patients with grade III haemorroids RBL and electrotherapy did not cause any significant changes in anal pressure compare to haemorroidectomy. Increased VFS which develops in parallel to the development of prolapsed hemorrhoids elevated after haemorroidectomy could be due to scar formation after surgery VFS was higher in all three types patients after treatment but patients did not have any complications. Among three treatment haemorroidectomy caused most significant changes in anal physiology. Hence haemorroidectomy must be avoided in grade–II and grade–III hemorrhoids because there will be over tonic contraction of anal sphincter muscle. When post treatment of RBL and electro therapy was compared electro therapy was quite safer in the treatment of grade–II and grade–III hemorrhoids.

Summary and Conclusion

The present study of haemorroids, comparison between electro therapy, RBL and haemorroidectomy will be useful to decide the pros and cons of RBL, haemorroidectomy and electrotherapy. This study clearly indicates that, electrotherapy is ideal and safer treatment for grade–II and grade–III haemorrhoids because electrotherapy has least post of operative pain and complications and had least changes in anorectal manometric parameters. But this study demands further biomechanical, haemo-dynamic, patho-physiological, genetic, nutritional studies because little is known about anorectic physiological changes.

This research paper is approved by ethical committee of Nimra institute of medical sciences Nimra Nagar. Jupidi (v) Ibrahimpatnum (M) Krishna (dist) Andrapradesh–521456

Conflict of Interest: No

Source of Funding: No

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Study of Recurrent Abdominal Pain in Children of Telangana

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Abstract

83 school going children aged between 6-15 years of both sexes were studied for Recurrent abdominal pain (RAP) the height of 49 (59%) children was the 148 to 150 cm, 34(40.9) children was 151 to 157 cms. The weight of the 47(56.6%) of children was 42 to 44 kg and 36(43.3%) children had 45 to 48 kg weight BMI of 46 (55.4%) children has 18.2 to 19.2, 37 (44.5%) had 19.3 to 20.2. The dietary habit of children 16(19.2%) were purely vegetarian, 18 (21.6%) were non vegetarian, 49(59%) were both vegetarian and non-vegetarians. The clinical manifestation were 16(19.2%) had constipation, 19(22.8%) had mesenteric lymphadenopathy, 14(16.8%)had urinary tract infection, 24(28.9%) had pallor, 6(7.22%) had hapatomegaly, 4(4.81%) had splenomegaly.

This pragmatic approach to children having various clinical manifestation will be quite helpful to pediatrician, Radiologists physician to treat such patients efficiently and to avoid morbidity and mortality because, there is always over protection and over caring towards children health.

Keywords: Recurrent abdominal pain, mesenteric lymphadenopathy, UTI, pallor.

Introduction

Recurrent abdominal pain (RAP)is the perhaps the most common painful health problem in the school going children about 10-20% of children suffer with RAP It was named as RAP syndrome by British pediatrician, J. Apley because of its repeated episodes and severe enough to affect their activities over a period longer than three months(2). The condition has remained poorly being implicated in the causation. The investigations seldom show organic disease. Treatments, strategies are very and little basis in evidence.

As many as, half of the children do not see the doctor about RAP (3). Although the pain is often as severe as in those who do, presumably the patient or family regards the symptoms as trivial because of mild severity or transient nature(4). Usually when the impacts on the functionings of child or family, then medical help was sought. Hence attempt was made to study the RAP in children at different ages to avoid morbidity and mortality among the children because abdomen has various systems of body hence it is popularly called as magic box.

Material and Method

83 school going children aged between 6-15 years of both sexes were visiting to pediatric OPD of Mediciti Institute of Medical Sciences Ghanpur, Medchal-501401 (Telangana) Hospital were selected for study. Blood examination CBC (complete Blood count) RBE (Routine Blood Examination) LFT(lever function test) urine analysis, culture, stool examination for cyst ova, parasites, In same patients x-ray abdomen, USG Abdomen and lower GIT were carried out various causes of recurrent abdomen pain, “Red flags” in history and examination of recurrent abdominal pain (RAP), moreover classification of RAP by symptomsatology according to Rome–II criteria viz functional dyspepsia, IRBS (Irritable Bowel Syndrome), functional abdominal pain, abdominal migraine, Aerophagia was also taken into consideration causes of recurrent pains mentioned below were also taken into consideration.
The children having HIV positive cardiac and neurological disease were excluded from the same. The duration of study was about 3 years. The ratio of male and female children was 2:1.

**Observation and Results**

**Table 1:** Anthropological parameters and Dietary habit of children with repeated abdominal pain No of the Patients-83

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Height (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a- 148 to 150</td>
<td>49</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>b- 151 to 157</td>
<td>34</td>
<td>40.9</td>
</tr>
<tr>
<td>2</td>
<td>Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a- 42 to 44</td>
<td>47</td>
<td>56.6</td>
</tr>
<tr>
<td></td>
<td>b- 45 to 48</td>
<td>36</td>
<td>43.3</td>
</tr>
<tr>
<td>3</td>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a- 18.2 to 19.2</td>
<td>46</td>
<td>55.4</td>
</tr>
<tr>
<td></td>
<td>b- 19.3 to 20.2</td>
<td>37</td>
<td>44.5</td>
</tr>
<tr>
<td>4</td>
<td>Dietary habit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a- Vegetarian</td>
<td>16</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td>b- Non vegetarian</td>
<td>18</td>
<td>21.6</td>
</tr>
<tr>
<td></td>
<td>c- Both veg and non vegetarian</td>
<td>49</td>
<td>59.0</td>
</tr>
</tbody>
</table>

**Table 2**–study of Anthropological parameters and dietary habit of children with RAP

1. Height-49(59%) children were 148 to 150 cm and 34(40.9%) were 151 to 157 cm
2. Weight–47(56.6%) had 42 to 44 kg weight b= 36 (43.3%) had 45 to 48 kg weight
3. BMI–46 (55.4%) had 18.2 to 19.2 and 37(44.5%) 19.3 to 20.2
4. Dietary habits-16 (19.2) were purely vegetarians, 18(21.6%) were non vegetarians, 49(59%) were both vegetarian and non vegetarian

**Table 2-1** 16 (19.2%) had constipation 19(22.8%) had mesenteric lymphadenopathy, 14(16.8%) had UTI, 24(28.9%) had pallor, 6(7.22%) had hepatomegaly, 4(4.8%) had splenomegaly.
Table 2: Clinical manifestation of RAP in children
No of the Patients-83

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Constipation</td>
<td>16</td>
<td>19.2</td>
</tr>
<tr>
<td>2</td>
<td>Mesenteric lymphadenopathy</td>
<td>19</td>
<td>22.8</td>
</tr>
<tr>
<td>3</td>
<td>Urinary tract infection</td>
<td>14</td>
<td>16.8</td>
</tr>
<tr>
<td>4</td>
<td>Pallor</td>
<td>24</td>
<td>28.9</td>
</tr>
<tr>
<td>5</td>
<td>Hepatomegaly</td>
<td>6</td>
<td>7.22</td>
</tr>
<tr>
<td>6</td>
<td>Splenomegaly</td>
<td>4</td>
<td>4.81</td>
</tr>
</tbody>
</table>

Discussion

The present study of RAP in children between 6 to 15 years of age both sexes. The height of children in 49 (59%) had 148 to 150, in 34 (40.9%). In study of weight 47 (56.6%) had 42 to 44 kg, 36 (43.3%) had 45 to 48 kg, The BMI in 46 (55.4%) had 18.2 to 19.2 and 37 (44.5%) had 19.3 to 20.2, the dietary habits study 16 (19.2%) were purely vegetarian 18 (21.6%) were non-vegetarian (Table-1) the clinical manifestation were, 16 (19.2%) had constipation, 19 (22.8%) had mesenteric lymphadenopathy, 14 (16.8%) UTI, 24 (28.9%) pallor 6 (7.22%) Hepatomegaly (Table-2). These findings were more or less in agreement with previous studies (5) (6) (7).

The pallor was associated with tiredness, anorexia, dizziness, headache, vomiting, fever diarrhea and constipation also (8). In fact RAP is and does not lend itself a single model of causation. Organic pathology cannot be identified in majority of children having RAP (9) (10). Organic disorders observed in RAP were UTI inflammation (crohn’s disease) or distention of abdomen and intestinal parasites also.

It can be also hypothesized that repeated eating habits consumption of junk foods, over burden of school studies may be the causative factors of RAP. Hence apart from treating RAP by pediatrician psychiatric counseling and sparing of time by the parents for kids may prove effective treatment for RAP.

Summary and Conclusion

The present pragmatic study of RAP in Telangana children will be useful to pediatrician radiologist psychiatrist because 90% of RAP is due to psychosomatic disorders. Hence affection by the teachers, mentors and parents is mandatory to treat such complicated non organic diseases.

This research paper was approved by ethical committee of Medicit Institute of Medical Sciences Ghanpur, Medchal-501401 (Telangana).

Conflict of Interest: No

Source of Funding: No

References

Study of Surgical Site Infections in Patients in a Tertiary Care Hospital

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Assistant professor, Department of General Surgery, Srinivas Institute of Medical Sciences, Mukka, Suratkal Mangalore, Karnataka

Abstract
There were 192 patients (110 males and 82 females) who underwent surgeries which were considered clean pre operatively (not contaminated or infected). Of these, 15(7.8%) had surgical site infections. Among 15 patients, 2(13.3%) had DM with obesity, 4(26.6%) had obesity only, 5(33.3%) had D.M. only, 2(13.3%) were anemic and 2(13.3%) had hypoalbuminemia. The surgeries in which infections observed were 4(26.6%) hydrocoelectomy, 2(13.3%) Thyroidectomy, 3(20%) Hernioplasty, 2(13.3%) lumpectomy, 2(13.3%) lipoma excision and 2(13.3%) mastectomy. The organism observed in surgical site infected area were 2(13.3%) klebesella, 5(33.3%) staphylococcus, 8(53.3%) had E.coli. Prevalence of surgical site infection varies with duration of hospital stay, increased duration of surgery, age, type of wound, electivity of procedure etc. Obesity and diabetes were also more prone to cause surgical site infection.

Keywords: SSI = Surgical site infection DM = Diabetes mellitus, Nosocomial organism.

Introduction
Surgical site infections could be hospital acquired and/or due to less immunity of patients like advanced age, D.M. etc. Apart from harming the patients, these health care associated infections can affect nurses, physicians, visitors and custodians of patients. Despite many advances in infection control practices including improved operating room ventilation, sterilization method, barriers, surgical technique and antimicrobial prophylaxis, SSI still cause substantial amount of morbidity and mortality among hospitalized patients. Prevalence of SSI are reported to be between 0 to 15% depending upon the reason for operation, the site, the approach, use of instruments, experience of surgeon etc. Study of surveillance of these infections is a vital step as it provides an insight into the magnitude of problem and helps the concerned authorities to take radical measures and curtail these infections. Hence attempt was made to study the incidence, types of SSI and associated factors so that this pragmatic approach will be helpful to treat such patients efficiently and avoid morbidity and mortality.

Materials and Method
192 patients of both sexes (110 males and 82 females) of different age groups regularly visiting to Srinivas Institute of Medical Sciences, Mukka, Suratkal, Mangalore–574146 (Karnataka) between August 2012 and July 2016 were studied. These patients had undergone variety of surgeries, viz. thyroidectomy mastectomy, lumpectomy, hernioplasty etc. Out of 192 patients 15(7.8%) patients had surgical site infections. Their infection pattern was studied along with culture and organisms were identified and treated accordingly. Moreover, history of surgically infected patients was also noted and their hematological and radiological examination was repeated to rule out and predict the secondary infection risk which may result in morbidity and mortality. Patients having infections before surgery were excluded from the study. The types of surgeries which had infections, the types of organism observed and the possible reasons were studied. The duration of the study was four years.
Observations and Results

Table 1: History of the patients of surgical site infections. 4 (26.6%) were obese, 5 (33.3%) had Diabetic mellitus, 2 (13.3%) had DM with obesity, 2 (13.3%) were anemic, 2 (13.3%) had hypo albuminemia.

Table 2: Surgeries in which surgical site infections were observed. 4 (26.6%) had undergone hydrocoelectomy, 2 (13.3%) had undergone thyroidectomy, 3 (20%) had hernioplasty, 2 (13.3%) had lumpectomy, 2 (13.3%) had lipoma excision and 2 (13.3%) had mastectomy.

Table 3: Study of prevalence of organism observed in surgical site infections. 2 (13.3%) klebesilla, 5 (33.3%) staphylococcus, 8 (53.3%) E.Coli.

Table 4: The present study findings were compared with previous workers.

Table 1: History of the patients of surgical site infections (Total No of p 15)

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particular</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Obesity and D.M</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>2</td>
<td>Obesity</td>
<td>4</td>
<td>26.6</td>
</tr>
<tr>
<td>3</td>
<td>D.M</td>
<td>5</td>
<td>33.3</td>
</tr>
<tr>
<td>4</td>
<td>Anemia</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>5</td>
<td>Hypo albuminemia</td>
<td>2</td>
<td>13.3</td>
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</tbody>
</table>

Table 2: Surgeries in which infections were observed

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Name of surgery</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydrocoelectmy</td>
<td>4</td>
<td>26.6</td>
</tr>
<tr>
<td>2</td>
<td>Thyroidectomy</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>3</td>
<td>Hernioplasty</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Lumpectomy</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>5</td>
<td>Lipoma excision</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>6</td>
<td>Mastectomy</td>
<td>2</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Table 3: Study of organism observed in surgical site infections

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Organism</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Klebesilla</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>2</td>
<td>Staphylococcus</td>
<td>5</td>
<td>33.3</td>
</tr>
<tr>
<td>3</td>
<td>E.coli</td>
<td>8</td>
<td>53.3</td>
</tr>
</tbody>
</table>

Discussion

In the present study of SSI in the patients of Srinivas Medical college, Suratkal (Mangalore), Karnataka state, the history of these patients was 4 (26.6%) were obese, 5 (33.3%) had D.M, 2 (13.3%) had obesity with DM, 2 (13.3%) were anemic, 2 (13.3%) had hypo albuminemia. The surgeries in which infection occurred were 4 (26.6%) had undergone hydrocoelectomy, 2 (13.3%) had undergone thyroidectomy, 3 (20%) had hernioplasty, 2 (13.3%) had lumpectomy, 2 (13.3%) had lipoma excision and 2 (13.3%) had mastectomy. The organism observed in the SSI were 2 (13.3%) had klebesilla, 5 (33.3%) had staphylococcus, 8 (53.3%) had E.coli. These findings were more or less in agreement with previous studies. It was also noted that prevalence of infection rate was higher with advancement of age. Other factors are, increased severity of acute illness and decreased host response to bacterial invasion associated with reduced immunity and prolonged hospital stay. Diabetes mellitus is an important risk factor for the development of wound infections as compared to non-diabetic patients. It was also observed that emergency surgery had lower rates of SSI than elective surgeries. This is counter-intuitive as emergency operation should be at higher risk because of suboptimal pre-operative preparation. Moreover stay of elective operation patients was longer than emergency operation. This may be because, majority of the emergency operative patients were of younger age group than elective operations. It was also analyzed that surgeries done by junior surgeons will have more rate of SSI as compared to experience surgeon. Apart from this those with anemia, malnutrition and obesity had more chances of SSI.
Summary and Conclusion

The present study of SSI will be helpful to have better knowledge of causative factors in reducing the incidence of such complications and helps to take preventive and precautionary measures which will prevent the risk of morbidity and mortality. But this study warrants further patho-physiological, immunological, nutritional, nosocomial patterns because exact formation and mechanism of infections of the surgical sites are still un-clear.

This research work was approved by ethical committee of Srinivas institute of medical science and hospital, Suratkal, Mangalore-Karnataka

Conflict of Interest: No

Source of Funding: No

Reference

Study of Factors Affecting Low Birth Weight of Newborn in Uttar Pradesh

Ambri Agarwal¹, Prashant Tomar

¹Assistant Professor, Department of Obstetrics and Gynecology, ²Assistant Professor, Department of Paediatrics, G.S. Medical College, Peeplabandapur, Pilkhuwa (UP)

Abstract

82 (Eighty two) pregnant ladies aged between 16-30 years were studied. The maternal history was- qualification, 38(46.3%) were illiterate, 28(34%) were primary school educated, 16(19.5%) were secondary school educated. The habits were, 4(4.87%) were smokers, 36(43.9%) were passive smokers, 42(51.2%) were Tobacco chewers. Socio-economic status was 12(14.6%) were house wives, 17(20.7) were shop keepers, 53(64.3%) were laborer. The material age was, 38(46.3%) were aged between 16-19 were, 29(35.3%), were aged between 20-25,15(18.2%) were aged between 26-30. The clinical manifestation during pregnancy was -14(17%) had PIH, 4(4.87%) had pre‑eclampsia, 2(2.43%) had eclampsia, 6(7.31%) had gestational diabetes, 24(29.2%) had APH, 32(30%) had PROM. The obstetric factors were 30(36.5%) were prim pares, 52(63.4%) were multiparous, 62(75.6%) had history of LBW, 38(46.3%) had history of miscarriage, the period of amenorrhea was ‑22,(26.8%) had 28 to 37 weeks, 53(64.3%) had 38‑40 weeks 7(8.53%) had above 40 week 5(6.09%) had multiple pregnancy. This pragmatic approach study of LBW will be quite helpful to obstetrics and gynecologist, pediatrician, physician to treat such patients actively to prevent morbidity and mortality of low birth newborn which is a great threat and challenge to the medical fraternity globally.

Keywords: PIH-pregnancy Induced Hypertension, APH = Ante partum Hemorrhage, PROM = premature rapture of membrane, LBW = Low Birth weight.

Introduction

LBW (low birth weight) defined as weight at birth which is less than 25000gm usually measured in the first hour of life irrespective of the gestation age (¹). LBW is the major cause and contributes to about 60% to 80% of all neonatal deaths (²). Based on epidemiological studies, infants weighing less than 2500 gm, are more, likely to, die than normal weight babies. Global occurrence of LBW is 15.5% which amounts to about 20 million low birth weight infants each year. 96.5% of them in developing countries (³). Many of the LBW newborn become the victims of protein energy malnutrition (PEM) and infection. The causes of LBW are socio-economic status, poor nutrition during pregnancy, education level, and awareness of health condition. LBW is one of the most serious challenges for mother and child health. It has number of public health consequences such as mental retardation, congenital anomalies, morbidity and mortality. Moreover very high cost of special care and intensive care unit (⁴). Hence attempt was made to study the different causes of LBW because there is increase of neonatal death every year globally.

Material and Method

82 (Eighty two) pregnant ladies aged between 16-30 years, regularly visiting to obstetrics and gynecology department of G.S medical college hospital NH24 near Dhoori petrol pump, Peeplabandpur, Pilkahuwa-245204 (U.P), were selected for study. They were admitted as per their expected delivery date (EDD). History of every patients was noted individually. The history clinical manifestations of pregnancy and obstetrics problems were noted and classified with percentage The LBW babies were referred to neo-natal department for
further investigation. The patients having neurological complications, HIV, HbSAG and mothers having still born babies were excluded from the study.

The duration of the study was about 2 years (from September-2016 to December-2018).

**Observation and Results**

**Table-1-Maternal history in LBW fetal study–**

1. Qualification study 38(46.3%) were illiterate, 28(34%) were qualified upto primary school, 16 (19.5%) up to high school. (Secondary school)
2. Habit study-4(4.87%) were smokers, 36(43.9%) were passive smokers, 42(5.2%) were Tobacco chewers.
3. Socio-economic status-12(14.6%) were house wives, 17(20.7%) were shop keepers, 53(64.3%) laborer.
4. Age of maternal was, 38(46.3%) were between 16-19 years, 29(35.3%) were between 20-25 years 15(18.2%) were aged between 26-30.

**Table-2-Study of clinical manifestation during pregnancy–**

14(17%) had PIH (pregnancy Induces Hyper tension),4(4.87%) had Pre-eclampsia, 6(7.31%) had gestational Diabetes mellitus, 24(29.2%) had APH(Antepartum hemorrhage),32(39%) had PROM(premature rapture of membrane).

**Table-3-Obstetric factors affecting LBW–**

30(36.5%) were primiparous, 52(63.4%) were multiparous, 62 (75.6%) had previous history of LBW, 38(46.3%) had history of miscarriage.

The period of amenorrhea at delivery, 22(26.8%) had 28-37, weeks, 53(64.6%) had 38-40 weeks, 7(8.53%) had above 40 weeks,5(6.09%) had multiple pregnancies.

**Table 1: Maternal history in LBW fetal study No of Patients-82**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-Illiterate</td>
<td>38</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>b-Primary school</td>
<td>28</td>
<td>34.1</td>
</tr>
<tr>
<td></td>
<td>c-High school</td>
<td>16</td>
<td>19.5</td>
</tr>
</tbody>
</table>

**Table 2: Study of clinical manifestation during pregnancy No of Patients-82**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PIH Pregnancy Induced HIN</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Pre-eclampsia</td>
<td>04</td>
<td>4.87</td>
</tr>
<tr>
<td>3</td>
<td>Eclampsia</td>
<td>02</td>
<td>2.43</td>
</tr>
<tr>
<td>4</td>
<td>Gestation Diabetes</td>
<td>06</td>
<td>7.31</td>
</tr>
<tr>
<td>5</td>
<td>APH Ante partum hemorrhage</td>
<td>24</td>
<td>27.2</td>
</tr>
<tr>
<td>6</td>
<td>PROM Premature rapture of membrane</td>
<td>32</td>
<td>39</td>
</tr>
</tbody>
</table>

**Table 3: Obstetric factors affecting LBW No of Patients-82**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-Primiparous</td>
<td>30</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>b-Multiparous</td>
<td>52</td>
<td>63.4</td>
</tr>
<tr>
<td>2</td>
<td>Previous history of LBW</td>
<td>62</td>
<td>75.6</td>
</tr>
<tr>
<td>3</td>
<td>History of miscarriage</td>
<td>38</td>
<td>46.3</td>
</tr>
<tr>
<td>4</td>
<td>Period of Amenorrhea at delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-28-37 week</td>
<td>22</td>
<td>26.8</td>
</tr>
<tr>
<td></td>
<td>b-38-40 week</td>
<td>53</td>
<td>64.6</td>
</tr>
<tr>
<td></td>
<td>c-Above 40 week</td>
<td>07</td>
<td>8.53</td>
</tr>
<tr>
<td>5</td>
<td>Multiple pregnancy</td>
<td>05</td>
<td>6.09</td>
</tr>
</tbody>
</table>

**Discussion**

In the present study of factors, affecting LBW of newborn in Uttar Pradesh. The maternal history was qualification 38(46.3%) were illiterate, 28(34%) were studied till primary school. 16(19.5%) were educated
till secondary school. The habits were 4(4.8%) were smoker, 36(43.9%) were passive smokers, 42(51.2%) were Tobacco chewer (like Gutaka). The Socio-economic status was 12(14.6%) were house wife, 17(20.7%) were shop keepers, 53(64.3%) were laborer. The age of pregnant mothers was 38(46.3%) were between 16-19 years, 29(35.3%) were aged between 20-25, 15(18.2%) were 26-30 years old. (Table-1). The clinical manifestation of pregnant mother was 14(17%) PIH (Pregnancy induced Hyper tension HTN), 4(4.87%) had pre-eclampsia, 2(2.43%) had eclampsia, 6(7.3%) had gestational diabetes 24(29-2%) APH (Ante partum hemorrhage), 32(39%) had PROM (Premature Rupture of Membrane) (Table-2). The obstetric factors were - In parity study 30(36.5%) were primiparous, 52(63.4%) were multiparous, 62(75.6%) mothers had previous history of LBW, 38(46.3%) mother had history of miscarriage. The period of amenorrhea was 22(26.8%) had 28-37 weeks, 53(64.6%) had 38-40 weeks, 7(8.53%), had above 40 weeks, 5(6%) mothers had multiple pregnancies. This finding were more or less in agreement with previous studies (5)(6)(7).

The socio-economic conditions such as poverty, education level, violence during pregnancy, passive smoking (because her husband or father in law, family members could be smokers) early marriages are also contributing factors for LBW. Infectious agents have potential to penetrate through uterus in lesser immunity females and cause inflammation in uterus and placenta. Cytokines are released in response to the inflammation by the body immune system resulting in preterm initiation of labor which results in LBW. Adolescent when become pregnant before their own growth is completed faces difficulty in fulfilling their own and nutritional requirement (8). It has been also reported that passive smokers exposure to beedi or cigarettes smoking contains a complex mixture of various mutagenic which endogenous to growing fetus (9).

LBW individuals experience many health complication throughout their life which can cause long and short terms consequences including hypothermia, perinatal asphyxia respiratory problems, Hyperbilirubinemia, anemia, infection, neurological problems. Ophthalmic complications, hearing defects, sudden infant death syndrome, coronary artery disease, immune-system problems (10). LBW could be due to serious placental problems leading to insufficient transport of nutrient and oxygen to fetus. Hence expecting mother must have proper nutritional intake and regular medical check-up moreover expecting mothers should not take self-medicine without advice of physician or obstetrics and gynecologist.

Sometimes premature LBW babies need to be born to save mothers life due to other complications like anomalies of placenta, severe bleeding etc. It is also hypothesized that, violence during pregnancy leads to stress and strain on growing fetus may impair or retard the growth of fetus lead to LBW with de-arrangements of cardio-vascular and central nervous system. The LBW babies suffer with this de-arrangement in their future life, such children will be burden to whole family and society as well.

During pregnancy, apart from proper nutrition, regular medical check-up, expecting mothers should be treated, sympathetically and amicably for healthy growth of fetus.

**Summary and Conclusion**

The present study of factors affecting LBW of newborn in Uttar Pradesh will be quite useful to obstetric and gynecologist, physician pediatrician to avoid the morbidity and mortality of newborn. It is necessary improve the maternal health through nutrition and education because maternal malnutrition and anemia have significant association with LBW but this study further demands genetic, immunological, nutritional and embryological study because exact function of placental barrier and duration of formation of germ layers is still un-clear.

This research paper was approved by ethical committee of G.S. Medical College, NH24, Near Petrol Pump, Peelabandapur, Pilkhuwa-245304(UP)

**Conflict of Interest:** No

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A Study to Assess the Effectiveness of Video Assisted Teaching Programme on Knowledge Regarding Breast Self-Examination among Adult Women in Selected Hospital in Bangalore

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Abstract

Breast self-examination is an important screening method used to detect early breast cancer. Studies have reported that awareness and practice of breast self-examination is an important method of prevention of breast cancer as it is one of the public health problem.

Aims: The main aim of the study was to assess the effectiveness of video assisted teaching on knowledge regarding the breast self-examination among adult women.

Materials and Method: Descriptive research approach which was evaluative in nature with one group pretest and post test design was used for the study. Purposive sampling technique was used to select the subjects of 30 adult women in vanivillas women and children hospital Bangalore. The tool used for the study was self-administered questionnaire and video assisted teaching regarding breast self-examination.

Results: The study reveals that majority 26 (86.7%) of the subjects had inadequate knowledge during pre-test. In post-test, 5 (16.7%) of the subjects had adequate knowledge and 22 (73.3%) had moderately adequate knowledge. It shows that there was a significant difference between pre-test knowledge score (8.63) and post-test knowledge score (15.20). Paired t test was used in order to assess the effectiveness of video assisted teaching programme on knowledge regarding breast self examination and was found to be effective (t=12.679 p<0.05) at 0.05 level of significance.

Conclusion: Video assisted teaching is effective in improving the cognition and confidence of the adult women.

Keywords: Video Assisted Teaching (VAT), Breast Self Examination (BSE), Effectiveness, Knowledge, Adult women.

Introduction

Every country in the world is progressing towards the destiny of “Health for all”. Breast is the important organ for each woman as these are the symbol of motherhood and women hood. The breast is susceptible to numerous benign and malignant conditions. Breast cancer is probably the most feared cancer in women because of its frequency and psychological impact. It affects the perception of sexuality and self-image to a degree greater than any other cancer. The incidence of breast cancer is rising in every country of the world especially in developing countries such as India[1].

Breast cancer begins in the breast tissue. In breast cancer, the cell of the breast grows in a chaotic way. Instead of going and dividing in a regular and expected other, they grow out of control. If the cancer is not treated, the cell can spread can spread within the breast or even break off and metastasis to other part of the body[2].

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India is likely to have over 17.3 lakhs new cases of cancer and over 8.8 lakhs death due to the disease by 2020 by cancer of breast, lungs and cervix topping the list, a premier a medical research body said. In its projection, the Indian council of medical research (ICMR) said in 2016 the total number of new cancer cases is expected to be around 14.5 lakhs and figured is likely to reach nearly 17.3 lakhs in new cases in 2020. Over 7.36 lakhs people are expected to succumb to reduce in 2016 while the figure is estimated to shoot up to 8.5 lakh by 2020. Data also revealed that only 12.5 % of patient comes for treatment in early stages. The northeast reported the highest number of cancer in both male and female[3]. Among females, breast cancer topped the list and among male mouth cancer, the studied said.

Breast Self Examination is an important screening measure for detecting breast cancer among women; those who correctly practiced BSE monthly can detect a lump in the early stage of its development and treated for a better survival rate. Nurses play a pivotal role in teaching the BSE to the women to identify the breast abnormalities. The nurses who can promote monthly BSE should be perfect by supporting realistic beliefs about early detection and prevention of breast abnormalities as well as demonstrating BSE, so that women can do it themselves without consulting physician[4]. Thus the investigator was interested to educate the adult women about breast self examination in a view to prevent the breast illness in the advancing age and the best method to reach the adult women would be VAT (video assisted teaching). Therefore this study aims to evaluate the effectiveness of VAT on cognizance of BSE among adult women.

Materials and Method

Research Approach: In order to accomplish the objectives of determining the level of knowledge and assessing the effectiveness of VAT on breast self-examination among women, evaluative research approach was adopted for the study.

Research Design: The research design selected for this study was one group pre-test and post-test design.

Variables: Variables are qualities properties or characteristic of a person, things, situation that vary or change in qualitative research an activity is aimed at trying to understand how or why things vary and to learn how or one variables is related to others[6].

In this study, three types of variables were identified.

Independent Variables: In this study, the independent variable is video assisted teaching (VAT).

Dependent Variables: In this study, the dependent variable is the knowledge of adult women regarding breast self-examination.

Extraeous Variables: Any uncontrolled variable that greatly influence the result of the study is called as extraneous variables. The extraneous variables considered in this study are

- Age
- Gender
- Religion
- Family history
- Dietary pattern
- Previous source of information regarding breast self-examination.

Population: The population is the present study consisted of adult women admitted in selected hospital at Bangalore.

Setting of Study: The present study was conducted in Vani villas women and children hospital at Bangalore.

Sample: The 30 adult women who were admitted in Vanivilas women and children hospital, Bangalore who fulfilled the inclusion criteria were selected as samples.

Sampling Technique: In this study, purposive sampling technique was used to select the subject.

Inclusion Criteria: In this study, the inclusion criteria consisted of the women who are:

- Married women
- Who are willing to participate in study and available at that time of the study.
- Able to communicate in Kannada, Hindi and English.

Exclusive Criteria: In the present study, the exclusion criteria consist of women who are;

- Not willing to participate.
- Absent while administering the intervention.
**Data Collection Task/Instrument:** Data collection tools are the procedures or instrument used by the researcher to observe or measures the key variables in the research problem. The data collection instrument for the present study consisted of self-administered questionnaire with two sections.

**Section-1:** Demographic Performa

**Section-2:** Questionnaire to assess the knowledge regarding breast self-examination among adult women.

**Development of The Tool:** The tools were prepared on the basis of the objective of the study. The researcher did an extensive review of literature to collect the relevant materials and based on it, the two was selected for the study.

The following steps were understood to prepare the final tool. Tools was developed based on the related literature and expert suggestions.

**Description of The Tool:**

**Section 1: Demographic Data:** It consists of the details related to age, education, religion, gender, family history, dietary pattern, previous source of information of the breast self-examination among the adult women.

**Section 2: Questionnaire:** Self-administered questionnaire to assess the knowledge on breast self-examination among adult women.

A self-administered questionnaire was prepared to assess the effectiveness of video assisted teaching on knowledge regarding the breast self-examination among adult women in selected hospital in Bangalore. It compromised of 24 items with 4 choices. This was prepared by investigators. Each correct answer was given a score of 1 and wrong answer was given a score of 0. The maximum score was 1.

**Content Validity:** Content validity is the criterion for evaluating the quality of measures or an instrument. Content validity refers to extent to which an instrument adequately encompasses the pertinent range of subject matter \(^7\). Content validity of the tool for the present study was established by 7 experts in the field of nursing. The tool was given along with the objectives of the study and blue print of the tool was also provided. Modifications were made based on the suggestions given by the experts, after consulting with guide

**Validity Of The Tool:** The tool was distributed to the experts in the field of nursing and the appropriate correction was made according to their opinion with references to guides.

**Data Collection Procedure:** The data collection for the main study was done on 30 adult women in Vani Vilas women and children Hospital at Bangalore. Formal written permission was obtained from the concern authorities before data collection.

The researcher introduced themselves to the mother and the purpose of the study was explained to them. Confidentiality was assured and the consent was taken from the admitted adult women. Pre-test was conducted for 3 days (each day 10 sample) followed by Video assisted teaching. And the post-test was conducted after 3 days of VAT.

The subjects were asked to give base line information after which the pre-test measurement was taken by using self-administered questionnaire.

The investigator observed that many subjects were motivated to participate in the study. The data collection was completed by thanking the subjects for their participation and co-operation. The data collection was compiled for analysis.

**Plan For Data Analysis:** A master scoring sheet was prepared by the investigator to organize the computed data. The data would be analyzed using descriptive and inferential statistics.

**Findings**

**Major finding of the study:**

**Section 1: Description of baseline characteristics of the adult women:** This section deals with the description of the baseline characteristic of the subject in terms of frequency and percentage such as Age, Gravida, Religion, Family income, education and previous source of information regarding the breast self-examination. The majority subject belongs to the age group 19-22 year (50%) and it was also inferred that majority of the subjects were primipara i.e. (64%). The majority of the subjects were Hindus i.e. (74%) and also majority of the subjects were attained secondary education i.e. (40%). The majority of subject family income is in between 7323-9787 i.e. (33.33%). The result shows that 70% of women reported as never having practiced breast self-examination.
Section 2: Comparison between pre-test and post-test knowledge scores on breast self-examination:
The majority of subjects had inadequate knowledge during the pre-test i.e. 26 (86.7%). In post-test, 16.7% of subjects had adequate knowledge i.e. 5 (16.7%) and 22 (73.3%) had moderately adequate knowledge.

The effectiveness of teaching method in promoting women’s breast self-examination in breast self-examination teaching clinic. The sample was composing of 130 women. Demonstration was used with the comparison group while the experimental group 1 was taught by demonstration and practice, the experimental group 2 was provided by demonstration and self and reminding, and the experimental group 3 was provided by demonstration and reminding from friends. The result of study shows that the least change of breast self-examination behaviour was found among comparison group at highest change of breast self-examination behaviour was found among the experimental group 1, but the significant difference was not found between the women’s breast self-examination behavior [8].

Section 3: Effectiveness of video assisted teaching on knowledge regarding breast self-examination:
Paired t test was conducted in order to assess effectiveness video assisted teaching programme on knowledge regarding the breast self-examination among adult women. The calculated t value t=12.679 was found to be greater than the table value t1=2.05 at p<0.05 level of significance. Hence it was inferred that video assisted teaching programme was effective in increasing the knowledge among adult women regarding breast self-examination.

A descriptive study was conducted in southern Iran in 2009 to determine the knowledge and attitude of breast self-examination in women. A self-administered questionnaire was developed to collect information from 60 women in the age group of 30-50 years. The results showed that 46.7% of participants didn’t perform breast self-examination and that almost all of those who did perform breast self-examination did it in correctly [9].

Section 4: Association of pre-test knowledge scores on breast self-examination with their selected demographic variables: There was no significance association between the pre-test knowledge score and the selected demographic variables.

Conclusion

Breast is the important organ for each woman as these are the symbol of motherhood and womenhood. The breast is one of the target organs for various hormones, of a particular oestrogens, progesterone and prolactin. As such many a breast related complaint or disease is associated with endocrine dysfunctions [10]. It is important to examine the breast of female and male clients. A small amount of glandular tissue, a potential site of for the growth of cancer cells, is located in the milk breast. In contrast, the majority of the female breast is glandular tissue. The breast is susceptible to numerous benign and malignant conditions. Among the various breast problems, breast cancer is one of the most common malignancies in women [11].

The samples consist of 30 adult women whom are admitted to Vani villas women and children hospital, KR. Market, Bangalore. The consent was taken from the admitted adult women. Pre-test was conducted for 3 days (each day 10 sample) followed by VAT. And the post-test was conducted after 3 days of VAT.

The data collected were subjected to analysis using descriptive statistics in term of frequency percentage, mean, SD, and inferential statistics using paired t test.

The following conclusions were drawn based on the finding of the study:

- Majority of the subjects were in the age group between 19–22 years among adult women.
- Majority of the subjects were Hindus.
- Majority of the subjects were primipara mother.
- Majority of subjects were not practicing Breast self-examination regularly.
- Majority of subjects were secondary level of education.
- The present study concluded that the video assisted teaching programme which was found to be effective in increasing the knowledge among adult women. (t=12.679 at p<0.05) The results showed a significant
difference between the pre-test knowledge scores 
\( x_1 = 8.6333 \) and the post-test knowledge score 
\( x_2 = 15.2000 \) after administration of video assisted 
teaching programme and was tested using paired ‘t’ test analysis. The computed chi-square values showed that, there was a significant association between the pre-test and the post-test knowledge.

- The present study concluded that there is no significant association between pre-test knowledge score and demographical variables like age, parity, religion, education, family income and practicing BSE.

**Limitation:**

- The study made use of self-administered questionnaire only to assess the knowledge of adult women.
- The study was limited to only one hospital at KR. Market, Bangalore.
- The study was confined to only 30 adult women.

**Recommendation:** On the bases of the findings of the study following recommendation has been made for the further study.

- The study can be replicated on the larger samples for the generalization of finding.
- A similar study can be conducted in different hospital setting.
- A similar study can be conducted for a longer duration.
- A similar study can be done focusing on different age group.
- A comparative study can be conducted both in urban and rural female population.

**Source of Funding:** Funding for the study was done by self.

**Ethical Clearance:** Ethical Clearance was obtained from the institutional review and ethical board.

**Conflict of Interest:** There are no conflicts of interest.

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An Observational Study to Analyse the Neuromotor Control and Endurance of Neck Muscles among Physiotherapy Students

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Abstract

Aim: To analyze the neuromotor control and the neck muscle endurance among the student population.

Background Of The Study: Recent studies shows that poor posture habits causes the neck muscles to continuously overwork to counterbalance the pull of gravity causing imbalance between the agonist and antagonist.

Materials And Method: The study design is observational study. Female subjects within the age group of 18-25 years were included and Subjects with migraine, tension type headache and neck pain were excluded from the study. After getting consent from the 100 samples, CCFT and jull's test were performed.

Conclusion: The study revealed that there is reduced neck muscle endurance and motor control among the subjects.

Keywords: CCFT, Jull’s test, Endurance, Neuro motor control.

Introduction

The neck muscles, including Sternocleidomastoid and trapezius are responsible for the gross motor movement in the muscular system of the head and neck¹. The deep neck flexor is made up of the longus colli, longus capitis, rectus capitis anterior. Not like the superficial neck flexor muscles, the deep neck flexors are responsible for maintenance of cervical lordosis and inter segmental stability during the activities of daily living².

Neck muscles are responsible for head movement, stabilizing the upper region of the body, assisting in swallowing and also to elevate the ribcage during inhalation or more. The neck supports the weight of the head and is highly flexible and turns in all directions. They move the head in every direction, pulling the skull and jaw towards the shoulders, spine and scapula. Working in pairs on the left and right sides of the body, these muscles control the flexion and extension of head and neck. Individually these muscles rotate the head or flex the neck laterally to left or right. These diverse tasks require both strong, forceful movements and some of the fastest, finest and most delicate adjustments in the entire human body. The deep cervical muscles are rich in muscle spindles and have been thought to play a relatively more prominent role in sensory motor function of this region. Neck muscles contract to adjust the posture of the head throughout and thereby require the greatest endurance of the muscles.

The concepts of “postural health” and “optimal posture” have been discussed in the healthcare professionals community for decades and broadly accepted that “good” and “bad” postures exist³,⁴. The Posture Committee of the American Academy of Orthopedic Surgeons (AAOS, 1947) defined healthy posture as the state of muscular and skeletal balance.
which protects the supporting structures of the body against injury or progressive deformity and poor posture as a faulty relationship of the various parts of the body which produces increased strain on the supporting structures. The prolonged periods of repeated motions or remaining fixed in one particular position commonly leads to the adaptation of poor posture habits. This postural adaptation causes the muscles of upper back to continuously overwork to counterbalance the pull of gravity on forward head and ultimately causes faulty posture adaptations like rounded upper back, neck muscle tightness and neck pain.

Based on existing evidence physiotherapists would select mainly upright postures, as these optimal postures were safe and natural when in cases of treating patients. However it is necessary that the therapists themselves should also concentrate on the importance of maintaining the strength of their neck muscles to prevent strain and other related problems. This study aimed to analyze the neuro motor control and endurance of the neck muscles among the physiotherapy students.

**Materials and Method**

The study was carried at the Faculty Of Physiotherapy, Dr. MGR Educational and Research Institute, Chennai. The study was approved by the institutional review board, among 125 volunteers 100 samples were selected based on the inclusion and exclusion criteria. The study included only the female subjects between the age group of 20-25 years, Subjects with migraine, tension type headache and neck pain were excluded from the study. As the study was an observational study type the samples were clearly explained about the procedure that they have to undergo. The informed consent was duly signed by the samples and the physiotherapist.

**Outcome measures:** The samples were asked to perform two tests, Jull’s test and Cranio cervical flexion test (CCFT). Jull’s test was performed to assess the endurance of neck muscles and CCFT were performed to analyse the motor control of the neck muscles.

Jull’s test is a cervical spine examination procedure that tests for deep neck flexor muscle weakness or deconditioning. Subjects should be awake and cooperative during a Jull’s Test. The subjects should be positioned in supine lying and tries to maintain the neck in flexion for 5-10 sec. This test can be performed in 2 positions, one in supine lying and the other involves the head about 3 cm off the table in full neck flexion. A positive Jull’s test is seen when there is noticeable chin jutting or excessive shaking when the subject maintains a flexed position.

The CCFT tests the neuromuscular control of the control of the deep cervical flexor muscles, the longus capitis, and colli. It can also be used as a clinical indicator of impaired activation of the deep cervical flexor muscles, to measure the muscle activity of the deep and superficial cervical muscles or as a therapy approach. The intra-and inter-reliability for the CCFT was between “fair to good” and “good to excellent” (ICC: 0.63 to 0.86).

The patient is positioned in a supine crook lying position, with the neck in a neutral position. The neutral position of the neck can be visually determined by maintaining a horizontal face position between the forehead and chin, before performing the test, an uninflated pressure sensor (= PBU or pressure biofeedback unit) must be placed beneath the occiput. The pressure sensor is inflated to a stable baseline pressure of 20 mmHg.

The patient is instructed to move the head vertically. The movement is performed gently and slowly. This nodding action causes the pressure in the inflated pressure sensor to increase. For the first stage of the test the pressure should increase by 2 mm Hg and asked to maintain this position for 5-10 seconds. Then the patient relaxes back to 20 mm Hg to increase the pressure again this time to 24 mm Hg using the same action and hold for five seconds. The patient has to do this until he/she has reached a pressure of 30 mm Hg. This test should be repeated twice without substitution or fatigue. Flexion of the neck requires activation of the deep cervical flexors. It is necessary to pay attention to compensatory strategies like Loss of the neutral position of the neck and head and Palpable or visible contraction of the sterno cleido mastoid and scalene muscle.

**Data Analysis:** Data was analysed using SPSS 21.0 and Microsoft Excel. All responses received were included in the analysis along with the average values of the trials; therefore results are reported accordingly. Mean and standard deviation were used for continuous data.
Table 1 The values achieved by the subjects when performing the Jull’s test and CCFT

<table>
<thead>
<tr>
<th></th>
<th>JULL’S TEST</th>
<th>CCFT</th>
<th>F Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NORMAL</td>
<td>3CMOFF</td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>Mean</td>
<td>3.20</td>
<td>2.05</td>
<td>1.76</td>
<td>0.62</td>
</tr>
</tbody>
</table>

The median pressure level while performing the CCFT was 26 mm Hg. P value < 0.001

Result

According to the data analysis, the average values of both the Jull’s test and CCFT values were calculated. The mean value of Jull’s test in normal position is 3.20 and when it was 3cm off the table is 1.76. The mean value of CCFT is 5.62. The p value of both the scores when calculated is 0.000*. Based on the p value scores, it suggests that there is a significant difference among the subjects when the neck muscle endurance and neuro motor control activity was assessed. The normative baseline for CCFT was considered to be 26 mmHg. This study revealed that on assessing the Jull’s test and CCFT endurance of and the motor control of the neck muscles are reduced among the student population (physiotherapy students).

Discussion

Reduced activity of the the deep cervical flexor muscles goes hand in hand with an increase in activity and neuromuscular inefficiency of the superficial muscles even under low load and even with non-functional tasks. Patients with neck pain also struggle to relax the superficial neck flexor muscles even after an activity has ceased. Changes in function in the deep cervical muscles has an influence in function as it affects the support and control of the cervical spine and could lead to overload on specific segments. Falla et al (2004) revealed that any deficits in neuro-motor control could play an important role in the development of recurrent or chronic neck pain.

McKenzie and Haughie et al have proposed that nonspecific neck pain results from poor posture, arising through the sustained, long-term, abnormal physiological loads that such postures impose on the neck, with a consequent reduction in neck muscle strength. Petty et al. noted that weakened deep flexor muscles and consequentially decreased adjustment ability activated the superficial muscles, sterno cleido mastoid muscle and scalenus anterior muscle, and triggered excessive movement of the chin and the head resulting in excessive extension of the upper neck bone and shortening of the posterior muscles of the neck, reducing the stability of the neck. An obliteration of the cervical lordosis and a compensatory tilting back of the head at the atlanto-occipital joint, stretching of the posterior cervical muscles and weakness of semispinalis cervicis and overaction with ultimate shortening of semispinalis capitis thereby, the head shifts anteriorly from the line of gravity, the scapulae may rotate medially, a thoracic kyphosis may develop and overall vertebral height may be shortened. This ultimately leads to a forward head posture.

Conley et al. reported that deep muscles of cervical vertebrae maintain cervical lordosis and play an essential role in adjusting the movement of spinal segments. Much research has focused on the correlation between the stability of the cervical spine and the deep flexor muscles. Heo JG observed that impairment of the deep flexor muscle in patients with chronic neck pain weakened the strength of static muscles and severely weakened the endurance of the muscles. The role of the longus capitis and longus colli, deep flexor muscles of the neck, is considered important in postural adjustment and maintaining stability of the neck. They jointly cooperate to support the weight of the head while moving the head in various directions and provide stability during low-intensity static muscle endurance exercise, but not during high-intensity exercise, for which strong muscle contraction is required.

Based on the recent trends, physiotherapists play a major role in advising the importance of posture correction and its impact in the working areas, thereby it is also necessary for the therapist themselves to concentrate on the posture. Thereby it is necessary to emphasize on exercise training for the neck muscles and to counter balance equally over the muscles and pull of gravity. When exercises are followed regularly it helps in maintaining the properties of the muscles to reduce the strain over the neck muscles and other neck related problems.
The limitations of this study were the small number of participants in the study, the inclusion of female students only, and the lack of information on their levels of activity, all of which make it difficult to generalize the results. Future research should include a greater number of subjects and make gender comparisons.

**Conflict of Interest:** None

**Ethical Considerations:** The manuscript is approved by the Institutional Review board of faculty of physiotherapy. All the procedures were performed in accordance with the ethical standards of the responsible ethics committee both (Institutional and national) on human experimentation and the Helsinki Declaration of 1964 (as revised in 2008).

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Antibiotic Susceptibility Pattern of Staphylococcus Aureus and Methicillin–Resistant Staphylococcus Aureus Isolated from Various Clinical Specimens in a Tertiary Care Teaching Hospital, Pondicherry

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Abstract

Introduction: *Staphylococcus aureus* is one of the most common human pathogen capable of causing a wide range of infections. *Staphylococcus aureus* is a common cause of both community and hospital infections. It was the endemic microorganism in several reports of nosocomial infections which induced high mortality and morbidity. This microorganism is a virulent bacterium that can cause serious infections including skin and soft tissue infections, wound infection, bacteremia, pneumonia and endocarditis. It is estimated that *Staphylococcus aureus* has developed the ability to acquire resistance to all classes of antimicrobial agents and methicillin-resistant *S. aureus* (MRSA) has become a major problem in many hospitals worldwide. Hospital acquired infection (HAI) due to multidrug resistant bacteria like MRSA are a growing problem in many health care institutes. Materials and Method A total of 568 clinical isolates of *Staphylococcus aureus* were isolated from various clinical specimens received in the Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry from April 2014 to December 2017, were included in the study. Isolation and identification of *Staphylococcus aureus* was done by standard conventional microbiological method. Identification of MRSA was done as per standard guidelines of CLSI by using Oxacillin broth microdilution method. Antibiogram was determined by Kirby-Bauer disc diffusion method on Mueller-Hinton agar with zones of inhibition.

Results: *Staphylococcus aureus* was susceptible to Vancomycin (94.7%), followed by Teicoplanin (91.7%), Linezolid (88.5%), Amikacin (85.7%). In case of MRSA all the isolates showed 100% susceptibility to vancomycin, followed by Teicoplanin (97.5%), Amikacin (84.7%) linezolid (80.3%) and Clindamycin (54.8%). In case of MRSA all the isolates were 100% susceptible to vancomycin followed by teicoplanin (97.5%), amikacin (84.7%) linezolid (80.3%) and clindamycin (54.8%).

Conclusion: MRSA infections are emerging as a serious health problem in health care set up. Joint efforts by clinicians, clinical microbiologists, hospital management and public health authorities are required to meet the challenge of MRSA on the forefront.

Keywords: *Staphylococcus aureus*, MRSA, Oxacillin, Vancomycin.
localized infection and septicemia, including the use of animal models for infection.²

*Staphylococcus aureus* has emerged as one of the main important human pathogens, and has over the past decades, been a leading cause of hospital and community-acquired infections. Staphylococcal infections give rise to a wide spectrum of symptoms and diseases in humans. The bacterium is well characterized and known to have a diverse arsenal of virulence factors that causes a prominent inflammatory response.³ This pathogen affects both immune competent and immuno compromised individuals, frequently resulting in high morbidity and with complications, which constitute problem to health care institutions. *S. aureus* has been reported by several studies as the causative agent of wide variety of diseases of supportive infections such as boil, wound infection, pustule, subcutaneous and sub-mucosa abscesses, osteomyelitis, mastitis, impetigo, septicemia, meningitis, bronchopneumonia, food poisoning, a common cause of vomiting, diarrhea, and urinary tract infections.⁵

*S. aureus* was discovered in 1880, its effective treatment was started in 1940, penicillin was the only drug used for treatment of the infections caused by this bacterium. After in late 1940 and throughout 1950, *S. aureus* developed resistance mechanism to penicillin. Introduction of Methicillin was done in 1961 to treat these resistant strains and within a year or later, clinicians had encountered methicillin-resistant *Staphylococcus aureus* which became a big threat. Now strains of MRSA are simultaneously resistant to a list of different groups of antibiotics, including vancomycin which is often considered our last line of antibacterial defence. Methicillin-resistant *Staphylococcus aureus* (MRSA) has been recognized as one of the major pathogens in both hospital and community settings.⁶

In 1961, British scientists discovered MRSA, the first case of this “superbug” in the United States occurred in 1968.⁷ MRSA is due to the acquisition of *mecA* gene that carried on a large mobile genetic element, the staphylococcal cassette chromosome, and which encodes a low affinity penicillin-binding protein 2a (PBP2a) to β-lactam antibiotics. The *mecC* gene when present, may also mediate methicillin resistance. The *mecA* complex also contains insertion sites for plasmids and transposons that facilitate acquisition of resistance to other antibiotics.⁸ Hospital acquired MRSA is frequently multidrug resistant. This limits the therapeutic options to a few antimicrobials, which are toxic, complicated to administer and expensive. As a consequence patients have to be hospitalized for a longer duration, treatment costs are increased and associated mortality also rises. This has a significant impact on individual patients and institutions. An additional concern of grave significance is the emergence of vancomycin intermediate *Staphylococcus aureus* (VISA) and more recently vancomycin resistant *Staphylococcus aureus* (VRSA).⁹,¹⁰

Hence this study was conducted to evaluate antibiotic susceptibility pattern of *Staphylococcus aureus* and to determine methicillin-resistant *Staphylococcus aureus* (MRSA) isolates from various clinical specimens.

**Materials and Method**

A total of 568 consecutive, clinically significant, non-repetitive clinical isolates of *Staphylococcus aureus* were isolated from various clinical specimens (pus, urine, wound swabs, sputum, ear swabs, body fluids, throat swabs, catheter tip, nasal swabs, blood) received in the Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, during the period of April 2014 to December 2017 were included in this study.

**Specimen collection:** The specimens were collected in sterile containers following aseptic measures and transported to the laboratory without delay and processed immediately. All the specimens were inoculated on 5% sheep blood agar and Mac Conkey’s agar and plates were incubated aerobically at 37°C.

**Identification of *Staphylococcus aureus*:** Colony morphology, Gram reaction, pigment production, catalase, and mannitol fermentation tests were performed and allocated to appropriate genera to the isolates. Golden yellow colored colonies on nutrient agar were noted and slide coagulase and tube coagulase was performed for differentiation of *S. aureus.*¹¹

**Identification of Methicillin-resistant *Staphylococcus aureus* by Cefoxitin disk diffusion method:** The MRSA strains were identified by using Cefoxitin (30μg) disc on Muller Hinton agar (Hi-Media Laboratories, Mumbai). Zone size was interpreted according to CLSI criteria, susceptible, >22 mm; resistant, <21 mm.¹²

**Identification of MRSA by Oxacillin broth dilution method:** MICs of oxacillin for all isolates showing reduced zone of inhibition by cefoxitin disk
diffusion were determined by broth microdilution method as described by Raghabendra Adhikari et al\textsuperscript{13} and CLSI guidelines\textsuperscript{14}. The concentrations of oxacillin used were 0.0125 µg/mL to 128 µg/mL.

**Antibiotic susceptibility:** Antibiotic sensitivity was tested using the Kirby-Bauer disc diffusion method (1966) on Mueller-Hinton agar according to antibiotic Clinical and Laboratory Standards Institute disc susceptibility testing guidelines(2013).\textsuperscript{14} Bacterial suspension equivalent to 0.5 McFarland was prepared by mixing 3-5 well isolated colonies in 3-4 ml of sterile physiological saline. Each suspension was inoculated on Muller Hinton agar (Hi-Media Laboratories, Mumbai) using sterile cotton swab and antibiotic disks were applied and incubated aerobically at 37°C. Antibiogram was determined for the following antibiotics Teicoplanin (30µg), Vancomycin (30µg), Gentamicin (50µg), Amikacin (30µg), Linezolid (30µg), Ciprofloxacin (10µg), Cefotaxime (30µg), Clindamycin (2µg), Cotrimaxazol (25µg), Erythromycin (15µg), Penicillin (10units), Tetracycline (30µg) (Hi-Media Laboratories, Mumbai).

**Results:** Out of 568 clinical isolates, 321 (56.5%) patients were from male and 247 (43.4%) were female. Majority of the patients were of age 41-50 (17.2%) as shown in (Table-1 and Table-2). Distributions of various clinical specimens were given in the (Table-3) of the 568 Staphylococcus aureus recovered, 366(64.4%) exhibited resistance by Cefoxitin disk diffusion method and 361(63.5%) were found to be MRSA by broth microdilution method and the cutoff value is 4µg/ml. Among them 127 had high level resistance with MIC of >128µg/ml. The MIC of Oxacillin for *S. aureus* isolates ranged from 0.064 µg/ml to 256 µg/ml.

*Staphylococcus aureus* was susceptible to vancomycin (94.7%), followed by teicoplanin (91.7%), linezolid (88.5%), amikacin (85.7%).

In case of MRSA all the isolates were 100% susceptible to vancomycin followed by teicoplanin (97.5%), amikacin (84.7%) linezolid (80.3%) and clindamycin (54.8%).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No.of isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>37</td>
<td>6.5%</td>
</tr>
<tr>
<td>11-20</td>
<td>69</td>
<td>12.1%</td>
</tr>
<tr>
<td>21-30</td>
<td>81</td>
<td>14.2%</td>
</tr>
<tr>
<td>31-40</td>
<td>98</td>
<td>17.2%</td>
</tr>
<tr>
<td>41-50</td>
<td>102</td>
<td>15.3%</td>
</tr>
<tr>
<td>51-60</td>
<td>87</td>
<td>13.7%</td>
</tr>
<tr>
<td>61-70</td>
<td>72</td>
<td>12.6%</td>
</tr>
<tr>
<td>71-80</td>
<td>19</td>
<td>3.3%</td>
</tr>
<tr>
<td>81-90</td>
<td>3</td>
<td>0.52%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>321</td>
<td>56.5%</td>
</tr>
<tr>
<td>Female</td>
<td>247</td>
<td>43.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical specimens</th>
<th>No. of S aureus (n=568).</th>
<th>No. of MRSA (n=361).</th>
<th>Percentage of MRSA (63.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sputum</td>
<td>174</td>
<td>113</td>
<td>64.9%</td>
</tr>
<tr>
<td>Urine</td>
<td>56</td>
<td>39</td>
<td>69.6%</td>
</tr>
<tr>
<td>Body fluids</td>
<td>19</td>
<td>11</td>
<td>57.8%</td>
</tr>
<tr>
<td>Wound swabs</td>
<td>150</td>
<td>92</td>
<td>61.3%</td>
</tr>
<tr>
<td>Nasal swabs</td>
<td>9</td>
<td>4</td>
<td>44.4%</td>
</tr>
<tr>
<td>Throat swabs</td>
<td>7</td>
<td>4</td>
<td>57.1%</td>
</tr>
<tr>
<td>Catheter tip</td>
<td>13</td>
<td>6</td>
<td>46.1%</td>
</tr>
<tr>
<td>Pus</td>
<td>94</td>
<td>68</td>
<td>72.3%</td>
</tr>
<tr>
<td>Ear swabs</td>
<td>5</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td>Blood</td>
<td>41</td>
<td>21</td>
<td>51.2%</td>
</tr>
</tbody>
</table>
Table 4: Antibiotic susceptibility pattern of Staphylococcus aureus and Methicillin-resistant Staphylococcus aureus

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Staphylococcus aureus (n=568)</th>
<th>MRSA by Oxacillin broth microdilution. (n=361)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Susceptibility</td>
<td>Percentage %</td>
</tr>
<tr>
<td>Vancomycin (30µg)</td>
<td>538</td>
<td>94.7%</td>
</tr>
<tr>
<td>Teicoplanin (30µg)</td>
<td>521</td>
<td>91.7%</td>
</tr>
<tr>
<td>Gentamycin (50µg)</td>
<td>421</td>
<td>74.1%</td>
</tr>
<tr>
<td>Amikacin (30µg)</td>
<td>487</td>
<td>85.7%</td>
</tr>
<tr>
<td>Linezolid (30µg)</td>
<td>503</td>
<td>88.5%</td>
</tr>
<tr>
<td>Ciprofloxacin (10µg)</td>
<td>326</td>
<td>57.3%</td>
</tr>
<tr>
<td>Cefotaxime (30µg)</td>
<td>321</td>
<td>56.5%</td>
</tr>
<tr>
<td>Clindamycin (2µg)</td>
<td>259</td>
<td>45.5%</td>
</tr>
<tr>
<td>Co-trimaxazole (25µg)</td>
<td>301</td>
<td>52.9%</td>
</tr>
<tr>
<td>Erythromycin (15µg)</td>
<td>261</td>
<td>45.9%</td>
</tr>
<tr>
<td>Penicillin (10 units)</td>
<td>162</td>
<td>28.5%</td>
</tr>
<tr>
<td>Tetracycline (30µg)</td>
<td>173</td>
<td>30.4%</td>
</tr>
</tbody>
</table>

Discussion

Staphylococcus aureus is one of the most infectious agents with high prevalence in various communities and healthcare institutions. MRSA is recognized as a major cause of nosocomial infections which result in significant morbidity and mortality rates. It is a very common cause of infection in hospitals and is most liable to infect newborn babies, surgical patients, old and malnourished persons and patients with diabetes and other chronic diseases. The important reservoirs of MRSA in hospitals are infected or colonised patients and transient carriage and hands of health care workers is the predominant mode for patient to patient transmission.\(^{15}\)

In our study prevalence of MRSA was found to be (63.5%), similarly such percentages have previously reported in studies from verma et al. (80.89\%), Suresh Jaiswal et al. (72\%),\(^ {17}\) Dr. S. Kulkarni et al. (70.3\%),\(^ {18}\) Tiwari et al. (69.1\%), Joshi S et al.\(^ {19}\) and Ali et al. (68\%),\(^ {20}\) Yadav et al. (66.84\%),\(^ {21}\) Shilp Arora et al. (59.3\%),\(^ {24}\) Chandrasekhar et al. (56.7\%),\(^ {23}\) Anupurba et al. (54.8\%),\(^ {22}\) Rijal. Ket al (51.6\%).\(^ {2}\)

MRSA strains were predominantly isolated from pus samples (72.3\%) which correlates with Yadav et al. (86\%),\(^ {21}\) Dr. S. Kulakarni et al. (64.67\%),\(^ {18}\) Bandaru S Rao et al. (64.38\%),\(^ {23}\) in contrast Ankur Kumar et al.\(^ {27}\) and Bilal Ahmed Mir et al.\(^ {28}\) reported (21.42\%) and (27.5\%).

Staphylococcus aureus was susceptible to Vancomycin (94.7\%), followed by Teicoplanin (91.7\%), Linezolid (88.5\%), Amikacin (85.7\%). All the MRSA isolates were 100% sensitive to Vancomycin in the present study. The sensitivity followed by Teicoplanin (97.5\%), Amikacin (84.7\%), Linezolid (80.3\%) and Clindamycin (54.8\%) correlates with Bhatt CP et al.\(^ {29}\), Gitau et al.\(^ {30}\), Ankur Kumar et al.\(^ {27}\) and Bandaru S Rao et al.\(^ {26}\)

Conclusion: MRSA is emerging as a potential threat to our hospitals with a predilection for critically ill patients. Regular surveillance of hospital acquired infections, promotion of infection control precautions and formulation of definite antibiotic policy can be helpful in preventing MRSA infections from acquiring an alarming proportion. Good basic hygiene measures are extremely important, not only for hospital staff but also for patients and visitors, and it has a positive impact in infection control.

Ethical Clearance: Taken from Sri Lakshminarayana Institute of Medical Sciences, Pondicherry. Institutional Ethics Committee (Human Studies) Ref.No. IEC/C-P/50/2014.

Source of Funding: Self.

Conflict of Interest: Nil.

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Occupational Exposure to Petroleum Workers by Assessing Urinary Methyl Hippuric Acid and Micronuclei in Oral Mucosa Cell

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Abstract

Xylene is an important component of petrol and 98% of Xylene is derived from the petroleum refining industries. When human get expose to xylene, which is one of the major genotoxicant, which may induce with a range of acute/chronic diseases but occurrence of cancer is still not available in literature. Taking into our mind that our study aims to investigate and correlate the micronuclei in exfoliated oral epithelial cells with urinary methylhippuric acid level estimation among petrol pump workers.

Aims & Objectives:

• To evaluate occupational exposure of xylene in petrol pump workers by assessing urinary methylhippuric acid level.

• To determine the correlation between the level of urinary methylhippuric acid and the micronuclei of exfoliated epithelial cells of buccal mucosa.

Materials and Method: Urine samples and oral buccal mucosa smears were collected from 30 healthy individual (control) and 30 petroleum pump workers (case) working in petroleum station. The urinary methylhippuric acid (MHA) level was analysed by using Shimadzu UV-Visible Spectrophotometer procedure. The smeared slides were stained with PAP stain and analyse the micronuclei of exfoliated epithelial cells by using Axio Vision SE64 Rel 4.9.1. Ink Software.

Results: The urinary Methylhippuric acid level was substantially higher in cases than in controls (p<0.001). The Micronuclei (MN) frequency was drastically increased in cases than in controls and was statistically highly significant (P<0.0001). The frequency of MN gradually increased along with increased urinary MHA level in petroleum pump workers.

Conclusion: The urinary MHA level and MN frequency is a useful index to recognize the occupational exposure to the petroleum product. Thus, our study emphasizes that appropriate precaution and regular bio-monitoring must be taken among petrol pump workers which shall help to reduce their potential levels of risk associated with the occupation.

Keywords: Xylene, Exfoliated buccal cells, Micronuclei, Occupational Exposure, Urine Methylhippuric acid level.

Introduction

Health is very precious and the work environment plays an important role in one’s health. Air, noise, heat, and radiation are the main source of environmental pollution especially in urban areas.¹

Millions of workers in a variety of occupational settings have the potential to be exposed to hazardous
substances, important among which are petroleum derivatives. Many toxicological effects may be associated with the exposure to petroleum component such as benzene, toluene, ethylene and xylene, which are also known as volatile organic compounds (VOCs). Petroleum derivatives constitute a complex mix of chemicals and are well known genotoxic agents especially xylene. Exposure to petroleum vapours is classified by the International Agency for Research on Cancer as Group-2A (‘probably’) carcinogen to humans, mainly on the basis of well-established carcinogenicity. The presence of xylene in petrol and as an industrial solvent can result in widespread emissions to the occupationally exposed petrol pump workers. Xylene is a colorless, flammable liquid that smells like gasoline. It is found in both natural products like coal tar and petroleum and also in manufactured products like inks, insecticides, and paints. Xylene is also used as a solvent to make other chemical compounds. People might be exposed to xylene in many ways including breathing air, particularly in areas near factories or petrol pumps.5

The mechanism(s) of xylene as a carcinogenic agent has not yet fully understood but the hypothesis of xylene acting as an indirect genotoxic carcinogen is well-documented in literatures. Cytogenetic damage, including structural aberrations, micronuclei (MN) and sister chromatid exchanges (SCEs), are demonstrated in bone marrow cells, splenocytes, peripheral blood lymphocytes and oral mucosal cells of mice exposed to benzene but not proven in humans. Among all the cytogenetic biomarkers, micronuclei have been extensively used to gauge rates of chromosomal damage to genotoxic agents.6

Exfoliated oral buccal cells have been used non-invasively to successfully show the genotoxic effects of various lifestyle factors, medical treatments and occupational exposure to potentially mutagenic and/or carcinogenic chemicals.

Methylhippuric acid is a principal metabolite of xylene and hence its level in urine can be used to monitor external exposure in petrol pump workers. Although xylene is present at low level in urine of exposed individuals, trying to find some sensitive methodology of direct determination of trace amount of this environmental and industrial pollutant can be a suitable alternative way to overcome the problems may associate with the determination of its metabolite (methyl hippuric acid) in urine.7

Petrol pump workers are chronically exposed to petroleum derivatives primarily through inhalation of the volatile fraction of petrol during vehicle refueling. Taking into our mind that occupational exposure to such derivatives may possess genotoxic risk. Hence our study aims to investigate and correlate the cellular changes in exfoliated oral epithelial cells using PAP stained oral smears with the UV-spectrophotometric urinary methylhippuric acid level estimation in petrol pump workers.

**Materials and Method**

The study population selected from various petrol pumps according to inclusion and exclusion criteria and control population were healthy individuals who were not exposed to petrochemical product.

**Inclusion criteria:**
- Persons giving their written consent to participate in the study.
- Male employees who is above 18 years of age, working in the Mysuru city limits.
- Workers who are working in shifts not less than 8 hrs.
- Workers should not have the habit of consuming any form of tobacco/alcohol.

**Exclusion criteria:**
- Person with history of any systemic condition or disease.
- Person with history of any chemotherapy/surgery/radiation therapy.
- Person having any lesions/ulcer/tumour/trauma in the oral cavity.

Urine samples were collected from 30 healthy individual and 30 petroleum pump workers working in petroleum station who are above 18 years of age. The urine was collected before exposure/work shift and after completion of a work shift. The urinary methylhippuric acid (MHA) level was analyzed by using Shimadzu UV-Visible Spectrophotometer procedure. (Fig.1)
Oral buccal mucosa smears were also collected from the same individuals and smeared slides were fixed in the alcohol and coded it. These smeared slides were stained with PAP stain and 100 cells were analyzed in zig-zag manner by using bright field microscope under 40X magnifications. So that, overlapping/same cells should not be taken for consideration. Cytomorphometric changes like micronuclei of exfoliated epithelial cells were studied by using Axio Vision SE64 Rel 4.9.1. Ink Software. (Fig. 2)

The following criteria for scoring micronuclei:

- Rounded, smooth perimeter suggestive of the membrane.
- Less than a third the diameter of the associated nucleus, but large enough to discern shape and colour.
- Staining intensity similar to that of a nucleus.
- Texture similar to that of a nucleus.
- The same focal plane as a nucleus.
- An absence of overlap with, or bridge to, nucleus.

The obtained data were collected and statistical analysis method were applied like descriptive statistics, one sample t-test, Pearson’s correlation.

Result

In the present study, the urinary MHA level was in cases 87.8 μg/ml and 30.8 μg/ml in controls was found as shown in Table I. The urinary MHA level was high in cases than the control population.

The correlation of urinary MHA level and micronuclei (MN) among cases, the p-value was 0.000 which was significant in Table-II. The urinary MHA level increase along with the increase in the number of micronuclei.

The comparison between urinary MHA level and micronuclei in cases and controls, the p-value was 0.000 which was highly significant as shown in Table III.

Table I: The Mean, SD value of Urinary MHA level in both cases and controls.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary MHA</td>
<td>Cases</td>
<td>87.8</td>
<td>29.18441</td>
</tr>
<tr>
<td>(μg/ml)</td>
<td>Controls</td>
<td>30.8</td>
<td>7.42038</td>
</tr>
</tbody>
</table>

Highly Significant

Table-II: Correlation between urinary MHA level and micronuclei (MN) in Cases.

<table>
<thead>
<tr>
<th></th>
<th>V1</th>
<th>V2</th>
<th>Pearson Correlation</th>
<th>N</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary MHA (μg/ml)</td>
<td>MN**</td>
<td>.808**</td>
<td>30</td>
<td>.000</td>
<td></td>
<td>Significant</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

Table-III: Correlation between urinary MHA level and micronuclei (MN) in Cases and Controls.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>V1</th>
<th>V2</th>
<th>Pearson Correlation</th>
<th>P value</th>
<th>Inference</th>
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<tbody>
<tr>
<td>Case</td>
<td>30</td>
<td>Urinary MHA</td>
<td>MN**</td>
<td>.808**</td>
<td>.000</td>
<td>Highly significant</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>Urinary MHA</td>
<td>MN**</td>
<td>.662**</td>
<td>.000</td>
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</table>
Discussion

Xylene is an important component of petrol and a widely distributed environmental contaminant. About 98% of Xylene is derived from the petrochemical and petroleum refining industries. Petrol station attendants are chronically exposed to petroleum derivatives primarily through inhalation of the volatile fraction of petrol during vehicle refuelling. Therefore occupational exposure to xylene in humans generally takes place in factories, refineries; petrol refuelling and other industrial settings. When humans get exposed to one of the major genotoxicants like xylene have been associated with a range of acute/chronic diseases/cancer depending upon the concentration and time of exposure.

Methylhippuric acid is a principal metabolite of xylene and hence its level in urine can be used to monitor external exposure in petrol pump workers. Based on this, our study attempted to investigate any correlation between cellular changes in exfoliated buccal epithelial cells that were obtained and the urinary MHA level among petroleum pump worker.

The present study consisted of 30 petroleum pump workers (case group) and 30 healthy individuals with no known exposure to petrochemical products (control group) all of the above 18 yr old male population. All the subjects who met the inclusion and exclusion criteria were subjected to a pair of oral buccal smear sampling and collection of the urine sample for estimation of MHA levels. The oral buccal smears were stained with Rapid PAP stain to assess the micronuclei of exfoliated cells and the estimation of urinary MHA level was done using UV-spectrophotometer.

In our study, the urinary MHA level was found to be more in case population (87.8 μg/ml) than control population (30.8 μg/ml). Our study is in accordance with studies by Celik A et al. (2003), Singaraju et al. (2012), Koschisoruret al. (2000), Vermaet al. (2001), Hein et al. (1989), were also reported that the urinary MHA level in petrol station workers was significantly higher than controls. Engstrom K et al. (1978) who reported that a determination of methylhippuric acid concentration in urine samples was found to be high at the end of the workday for evaluating the xylene exposure. Thus our study found that occupational exposure to xylene is associated with increased MHA level in urine.

The analysis of micronuclei (MN) has gained popularity as biomarker assay for human genotoxic exposure and effect of xylene. Hence, we analysed the micronuclei along with urinary MHA level in both case and control group. In our study, the urinary MHA level and micronuclei (MN) showed highly significant in the case group than control group.

In our study, we try to identify the relation between urinary MHA level and micronuclei frequency in epithelial cells. The frequency of MN gradually increased with increased urinary MHA level in petroleum pump workers. Hence, the micronucleus test in exfoliated epithelial cells and the urinary MHA levels in urine seem to be a useful biomarker of occupational exposure to xylene.

As demonstrated in this study, MN frequency is a useful tool to identify the level of petroleum product, but we could not able assess the relationship between urinary MHA level and cytormorphometric analysis of epithelial cells among petrol pump workers. The urinary MHA level and MN frequency is a useful index to recognise the occupational exposure to a petroleum product. Further studies may require knowing the effect of the xylene over the oral epithelial cells with a time of exposure in the larger population. Molecular studies are required to identify the effect of the xylene over the oral epithelial cells in a larger population.

Xylene has a significant role in humans, and act as carcinogenic agent, it may initiate the carcinogenic process often to do damaging the cellular DNA. Thus our study emphasises that appropriate precaution and regular bio-monitoring must be taken among petrol pump workers about their health which may reduce their levels of risk associated with the occupation.

Conclusion

The hazards of xylene are well documented, but the substitutes are not so thoroughly evaluated. It may not be good to get expose to petroleum product on daily basis to larger the volume. One must be aware these petroleum products are the main pollutant that is responsible for the genotoxic effect. The result obtained
in this study suggests that exposure in these workplaces may induce genotoxic effects. It is important to control and reduce the exposure to petroleum products as much as possible and it is necessary to educate the petrol pump workers about its hazardous effect to ensure the safety and healthy working atmosphere for the petrol pump workers. Hence, the petrol pump worker should use a proper personal protective equipment like protective clothes (Buna-N-Rubber or Vilton gloves), impervious apron, face mask or full-face organic respirator, safety goggles, organic inhaler etc. so that they can prevent the hazardous effect of xylene on individual health.

**Source of Support:** JSS Academy of Higher Education & Research

**Ethical Clearance:** Taken and approved by the ethical committee of JSS dental college and hospital, Mysuru.

**Conflict of Interest:** Nil

**References**


Strategical Career Planning to Combat Career Plateau

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Abstract

A career planning is the route map of a person’s work life. It is the sequence of positions a person occupies during his lifetime. Earlier it was based upon the advancement and promotion of an individual in an organisation but in recent scenario it is defined in a holistic way to include a person’s attitude and experience based on this approach and extensive research conducted. It has been identified that a person goes through four different career stages during his adult growth and development. Plateau is a stage where an employee get stagnated at a position for a long time with no opportunities for growth in career. Planning the career in right way will avoid the career plateau for any employee.

Keywords: Career planning, career stages, learner, solid citizen’s deadwood.

Introduction

Career planning involves setting career objectives by assessing one’s capabilities, values and goals followed by examining alternative career options. Making a choice and planning how to progress in chosen career path. Career planning process involves identifying the individual needs and aspirations, the second step is analyzing career opportunities, third step is to align the individual needs and opportunities and the final step is related to action planning and periodic review.¹

Career Planning: The career is defined as the sequence of jobs that constitute what a person does for a living. It involves setting career objectives by assessing one’s capabilities, values and goals followed by examining alternative career options making a choice and planning how to progress in chosen career path.² A career plan is an individual’s choice of occupation and career path.

Features of Career Planning:

- Attracting talented person to the organisation.
- Identifying the person’s positive characteristics.
- Developing healthy way to deal with conflicts, emotions and stress.

Stages Incareer Planning:

Establishment stage: (Age 20 to 26) in this stage when an individual is not sure about his competence and potential they depend upon their subordinate for guidance support and feedback. At this situation they commit themselves to a specific career, organisation and job. Gradually they explore themselves and their capabilities.

Advancement stage: (Age 26 to 40) in this stage employees become independent contributors and are forced on achieving and moving up in their career. At this stage they need very little guidance: moreover they have a clear view of what they want to do in their career. At this phase they settle down in their career and so it termed as settling down stage.

Maintenance stage: (Age 40 to 60) in this stage the individual holds on to the career due to the success which he experienced in his stay. During this phase many people have achieved advancement whereas it could be conflictual and depressing for those who are dissatisfied in their career progress. Such types of employees try to find out alternate careers and there arises career plateau. In olden days career plateau raised maximum during this...
phase only but in recent times due to industrialization and globalization sometimes career plateau arises in the advanced stage itself.

**Withdrawal Stage:** (Age 60 and above) in this stage individuals want to leave their career. At this stage the individual slowly loses all attachment to the organisation and gets ready for retirement. Such people contribute by imparting knowledge and skill to others. The people who have found success in their career feel satisfied and fulfilled.

**Benefits of Career Planning:** The most relying beneficial factor is that it creates the path to avoid the career plateau.

**Important benefits**
- Laborturnover is reduced.
- Ensures constant supply of promotable employees.
- Creates reserve talent to meet any emergency.
- Improves the loyalty of the employees.
- Organisational growth and development is encouraged.
- Discourages the supervisors who suppress growth of subordinates.

**Career plateau:** Career plateau is defined as a point in one’s career where their likelihood of additional hierarchical upward mobility i.e. promotion is very low. There are four main principal career states they are.

**Learner:** Individuals who have high potentials less than the standard level.

**Stars:** Individual who perform outstanding work and are having high potential with fast track career paths.

**Solid citizens:** Individuals present performance is outstanding and has a little chance of future advancement.

**Deadwood:** individuals have a little potential for advancement and also their performance is not up to the level satisfaction.

**Career plateau has both subjective and objective aspects:** A subjective aspect includes self-perceptions, assessment and reaction towards present work situation.

An objective aspect includes observation and analyse the facts that are observed.

**Factors determining career plateau**

The following factors determine the career plateau stage of an employee

- Lack of intrinsic motivation
- Perception of individual
- Familial factors
- Locus of control
- Perseverance of work
- Lack of individual skill and ability
- Lack of organization’s innovative climate
- Business strategy
- Individual needs and values
- Slow organizational growth
- Lack of extrinsic rewards

The behaviour of each individual is influenced by several factors; these are classified as environmental, personal, organizational, psychological factors. Individual behaviour forms the basis of organizational behavior. Perception is an important factor influencing behaviour and as a process it involves steps such as receiving, selecting, organizing, interpreting, checking and reacting. Perception is influenced by the factors such as perceiver perceived and situation. Learning is yet another variable in human behaviour. Knowledge of learning is vital for understanding organizational behaviour. There are various sources of acquiring attitudes and in organisations there are work related attitudes.

**Environmental factors:** An environmental factor includes variables such as economic, social and political. These factors are mainly external and will influence individual behaviour. It is a synthesis of several factors such as employment level, wage rates, economic outlook and technological change.

**Personal factors:** Every individual brings to the workplace a variety of personal characteristics and attributes like age, sex, education dependents, abilities and similar related factors.

**Organizational system and remarks:** individual behaviour is also influenced by physical facilities. Organizational structure and design leadership and reward system.
Psychological factors: psychological factors are individual mental characteristics and attributes that can affect behaviour. There are several psychological factors but the more prominent among them are personality, perception, attitudes, values, and learning.

Career plateau relates to significant variance in three outcomes: career satisfaction, job satisfaction, and turnover intentions. All these three are interrelated with one another. The study of individual behaviour forms the basis of career plateau. Perception is a factor which influences the behaviour of individuals. Perception is the unique interpretation of a situation by an individual. Perception is composed of six processes: receiving, selecting, organizing, interpreting, checking, and reacting to sensory stimuli or data. These processes are influenced by the perceiver and situation.

Career satisfaction: Career satisfaction is a set of pleasurable feelings with which employees view their work. It is also referred to as a positive emotional attitude resulting from the evaluation of one’s job or job experience.

Job satisfaction: There are many factors which lead to job satisfaction, the most important job elements which contribute to job satisfaction. These are: wage structure, nature of work, promotion chances, quality of supervision, work groups, and working condition.

Turnover intentions: If an employee experiences career satisfaction and job satisfaction in his profession, automatically turnover intention gets vanished.

Professional plateau: Every individual will face the stagnating career in their duration of life. Stagnating career of professionals is an unavoidable phenomenon in organizational setting. Stagnation of an individual arises due to the lack of proactive planning. A career plateau from the organization’s points arises due to new business strategy and organizational restructuring.

Stagnation in the new business strategy or in the organizational restructuring are characterized into:

- When the employee’s competencies could not meet the requirements of the new organizational strategy.
- When the employees skill lacks against the market opportunities.
- When the employees possess outdated knowledge.
- When the professionals expertise becomes unimportant for the company anymore.
- When the employees face discrepancy between the effort and remuneration received by them.

These five categories are the important causes for the stagnation of an employee. Flexibility programmer and development plan should be designed to increase the professional’s career. Specific intervention should be designed in order to develop the organization. In an organizational process fleet review which is meant as a structural intervention is used to trace current position and to prevent future stagnation.

Plateaued professionals become aware of their own responsibility in managing their development in the changing business context. An explicit and focused collaborative effort can be of great importance in making plateaued professionals flexible and prevent a lot regarding personal damage and organizational damage related to career plateauing.

Conclusion

Career planning in an organisation encourages the employees towards having ambitions and working towards fulfilling them. Career planning involves setting career objectives by assessing one’s capabilities, values and goals followed by examining alternative career options making a choice and planning in accordance to it will definitely bring success in every employee’s life. Factors that are determining career plateau should be taken care while planning for career development so that the plateau can be avoided in one’s career.

Ethical Clearance: Nil (permission granted to send for publication by the bharath university research committee)

Source of Funding: Self

Conflict of Interest: Nil

References


Knowledge and Practice on Current Regulatory Requirements for Members of Ethics Committee amongst Dental Colleges in India

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Abstract

Introduction: Regulatory guidelines have been made stringent to safeguard human rights, integrity, safety and welfare.

Aim and Objective: The present study was designed to elucidate the knowledge and practice of current regulatory requirements for the members of ethics committee (EC), amongst dental colleges in India.

Materials and Method: A cross sectional survey was conducted amongst the ethics committee members of various post graduate dental colleges representing North, South, East, West and Central zones. A validated closed questionnaire was framed in accordance with the Schedule Y of Drugs and Cosmetic Rules 1945 and Indian-GCP guidelines, which was sent through an e-survey using Google forms.

Results: The response rate was found to be 40%. Less than 50% participants correctly answered about guidelines of biomedical research, composition of EC, serious adverse effect and vulnerable population. 16.3% of the participants had registered EC and only 28.7% applied universal ethical principles.

Conclusion: Despite the presence of ethics committee in the dental institute, the knowledge and practice regarding current regulatory requirements was found to be insufficient for proper functioning.

Keywords: Ethics, current regulatory requirements, dental colleges.

Introduction

Due to an enormous rise in research on human subjects in dental teaching institutions today, it is important for ethics committee members to address the ethical concerns of the subjects involved in the research. According to Indian Council of Medical Research (ICMR) it is compulsory for any biomedical research to be approved by the Institutional Ethics Committee (IEC)/Institutional Review Board (IRB), before its initiation. This is supported by the revised Schedule Y in Amendment 2005 of the Drugs and Cosmetics Act, 1940.¹ According to this Act, all the institutions undertaking research should have their IEC accredited to a central agency.²

The horizons of dental research are widening with time but individual and institutional research ethics capabilities are not improving in the required and ideal proportion.³ ICMR and the World Health Organization (WHO) conducted a survey on 223 IEC in India which shows that maximum committees did not meet regulatory requirements in terms of composition and function. Recently a survey was conducted to assess the existence, structure and functioning of IEC in dental teaching institution in Kerala found that out of 17 colleges, 13 had a functioning IEC and only 4 colleges were accredited to a central agency.⁴

Regulatory guidelines have been made stringent to safeguard human rights, integrity, safety and welfare.⁵

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Also, there is an insufficient interaction between researchers’ and ethics committee members leading to misconduct in implementing ethical guidelines. It is imperative that ethics committee members should have the requisite knowledge on current regulatory requirements which is in accordance with Schedule Y of Drugs and Cosmetics Act. The present study was designed to elucidate the knowledge and practice on current regulatory requirements for members of ethics committee amongst dental colleges in India.

**Materials and Method**

The study was approved by the institutional review committee of Dr. D.Y. Patil Vidyapeeth, Pune, India.

**Study setting:** A cross sectional questionnaire-based study was conducted amongst the ethics committee members of various post graduate dental colleges representing North, South, East, West and Central zones through an e-survey using Google forms between September to December 2017.

**Study population and sampling technique:** State wise list of post graduate dental colleges was obtained from the Dental Council of India (DCI) website. A list of the email addresses of ethics committee members was collected through convenience sampling. Sample size was calculated using EpiInfo software based on results from Deolia S where knowledge was 43.3%. The final sample size was 300 and e-mails were sent to 750 members through google form.

**Study tools and Data collection:** The 18-item closed questionnaire was framed in accordance with Schedule Y of Drugs and Cosmetic Rules 1945 and Indian-GCP guidelines. Lawshe’s method was used for content validity using judgments from a panel of 10 subject matter experts (SMEs). The reliability was also established by test–retest amongst 20 volunteers of similar population. The kappa value was 0.9, which indicated high reliability. This was followed by pilot testing amongst 10 volunteers who were asked to answer the questionnaire and provide feedback on content, clarity and brevity of the questionnaire.

Check boxes were provided and participants had to click on any one option for each question. Care was taken that one person could answer the questionnaire only once and all questions were mandatory. The responses were directly recorded through google forms. Since this was an e-survey, the informed consent was included in the Google form.

**Statistical analysis:** The online recorded information was converted into codes and analyzed using Statistical Package for Social Sciences (SPSS) Version 20 software package (SPSS inc., IBM, and Chicago, IL, USA). Analysis was done using descriptive statistics and expressed in the form of frequency and percentages.

**Results**

Out of 750 EC members, 300 responded giving a response rate of 40%. 37% of the participants belonged to South zone. Only 38.6% of the participants received training in research ethics. Table 1 presents the characteristics of the study participants.

Nearly 64% had adequate knowledge about informed consent, but only 14.7% knew about the continuing review of an approved protocol. 46.3% of EC members were aware of the ICMR guidelines on ethics for research and only 11.3% of the participants knew about the current regulatory requirements. Table 2 presents the responses to questions on their knowledge.

Only 16.3% of the participants had registered ethics committee and 39.3% of the participants would review all research studies at least annually. Less than 50% of the participants maintained confidentiality and applied universal ethical principles while reviewing a protocol. Table 3 shows the EC members responses regarding their practice.

A statistically significant association \[p<0.001\] was found between training received in research ethics and number of years of experience in ethics committee with knowledge.

A statistically significant association \[p<0.001\] was found between the training received in research ethics and the number of years of experience in ethics committee with practice.
Table 1: Demographic Details

<table>
<thead>
<tr>
<th>Demographic Details</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Responses</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td>1. Zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>43</td>
<td>14.3%</td>
</tr>
<tr>
<td>South</td>
<td>111</td>
<td>37%</td>
</tr>
<tr>
<td>East</td>
<td>34</td>
<td>11.3%</td>
</tr>
<tr>
<td>West</td>
<td>66</td>
<td>22%</td>
</tr>
<tr>
<td>Central</td>
<td>46</td>
<td>15.4%</td>
</tr>
<tr>
<td>2. Number of Years of experience in ethics committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 2 years</td>
<td>106</td>
<td>35.3%</td>
</tr>
<tr>
<td>3–5 years</td>
<td>68</td>
<td>22.7%</td>
</tr>
<tr>
<td>6–10 years</td>
<td>96</td>
<td>32%</td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>30</td>
<td>10%</td>
</tr>
<tr>
<td>3. Role you are playing as ethics committee member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chairperson</td>
<td>39</td>
<td>13%</td>
</tr>
<tr>
<td>Member Secretary</td>
<td>36</td>
<td>12%</td>
</tr>
<tr>
<td>Basic Medical Scientist</td>
<td>13</td>
<td>4.3%</td>
</tr>
<tr>
<td>Clinician</td>
<td>161</td>
<td>53.6%</td>
</tr>
<tr>
<td>Legal Expert</td>
<td>14</td>
<td>4.6%</td>
</tr>
<tr>
<td>Social Scientist/Representative of NGO</td>
<td>5</td>
<td>1.6%</td>
</tr>
<tr>
<td>Philosopher/Ethicist/Theologist</td>
<td>16</td>
<td>5.3%</td>
</tr>
<tr>
<td>Lay Person</td>
<td>20</td>
<td>5.6%</td>
</tr>
<tr>
<td>4. Have you received any training in research ethics?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>116</td>
<td>38.6%</td>
</tr>
<tr>
<td>No</td>
<td>184</td>
<td>61.4%</td>
</tr>
</tbody>
</table>

Table 2: Knowledge Regarding Current Regulatory Requirements

<table>
<thead>
<tr>
<th>Questions</th>
<th>No. of Participants</th>
<th>Total Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Guidelines of biomedical research on human subjects should be governed by-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICMR Guidelines</td>
<td>139</td>
<td>46.3</td>
</tr>
<tr>
<td>2. Ideally how many members should an ethics committee have</td>
<td>84</td>
<td>28</td>
</tr>
<tr>
<td>8–12 members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. As per ICMR Guidelines (2006) the final decision on each proposal discussed in the meeting shall be made-</td>
<td>98</td>
<td>32.6</td>
</tr>
<tr>
<td>Broad consensus of ethics committee members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Research study proposals that can be exempted from ethics committee review for-</td>
<td>121</td>
<td>40.3</td>
</tr>
<tr>
<td>Less than minimal risk to participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. After closure of regulatory clinical trial, files at EC Secretariat are-</td>
<td>62</td>
<td>20.6</td>
</tr>
<tr>
<td>Archived separately for 5 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Continuing review of an approved protocol by EC must-</td>
<td>44</td>
<td>14.7</td>
</tr>
<tr>
<td>Occur at least annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ethics committee should forward report on serious adverse effect related to clinical trial to Drug Controller General of India within</td>
<td>34</td>
<td>11.3</td>
</tr>
<tr>
<td>30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. What should be done to obtain informed consent from a literate participant who cannot understand English</td>
<td>192</td>
<td>64</td>
</tr>
<tr>
<td>The participant should be given a consent form written in his/her language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Informed consent for clinical trials involving vulnerable population should be in the form of-</td>
<td>82</td>
<td>27.3</td>
</tr>
<tr>
<td>Audio visual recording</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Practice Regarding Current Regulatory Requirements

<table>
<thead>
<tr>
<th>Questions</th>
<th>No. of Participants</th>
<th>Total Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Have you registered your ethics committee?</td>
<td>49</td>
<td>16.3</td>
</tr>
<tr>
<td>2 Is the chairperson of your ethics committee from the same institution?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 You must review all research studies, at least annually, in order to-</td>
<td>118</td>
<td>39.3</td>
</tr>
<tr>
<td>Protect the rights and welfare of participants in research studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Waiver of consent is approved by your EC when-</td>
<td>98</td>
<td>32.7</td>
</tr>
<tr>
<td>Study is only on left over biological material which is anonymized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Full review is undertaken in presence of-</td>
<td>70</td>
<td>23.3</td>
</tr>
<tr>
<td>Entire committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Does your institutional ethics committee invite non-members in special area when needed?</td>
<td>102</td>
<td>34</td>
</tr>
<tr>
<td>7 Which universal ethical principles are applied in your institution while reviewing a protocol?</td>
<td>86</td>
<td>28.7</td>
</tr>
<tr>
<td>Autonomy, beneficence, non–maleficence and justice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 In case of minors, assent can be taken from the age of-</td>
<td>112</td>
<td>37.3</td>
</tr>
<tr>
<td>7 years up to 18 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 How do you maintain patient’s confidentiality during medical research?</td>
<td>98</td>
<td>32.7</td>
</tr>
<tr>
<td>Patients research files should be coded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

India is considered as an ideal, cost-effective location for undertaking clinical trials and for meeting international regulatory requirements. Ethics committee members are responsible for the safety of research participants. In India, institutional mechanisms for ethical review of research involving human subjects are weak and vulnerable, collaborative effort is required to strengthen them to fulfill their stated missions. Due to an inherent need for strengthening the ECs, ICMR has started promoting the establishment of ECs and providing training modules for EC members and researchers in ethics. In our survey, we included only post graduate institutions because there is an enormous increase in the number of research projects carried out in these institutions. In addition, numerous independent studies are also undertaken by the faculty as a part of professional enrichment. We had a response rate of 40% which was better than (24.8%) reported by Mirzae A.

A study found that only 23.5% of IECs were accredited to Central Drugs Standards Control Organization (CDSCO), 91.6% had more than one dentist as clinicians. The results of the present study also indicate that only 16.3% of the EC are registered and 46.3% of the respondents had MDS degree which suggests that findings in this study are not necessarily generalizable because sometimes dental institutions have sub-committee which function at college level.

In a study conducted to check the competence of ethics committees, a survey questionnaire was developed and sent to 20 EC representing various parts of the state. 83% said that the decision to approve/reject the protocol was taken during the meeting with all members participating in the final decision making and 93% of the members said that periodic ethics review of ongoing trials was conducted. The results obtained in our study are in contrast where only 32.6% of the members were aware about the ICMR guidelines on final decision making and 14.7% of the members knew that continuing review of an approved protocol should be done at least annually.

A survey found that only 23.5% of IECs were accredited to Central Drugs Standards Control Organization (CDSCO), 91.6% had more than one dentist as clinicians. The results of the present study also indicate that only 16.3% of the EC are registered and 46.3% of the respondents had MDS degree which suggests that findings in this study are not necessarily generalizable because sometimes dental institutions have sub-committee which function at college level.
whereas the university have IEC/IRB which is probably registered with CDSCO.

The present study sheds light on the fact that only 34% of the members invited expert in special area similar to a study done in compliance with Schedule Y/ICMR Guidelines 2006 where legal experts were not present in approval meetings. It was observed that in most institutes, the chairperson was affiliated to the same institution like in the present study. 39.3% of the respondents said that the chairperson was from the same institution which could potentially induce a conflict of interest while reviewing the proposals.

Members who had received training in ethics showed adequate knowledge and good practice, which was similar to this study showing that training is significantly (p<0.001) associated with knowledge and practice of the EC members. The overall knowledge regarding various regulatory requirements was found to be discouraging amongst EC members in this study justifying the requirement for compulsory training and upgradation in knowledge.

In a study, it was observed that higher qualifications (p=0.004), those with more than 20 years of research experience (0.023) and those with more experience of working with ECs (p=0.032) were more likely to attend meeting. Results obtained in this study, showed the number of years of experience in ethics is significantly associated with knowledge and practice.

Practice of the EC members might not have been evaluated appropriately because some of the questions were not based on individual decisions rather policies made by institutions. However, this survey from dental colleges in India is an effort to capture the existing level of knowledge of EC members about current regulatory requirements, which can be validated further by undertaking a larger study across India in the near future. This study highlights the need for mandatory training for EC members in the form of workshops and lectures to keep abreast with the current regulatory requirements and appropriate institutional support to IEC for proper functioning.

**Conclusion**

Despite the presence of ethics committee in the dental institute, the knowledge and practice regarding current regulatory requirements was found to be insufficient for proper functioning. This study was attempted to bring awareness amongst members of EC to follow ethically high standards that will help in safeguarding and protecting the health and welfare of the research participants in particular and the nation as a whole.

**Conflict of Interest:** No

**Source of Funding:** No

**References**

6. Available at http://www.dciindia.org.in/.[Last accessed on 30th Oct 2017, 2.15pm]


Forcing Gender Issues and Challenges Affecting Women Employees to Continue their Career in IT Industry

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Abstract

Despite the major advancements women have made in becoming a significant part of the workforce, they are still facing important career development issues. Although many women achieve lower and middle management positions, they seem to hit the “glass ceiling” in many organizations and are denied the most senior levels of upper management. The reasons are multi-dimensional; some women lack the confidence to apply for senior positions; some lack the necessary education or training; and others find themselves excluded from the top positions because of systemic gender bias that exists in some companies. There are plenty of statistics tracking the percentage of women in the workforce, their qualifications and their salaries. But the data doesn’t show us the whole picture. It doesn’t assess how women feel, how they fare in their day-to-day business, the challenges they encounter. And that is why the research embarked on a global task, asking more than 9,500 women across the G20 to identify the top five issues faced at work especially in IT industry.

Keywords: Women Retention, Issues and Challenges, Career Advancement, Gender Discrimination, Strategies to Overcome.

Introduction

Despite progress in employment gender equality, men continue to substantially outnumber women in terms of employment in the tech industry. Many analysts attribute the gender disparity in technical fields to the fact that women study science, technology, engineering and mathematics (STEM) at a lower rate than men do. Some experts suggest that cultural expectations also influence the gender divide causing women to feel pressured to pursue careers in other industries1.

Regardless of having equal or superior skills to their male counterparts, women often feel like societal pressure and cultural norms work against them while seeking employment and advancement in tech careers. Many companies have taken a proactive approach toward gender bias in tech employment by adopting inclusive and collaborative policies that mandate equal treatment for men and women. However, the following three challenges still exist in many settings, but women in IT can overcome them as they pursue a fulfilling and successful career.

Inequality and Discrimination: Statistics indicate that women working in IT positions report gender inequality at a higher rate than the overall average among employed women. Networking opportunities and promotions go to men in tech careers at a higher rate than to women2. Company events and trade gatherings often provide settings where male tech workers exhibit sexist attitudes and behaviours toward their female colleagues. Meanwhile, employees in the work environment often question whether a woman has the ability to address and resolve technical issues.

Gender discrimination, though illegal, still exists in the job market. Interviewers ask questions about marital and parental status to three-quarters of female applicants. Even when not directly quizzed about their family status, a stunning forty-percent of all women feel like they must carefully guard details about their family during job interviews. When women (or any employee) feel like outsiders in the workplace because of their unique qualities or differences (e.g., gender, race/ethnicity, nationality, age, religion, sexual orientation), they feel excluded. Exclusion comes at a great cost to
organizations in the form of lowered job satisfaction, reduced work effort, diminished employee voice, and greater intention to leave. Building an inclusive workplace means creating a culture that fully engages and supports all employees.

Women who experience discrimination and inequality in the workplace should talk about the issue openly and report it to their supervisor. The company’s responsibility will, then, be to address the issue properly. To prevent such situations from occurring again, business owners need to educate their personnel about gender discrimination and teach them how to recognize and deal with it.

Moreover, business owners and managers who have a healthy attitude toward women in the workplace should set an example for the entire company by behaving in ways that respect all workers and treat everyone working in IT fairly, regardless of gender. Such behavior will also respectfully treat all employees that become mothers and make them feel comfortable and secure while taking leave. Similarly, employers need to adopt flexible scheduling so working mothers don’t feel as though they must neglect their responsibilities to keep their job.

**Not Fitting in:** Women in male-dominated fields such as IT often lack self-confidence and suffer from feelings of inferiority. In a workplace where the great majority of employees are male, women often feel as though they don’t fit in. A drastic number of approximately 60 percent of women working in tech report sexual harassment. Although such problems can exist in fields with a higher degree of gender equality, the problem seems worse in IT. Female tech workers have a higher incidence of sexual harassment in IT because fewer targets exist in that profession. The fact that one-third of women IT workers feel unsafe at work illustrates the severity of the problem. This is a serious issue and women should never hesitate to report it to their supervisors.

Additionally, not having a college degree in engineering or computer science can also lead to a workplace atmosphere where women feel as though they don’t fit in. Some women can also experience difficulty staying up-to-date with the latest trends in technology, leading to a skill gap that adds to the challenges they face. Still, women can do IT jobs just as well as men can, as long as they make an effort to develop and maintain their proficiency in required skills.

Lucky enough, the IT industry usually operates as a meritocracy where employees who deliver consistent results receive favorable treatment regardless of their gender or background. Women can overcome the obstacles they face while working in IT by letting their performance speak for them. Although the strategy doesn’t eradicate gender-based prejudice and discrimination, it allows women to achieve upward mobility.

**Lack of Support and Understanding:** Female IT employees often report feeling as though they don’t have the full support of their co-workers. They also feel a lack of support at home in cases where their family members and friends still embrace cultural biases regarding women in the workforce. Attitudes about the role of women at home often prevent female IT workers from achieving a healthy work-life balance. Also, new mothers often cut short their paid maternity leave because they feel as though they will lose their job or promotion because of their absence.

Handling inequality and discrimination in the workplace is hard on its own, but handling it without any support for the chosen career makes things even harder. Working on improving the quality of family communication can go a long way in making sure that every female IT worker’s family member understands that their job in the IT industry is important to them.

**Flexible Work Arrangements and equal pay:** Flexible work arrangements (FWAs) define how, where, and when employees’ work, allowing them to best manage their career and personal priorities. Once seen as an employee benefit or an accommodation for caregivers (primarily women), flexible work arrangements are now an effective tool for organizations to attract top talent as well as a cost-savings measure to reduce turnover, productivity, and absenteeism.

**Equal Pay-it’s 2018, and women still make less than men.** Women around the world continue to face a wage gap. In fact, women on average will need to work more than 70 additional days each year just to catch up to the earnings of men. Our research shows that even after taking into account prior experience, time since degree, job level, industry, and global region, women MBA graduates were paid $4,600 less than men in their first job after graduation.

**Children and career:** Almost half of the women polled are optimistic about the prospects of having a
child and a career. Women in emerging countries led by Brazil—where maternity laws are generous and family ties are close—are the most confident. By contrast, women in some of the richest countries—Germany, the UK and France—are least confident and feel having a family might wreck their careers.

According to the Denver Women’s Commission, even though most women work outside the home, they are still the primary caregivers for their young children as well as elderly or infirm relatives. Consequently, many women can only pursue their careers on a part-time basis, resulting in fewer promotion opportunities. Unlike their male colleagues, women consider the ages of their children and the amount of time they have available before they decide to pursue a career path.

**What Else Can Be Done?**

IT companies need to recognize and admit to the problem of gender inequality in their IT workforce. They need to diligently transform their corporate culture into one that respects all employees, regardless of gender, and make discrimination and harassment socially unacceptable.

Employers need to create and enforce policies that protect women when they become victims of sexual harassment and discrimination. However, they also need to go beyond forced compliance to fully eliminate gender-related IT employment issues.

Technology exists for men and women and so does IT employment. As companies and families work to erase gender-based prejudices, more women will aspire a career in the tech industry. Girls need positive male and female role models so that they will never consider their gender as a negative attribute.

**Conclusion**

Women can overcome gender-based challenges in IT right now by focusing on their skills and staying current with industry trends. Still, cultural norms need to change in employment, family and educational settings to permanently eliminate the problem of gender discrimination, so every woman can feel confident, supported and safe as they pursue their dreams. As an atmosphere of equality permeates the workplace culture, women will feel confident because they know their skills and performance determines their success rather than their gender and college degree.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Emerging Trends of IT Industry Policies for Ensuring Women Employee Retention

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Abstract

Today, behaviour of women employees has changed the environment of the private organization. Young women employees always ready to switch over whenever she dissatisfy with any reason in the job. Retention strategy is a powerful recruitment tool. Private organizational issues matters as lost knowledge and training time. HR managers should identify the needs of the women employee and then devises the retention strategies. As different individuals have different priorities does not fit one strategy. HR professionals face the vital challenge to retain talented women employees. Retention strategies are fall into four categories- job enrichment, salary, working conditions and education, addressing these issues this article demands a specialized approach that emerge new fangled women friendly policies which foster gender neutral workplace in developing retention strategies.

Keywords: Retention strategies for female employees, scope, trends and policies.

Introduction

“New-Fangled Women Friendly Policies which Foster Gender Neutral Workplace”

The fast developing knowledge economy coupled with the information technology during the last two decades has totally changed the complexion of our business and employment relations. The globalized economy and the labour market have further added new dimensions to this phenomenon. India has taken advantage of this growing trend entering the IT sector of economy and industry¹. Though the Indian is fast responding and taking the challenge head on and competing effectively in the new IT dominated global market the industrialist-employer in the IT industry are facing another challenge, namely, finding suitable people to recruit to the jobs being generated by them. When and where they are able to find people who can meet their expectations, they are facing the new challenge that this is coming their way in the form of retaining the people working with them. In fact, recruitment and retention are two sides of the same coin. Economically and financially employee retention, of late has acquired greater significance.² It is much more costly and time consuming to find the right replacements. Resultantly the employee retention has turned out to be a critical challenge to the employers. They have become very sensitive to the problem of employee retention. Researchers also are seized of the situation and getting involved in this challenge.

Researchers have found that workplace culture and women’s personal character traits play major roles in retention. So what are the things that make a difference? Women prefer workplaces that are collaborative rather than hierarchical, explains Heather Metcalf, director of research and analysis at the Association for Women in Science³. And they are more apt to stay in work environments that allow for creativity and flexibility, she says. Conversely, women are fleeing companies that encourage employees to practically live at work, she says. While 71 percent of women with young children work outside the home, according to the Pew Research Center, women still shoulder more responsibility for child care and elder care than men. So living at the office to show they are committed to their jobs is not an option. “Creating workplaces that have a lot of flexibility, that allow for people to work in a way that fits best with them, boosts creativity and job satisfaction,” Metcalf says, and these are the settings where women stay and thrive. No matter what type of organization women work for, large or small, public or private, their relationships with their immediate bosses are critical.
to whether they feel engaged and content. The ideal supervisor is committed to his or her subordinates’ advancement and development, assigns stretch projects, and provides necessary support and feedback to help them be successful, Bilimoria says. And workplaces that employ women in higher levels are more apt to retain women at the lower levels.

Objectives of the Study

1. To identify the emerging trends and policies for retaining women employees in IT industry
2. To identify the scope of ensuring women retention in IT industry
3. To suggest new policies that are women friendly and that will foster gender neutral workplace

Scope of the Study: Keeping in view the critical problem the organizations in the IT industry have been facing ever since the IT industry came into existence in India to retain their performing employees at different levels, this study seeks to understand the different strategies of different organizations for retaining their employees and examine whether those strategies have any universal base and comparison with the experiences of high-tech organizations or organizations depending on the knowledge workers or professional employees and if so what are these common employee retention strategies being in practice in different organizations in the IT industry in Chennai.

The scope of this study is confined to IT industry in Chennai. The study throws light through valuable suggestion to increase the female employees’ retention in the organization. This study can help the management to find the weaker parts of the female employee feels towards the existing organization retention strategies and also helps in converting those weaker part in to stronger by providing the optimum suggestions or solutions. This study is a clear guide for the solution seeker about the factors which induced women employees to stay back in the same organization. Special attention has been shown in this research about their empowerment in the society economically as well as professionally. Career development is an existing trend to be stay in their organization and how these factors induced them; all those answers will be make this research unique and an find an enhanced approach towards balancing gender at workplace.

Emerging Trends for Retaining Women Employees:

More Women Leaders: The first thing that gives a woman confidence at her workplace is having women leaders to look up to. This also indicates that the company offers them an environment conducive to scale the corporate ladder. It would be more beneficial if women leaders took on the role of mentors in mentorship programmes that are already at work in certain companies.

Sexism-Free Work Culture: Every workplace must offer a safe and secure environment for employees that help them grow personally and professionally. But it is a sad reality that this is not always true in India. Some of the biggest companies here lack sexual harassment cells and policies against discrimination at the workplace. Create a culture that does away with sexism at work by educating your employees about ‘unconscious biases’ and ‘benevolent sexism’.

Pay men and women equally: When you hire talented women, understand that they put in the same amount of hard work and time as the men and acknowledge that with equal pay. Offer them equal opportunities and trust them with responsibilities similar to what their male counterparts are given to foster increased confidence and professional growth.

Transparent Performance Evaluation Policy: Make it clear to all employees how they are going to be evaluated and about the requirements to be met to make career advancements. It is commonly seen that most organisations promote men on potential and women only on measurable and proven performance. Check your talent management systems and do away with such biases.

Flexible Work Schedules: Many Indian companies already offer flexible schedules to their employees, but most often they turn out to be only the freedom to choose their shifts. True flexibility means allowing your employees to adjust their work schedules to maintain a healthy work-life balance without being penalised. As long as they turn in their work on time and are producing results, their physical absence from office shouldn’t be a concern. Having flexible schedules end up in happier, more satisfied and extremely productive employees. Good intentions, alone, are not enough to make women employees want to work for your company. Treat
them well, provide them opportunities for professional development and create a culture that values their talents and respects them as individuals.

**Paternity Leave:** Reputation being known as a company that promotes gender equality will go a long way in attracting top female talent. And offering a generous paternity leave policy is one of the most effective ways to demonstrate a commitment to women and working families. While paternity leave is designed for men, it ultimately benefits working mothers and children. Furthermore, since most states don’t require it by law, implementing paternity leave shows that an employer is willing to go above and beyond to promote equality and inclusion.

**Empower Female Employees to Shape Company Culture:** Startup land has become famous for offering a fraternity-like atmosphere: free beer, video games, and personalized goodies. While it’s not fair to say women don’t like these perks, tech companies should include women on the teams that are shaping company culture. Expanding the activities beyond those evoking college dorm rooms will help attract talented women who don’t feel connected to those traditions.

Finally, it should go without saying that the best way to attract female talent is to offer competitive wages and excellent benefits that will support them in their life choices regardless of if they decide to have children or not. While the grand gesture of Face book and Apple will surely help their recruitment efforts, our corporate culture as a whole needs to focus on making small, but important, everyday changes and sticking with them.

**Career Development Program:** Every individual is worried about her career. You can provide them conditional assistance for certain courses which are beneficial from your business point of view. Conditional assistance means the company will bear the expenses only if she gets an aggregate of certain percentage of marks. And entrance to that course should be on the basis of a Test and the number of seats to be limited. For getting admitted to such program, you can propose them to sign a bond with the company, like they cannot leave the company for 2 years or something after the successful completion of the course.

**Timely increments:** Timely Increments in salary makes talented employees to stick to the organisation for long time. Many researchers have found that the salary and increments were the core reasons behind leaving of employees to other organisations and competitor organisations attracts talent by showing sole monetary benefits, indeed most of the talent is getting attracted for this reason. It is universal fact and one has to accept that the monetary benefit is the core reason for an employee decision-making on retention in the organization.

**Conclusion**

In a competitive business climate, retaining key employees is vital for the health of the company. But when these key employees are women, many corporations and industries continue to be befuddled as to how to retain this valuable cohort. Indeed, it’s surprising how many supposedly modern institutions are caught in a time-warp. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small. The good news is, above few simple strategies can vastly improve conditions for female employees. Women who are trained to develop an executive-type persona in terms of gravitas that is, confidence, poise under pressure and decisiveness—as well as communication and appearance become more confident and are better able to command a room, thereby clearing a path to high-stakes and high-visibility positions. By utilizing some or all of these ideas, companies can benefit from a healthier and more balanced work environment. It just makes sense.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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2. Deborah Blackman, Fiona Buick, Michael O’donnell, Janine O’flynn, Damian West, Managing Expectations To Create High Performance,January 2013 (Meeting Abstract Supplement).


Back Stretch Exercise vs Pelvic Tilt on the Backache among Antenatal Mothers

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Abstract
Back pain is a very common discomfort during pregnancy. The reasons are weight gain, expanding sacroiliac joints and mal-position of the fetus¹. The present study aimed to compare the effect of back stretch exercise versus pelvic tilt on the backache among antenatal mothers in selected hospitals of Pune. Pre experimental two group pretest and post test design was used for the study for 30 antenatal mothers with the back pain in selected multi specialty hospital. To select the samples Non-Probability purposive sampling technique was used. After Pretest both exercises were taught to different samples and the post test was carried out after 7 days. Result shows that back stretch exercises were more effective than the pelvic tilt exercise.

Keywords: Back stretch exercise and Pelvic tilt exercise.

Introduction
During the childbearing year, woman’s body undergoes extensive changes which frequently necessitate many adaptations. While back pain during pregnancy interfere with work and daily activities². A strong back is essential for good posture and for proper balance during pregnancy; it can be achieved by Stretching exercise which helps in improving range of motion, flexibility, circulation, decreases stress, and releases tension. While experiencing pregnancy back pain, gentle exercises, such as stretching and light movement will decrease spasm of the muscles, and help decrease back pain¹. Throughout the pregnancy this exercise release endorphins (naturally occurring chemicals in brain) which relieves backaches improve posture by strengthening and toning the muscles in back, buttocks, and thighs. It reduces constipation by accelerating movement in intestine. Prevent wear and tear of joints and which become loosened during pregnancy due to normal hormonal changes by the lubricating fluid in joints, and help to sleep better by relieving the stress and anxiety.

Many women feel uncomfortable with the idea of working out during pregnancy. By doing exercise, women likely to have an easier labor and get back into shape more quickly after giving birth⁴. One way to strengthen the pelvis is to do pelvic tilt exercises regularly. These easy pregnancy exercises strengthen abdomen muscle, soothe backaches during pregnancy and labor, improve posture, and ease delivery⁵.

Statement of the Problem: A comparative study to assess the effect of back stretch exercise vs pelvic tilt on the backache among antenatal mothers in selected hospitals of Pune.

Objectives of the Study:
1. To determine the level of backache among antenatal mothers.
2. To determine the effect of back stretch exercise on backache among antenatal mothers.
3. To determine the effect of pelvic tilt exercise on backache among antenatal mothers.
4. To correlate between selected demographic variables and backache among antenatal mothers.

Operational Definitions:

Back Stretch Exercise: In this study it refers to the activities performed to pull tightly and releasing the back muscles in sitting position to reduce the pain and increase the flexibility. This activity will be carried over for 20 to 30 sec and repeated twice per day for a period of 1 month.
Pelvic tilt exercise: In this study it refers to the activity performed to pull tightly and releasing the back muscles in standing position to reduce the pain and increase the flexibility. This activity will be carried over for 20 to 30 sec and repeated twice per day for 1 month.

Assumption
- Antenatal mother may suffer from backache
- Back stretch exercise may have significant effect on backache among antenatal mothers.
- Pelvic tilt exercise may have significant effect on backache among antenatal mothers.

Research design: The selection of research design is the most important step as it provides the framework for the study.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>O1</td>
<td>X</td>
<td>O1</td>
</tr>
<tr>
<td>O2</td>
<td>X</td>
<td>O2</td>
</tr>
</tbody>
</table>

Keeping in view the objectives of the study, the researcher selected for the study was pre experimental two group pretest and post test design (O1 x O1), (O2 x O2). In the present study, the base measure will be the assessment of pain on numerical pain scale and the experimental variable will be the demonstration of back stretch exercise and pelvic tilt exercise depicted as ‘X’.

In this study the independent variable is the back stretch exercise and pelvic tilt exercise. The dependent variable in the study is backache among antenatal mothers.

Setting of the study is multispecialty hospital in PCMC Area.

Population: The population of this study comprises of women who are suffering from backache among antenatal mothers of selected hospital of Pimpri, Pune.

Sample and sampling technique: A non probability-purposive sampling technique was used for selecting 30 postnatal working women who met the set criteria during the period of data collection.

The following criteria were set for the selection of samples:

Inclusion Criteria:
1. Antenatal mothers in second and third trimester
2. Antenatal mothers who were suffering from backache
3. Antenatal mothers who were willing to participate in this study

Exclusion Criteria:
1. Antenatal mothers who were at high risk due to medical and surgical condition.
2. Antenatal mothers who were in 1st trimester.

Data collection technique and instruments: A study aimed at assessment of comparison of back stretch exercise vs pelvic tilt exercise on backache among antenatal mothers. Hence, numerical pain scale and observational checklist was used for collection of data.

Development Of the tool

Observational checklist was prepared to assess the effect of back stretch exercise vs pelvic tilt exercise on backache among antenatal mothers

Description of the tool

Section I: Socio demographic profile which consists of age, education, occupation, gravida and monthly income.

Section II: Standardized pain scale (numerical Scale) to assess intensity of backache.

Section III: Profile for back stretch exercise which contains the profile of the exercise step wise.

Section IV: Observational checklist for profile for back stretch exercise.

Section V: Profile for pelvic tilt exercise which contains the profile of the exercise step wise.

Section VI: Observational checklist for profile for pelvic tilt exercise.

Content validity: To ensure content validity of the tool it was submitted to 24 experts. Twelve from Obstetrics and gynaecological nursing, four from Obstetrics and gynaecology department, three from community health nursing departments, three from medical surgical department and two from physiotherapy. The experts were selected based on their clinical expertise, experience and interest in the problem being studied. They were requested to give their opinion on the appropriateness and relevance of items in the tool. As a whole the suggestions and comments of experts included grammatical corrections of the sentences. The modified tool contained 10 items after incorporating
the suggestions. After validation of content, an expert in Marathi language translated the tool from English to Marathi.

**Reliability:** Reliability was assessed using inter-rater method. Cohen’s kappa was found to be 0.80. Hence the tool is reliable.

**Data Collection:** On day one (pre-test day) the purpose of the study was explained to each antenatal mother and the confidentiality of her response was assured. After pre-test on the same day back stretch exercise to 15 selected samples and pelvic tilt exercise to selected 15 samples was administered to the subjects. Post-test was taken on the 7th day using the same tool, and again post-test was taken on 7th day using the same tool.

### Table 1: Description of demographic variables

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Demographic variable</th>
<th>Back Stretch Exercise</th>
<th>Pelvic Tilt Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>1.</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Below 20 years</td>
<td>2</td>
<td>13.3%</td>
</tr>
<tr>
<td>b.</td>
<td>21 years-25 years</td>
<td>5</td>
<td>33.3%</td>
</tr>
<tr>
<td>c.</td>
<td>26 years-30 years</td>
<td>6</td>
<td>40.0%</td>
</tr>
<tr>
<td>d.</td>
<td>30 years and above</td>
<td>2</td>
<td>13.3%</td>
</tr>
<tr>
<td>2.</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Illiterate</td>
<td>2</td>
<td>13.3%</td>
</tr>
<tr>
<td>b.</td>
<td>Primary</td>
<td>8</td>
<td>53.3%</td>
</tr>
<tr>
<td>c.</td>
<td>Secondary</td>
<td>4</td>
<td>26.7%</td>
</tr>
<tr>
<td>d.</td>
<td>Graduate and above</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>3.</td>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Employed</td>
<td>5</td>
<td>33.3%</td>
</tr>
<tr>
<td>b.</td>
<td>Unemployed</td>
<td>10</td>
<td>66.7%</td>
</tr>
<tr>
<td>4.</td>
<td>Gravidra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Primigravidra</td>
<td>8</td>
<td>53.3%</td>
</tr>
<tr>
<td>b.</td>
<td>Multigravidra</td>
<td>7</td>
<td>46.7%</td>
</tr>
<tr>
<td>5.</td>
<td>Monthly income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Below Rs. 5000/-</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>b.</td>
<td>Rs.5001-10,000/-</td>
<td>9</td>
<td>60.0%</td>
</tr>
<tr>
<td>c.</td>
<td>Rs.10,001-20,000/-</td>
<td>5</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

### Description of level of backache among antenatal mothers:
In back stretch exercise group, majority (66.7%) had severe pain while in pelvic tilt exercises group, all the antenatal mothers had severe pain (Score 7-10) in first session.

### Table 2: Description of effect of back stretch exercise on backache among antenatal mothers.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Level of Pain</th>
<th>1st session</th>
<th></th>
<th>2nd session</th>
<th></th>
<th>3rd session</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>No pain (Score0)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>2</td>
<td>Mild (Score1-3)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>8</td>
<td>53.3%</td>
</tr>
<tr>
<td>3</td>
<td>Moderate (Score4-6)</td>
<td>5</td>
<td>33.3%</td>
<td>12</td>
<td>80.0%</td>
<td>7</td>
<td>46.7%</td>
</tr>
<tr>
<td>4</td>
<td>Severe (Score 7-10)</td>
<td>10</td>
<td>66.7%</td>
<td>3</td>
<td>20.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Table 3: Description of effect of pelvic tilt exercise on backache among antenatal mothers

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Pain</th>
<th>1st session</th>
<th>2nd session</th>
<th>3rd session</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
</tr>
<tr>
<td>1</td>
<td>No pain (Score0)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Mild (Score 1-3)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Moderate (Score 4-6)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Severe (Score 7-10)</td>
<td>15</td>
<td>100.0%</td>
<td>15</td>
</tr>
</tbody>
</table>

Analysis of data related to comparison of effect of pelvic tilt exercise vs back stretch exercise on the backache among antenatal mothers.

Two sample t-test for comparison of effect of pelvic tilt exercise vs back stretch exercise. Mean change in pain score in back stretch exercises group were 1.4 and 3.4 in session two and session three. For pelvic tilt exercise group, the mean effect was 0.7 and 2 in second and third sessions. T-values for this comparison were -3 and -5.1 with 28 degrees of freedom. Corresponding p-values were 0.003 and 0.000, which are small (less than 0.05), the null hypothesis is rejected. The pain scores decreased significantly better for back stretch exercise group as compared to that of pelvic tilt exercise group. Hence the back stretch exercise proven to be more effective than pelvic tilt exercise in reducing backache among antenatal mothers.

Table No 4: Association between level of backache among antenatal mothers and demographic variables

Fisher’s exact test for significance table.

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Demographic variable</th>
<th>Pain</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>1</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Below 20years</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>b.</td>
<td>21years-25years</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>c.</td>
<td>26years-30years</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>d.</td>
<td>30 years and above</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Illiterate</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>b.</td>
<td>Primary</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>c.</td>
<td>Secondary</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>d.</td>
<td>Graduate and Above</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Occupation</td>
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</tr>
<tr>
<td>a.</td>
<td>Employed</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>b.</td>
<td>Unemployed</td>
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<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Gravida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Primigravida</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>b.</td>
<td>Multigravida</td>
<td>2</td>
<td>14</td>
</tr>
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<td>5</td>
<td>Monthly income</td>
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<tr>
<td>a.</td>
<td>Below Rs. 5000/-</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>b.</td>
<td>Rs. 5001-10,000/-</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>c.</td>
<td>Rs. 10,001-20,000/-</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
Since all the p-values are large (greater than 0.05), there is no evidence against null hypothesis. None of the demographic variable was found to have significant association with backache among antenatal mothers.

**Ethical Clearance:** Ethical clearance was taken from Dr. D.Y. Patil Hospital authorities before conducting a study. Personal consent was taken from the antenatal mothers before conducting the study.

**Source of Funding:** Self.

**Conflict of Interest:** There is a genuine need for continuing education for nurses, particularly for those who are working in hospital departments dealing with antenatal care. There is a need for extensive and intensive nursing research in this area so that strategies for educating people on the exercises which can give a better motherhood. The nurse researcher should be able to conduct the research on various aspects of awareness about the maintenance of body postures which will help to prevent or reduce the backache.

**Recommendations:**
- A similar study may be replicated on large samples; thereby findings can be generalized for a large population.
- A comparative study may be conducted using different antenatal exercises for backache.
- A similar study may be conducted to find out the knowledge regarding effects of different exercise on backache.
- A similar study may be conducted to find out attitude towards antenatal exercise.

**Conclusion**

The result shows, pain scores decreased significantly better for back stretch exercise group as compared to that of pelvic tilt exercise group hence the back stretch exercise proven to be more effective than pelvic tilt exercise in reducing backache among antenatal mothers.

**References**

Does Serum Ferritin Concentration Influence Antioxidant Vitamin C in Type 2 Diabetes?

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Abstract

Background: Iron a known pro oxidant was found to have a link between ferritin and pathogenesis of type 2 diabetes, but the mechanism is still not clear. The role of Iron in the electron transport chain has been postulated to be a major pathway of tissue damage by generating excess amount of free radicals. Vitamin C is an important co-factor for iron metabolism whether the serum ferritin level has any role in the vitamin C influenced diabetes or ferritin influenced diabetes or both is still not well established.

Aim and objectives: The present study is aimed to assess the link between serum ferritin and type 2 diabetes in perspective of vitamin C among the population of North Karnataka

Method: A study was conducted on known type 2 diabetes patients (n=28) and their age matched control group (n=28). Serum ferritin was estimated by ELISA technique and serum vitamin C level was assessed by Roe and Kuether method in both the groups. Basal parameters and lipid profile were measured and analyzed by standard method in both the groups.

Result: The serum ferritin level was found to be significantly higher (p= 0.0012) in the diabetics as compared to control group by 61%. Whereas the serum vitamin C level was lower in diabetics by 14.1% in comparison to controls, although the values were not statistically significant. No significant correlations were found among serum ferritin with vitamin C, fasting blood glucose with serum ferritin and fasting blood glucose with serum vitamin C in diabetics or in control subjects.

Conclusion: Significantly increased serum ferritin in type 2 diabetes in our study maybe due to pathophysiological changes in liver, which maybe independent of antioxidant vitamin C induced iron metabolism.

Keywords: Type 2 diabetes, serum ferritin, serum vitamin C, north karnataka.

Introduction

The precise molecular mechanisms underlying the pathogenesis of iron-overload-related diabetes have not been identified but the initial glucose abnormalities include insulin resistance and hyperinsulinaemia, followed by impaired insulin secretion[1]. Type 2 diabetes is a disease marked by chronic inflammation, and altered Iron metabolism maybe one of the causes. A link between type 2 diabetes with elevated ferritin levels and inflammation has been established[2].

Iron is an essential element in many vital processes, but intimately linked to oxidative stress. Iron participates, through the Fenton reaction, in the formation of highly toxic free radicals, such as hydroxide and the superoxide anion, which are capable of inducing lipid peroxidation[3]. Iron is essential for a number of biochemical reactions in the body including the electron transport chain, gene
regulation, regulation of cell growth and differentiation. The role of Iron in the electron transport chain has been postulated to be a major pathway of tissue damage. Iron in excess generates free radicals which have the ability to damage membrane lipids, proteins and also DNA. This ultimately leads to cell death including the beta cells which subsequently causes altered glucose homeostasis[4].

Several studies report a relationship between diabetes mellitus and vitamin C. Vitamin C is an important co-factor for iron metabolism, hence its influence on glucose and iron homeostasis may be considered[5]. The serum ferritin linkage with vitamin C found in various studies, were unable to come out with a definite conclusion whether ferritin influenced diabetes or diabetes influenced ferritin, or vitamin C was influenced by both these factors. There were a lot of research findings indicating the role of Iron in free radical mediated type 2 diabetes mellitus, hence our study intended to find out a link between serum ferritin and type 2 diabetes among the population of north Karnataka region. The study further aimed to assess the relationship between antioxidant vitamin C level and serum ferritin levels among the type 2 diabetics of the same populations.

Materials and Method

The study was conducted on twenty eight type 2 diabetes mellitus patients (more than five years since diagnosis) and same number of age and sex matched control subjects from the outpatient department of a tertiary care hospital. The protocol was explained to the subjects and patients, included in the study. Informed consent was obtained from each of the participant. The exclusion criteria were presence of anemia, inflammatory disorders, smoking, vitamin supplementation, hormone replacement therapy or evidence of infection at the time of sampling for the study. Both the controls and the diabetic patients were from the same geographic area of Northern Karnataka. They belonged to the lower socio economic group with similar cultural and dietary habits which was vegetarian in nature. The experimental protocol was approved by the Institutional ethics committee.

The basal parameters recorded were pulse rate, body mass index (BMI), blood pressure and body temperature and also the haematological parameters were analysed. Fasting and post prandial blood glucose was measured by routine laboratory method to confirm their diabetic status or otherwise. Lipid profile of both the groups were measured and analyzed by standard method. Serum ferritin level was estimated by Immunoenzymometric method. Serum was separated from samples collected in the pilot tubes after 1 hour and stored at -20°C. The serum ferritin was estimated in batches of samples by ELISA technique using commercial ELISA kit, FerritinAccubindTM ELISA test system from Monobind Inc. USA. The test values were read from the standard curve. The Serum Vitamin C level was estimated using Roe and Kuether method[6].

Statistical Analysis: The Mean±SD values of all parameters of control and diabetic group were calculated. unpaired ‘t’ test was done to compare data between controls and diabetics. Pearson’s Correlation test was done to correlate the biochemical parameters in controls and diabetic individuals. The Statistical Analysis was done using Graphpad Instat 3.

Results

Table 1 shows the comparison of mean values and standard deviation of physical anthropometry and haematological parameters of controls and type 2 diabetic patients. Table 2 depicts biochemical parameters, serum ferritin, serum vitamin C and lipid profile of controls and diabetics. The glycemic status was significantly different among the control and the diabetics. The fasting blood glucose and post prandial blood glucose were significantly higher (p=0.0001, p=0.0001) in the diabetics than in control subjects. Serum ferritin level in diabetics was also found to be significantly higher (p= 0.0012) as compared to the controls. Although the serum vitamin C levels in diabetics did not show any statistically significant change, but a decrease of 14.1% in serum vitamin C level was found in diabetics. The Total Cholesterol, Triglycerides, LDL and VLDL values were statistically higher and HDL level statistically lower in diabetic group as compared to the control group. Table 3 shows the Pearson’s correlation between fasting blood glucose and serum ferritin, fasting blood glucose and serum vitamin C and serum ferritin and serum vitamin C in controls and in diabetic group. The present study did not find any significant correlations among any of the parameters either in the controls or in the diabetic group.
Discussion

The bidirectional relationship between iron metabolism and glucose homeostasis is increasingly recognized. Several pathways of iron metabolism are modified according to systemic glucose levels, whereas the insulin action and secretion are influenced by changes in relative iron excess.

In present study we aimed to find serum ferritin and vitamin C level in diabetics and controls in North Karnataka region. The study also liked to emphasize the possible influence of serum ferritin concentration in relation to serum vitamin C level in control and type 2 diabetic patients. The hematological parameters did not show any significant differences in the diabetics except RBC count.

Increased serum ferritin levels in the diabetic patients in the present study, were indicating diabetic induced alteration of hepatocellular pathology. Iron is predominantly stored in the liver. Hepatocytes take up transferrin bound iron from the bloodstream through TfR1, expressed on the sinusoids, when iron load exceeds the iron-binding capacity of ferritin. The liver can maintain iron homeostasis within a narrow physiologic range by secreting hepcidin. Hepcidin senses a number of pathophysiological changes that control iron homeostasis, and it responds by downregulating the expression of iron transporter Ferroprotin-1(FPN-1) on the enterocyte. FPN-1 undergoes phosphorylation, internalization and degradation under the influence of hepcidin. This factor inhibits the duodenal absorption of iron. There is overexpression and release of hepcidin in proportion to the increased level of circulating ferritin.

Iron overload is found to exert an important effect on glucose homeostasis by impairing the response to insulin in the liver, muscle, and adipose tissue. Excess iron, once stored in the liver, interferes with glucose metabolism, causing hyperinsulinemia via both decreased insulin extraction and impaired insulin signaling Hyperinsulinemic status, on the other hand, favors the intrahepatic deposition of iron. Thus iron overload appears to cause hyperinsulinemia and insulin resistance. A study revealed that insulin and iron induce oxidative stress synergistically.

Increased serum ferritin concentration in diabetics of our study indicates a poorly controlled type 2 diabetes associated with hyperferritinemia, which maybe suggestive of possible oxidative stress. Our study further corroborated with an American cohort study where plasma ferritin levels were found to be higher by 28.7% in the diabetics. While an elevated plasma ferritin level may be a causal factor for diabetes, it is also possible that the moderately increased ferritin levels of diabetic patients are just a marker for the metabolic alterations that ultimately result in diabetes, without a causal role in diabetes development.

Our observations were further supported with a strong association between clinically raised ferritin in incident diabetes patients, independent of known risk factors like age, BMI, sex, family history, physical inactivity, smoking, etc.

In our study the serum vitamin C level was lower in diabetics by 14.2% in comparison to controls without having any statistical significance. Evidence suggests that Insulin favour hyperglycemia inhibits ascorbic acid uptake by cells. Thus the plasma levels may remain normal while tissue levels are low, a condition termed “tissue Scurvy.” This observation on vitamin C is further corroborated with a study by Schorah CJ and et al. Thus in the light of all these evidences we suggest that both plasma and intracellular vitamin C levels must be evaluated simultaneously to get a clear idea regarding vitamin C status in diabetics specifically.

No significant correlation between fasting blood glucose and serum ferritin, fasting blood glucose and serum vitamin C and serum ferritin and serum vitamin C, were found in our study which differs from the observation of Eshed. et al. (2001) were a positive correlation between plasma ferritin concentration with insulin resistance and with the risk of acquiring type 2 DM were found. Ershed et al., also found no correlation between plasma ferritin level and glycemic control. The alteration of lipid profile in the diabetics our study indicate diabetes related dyslipidemia.

Implication: Hence it maybe concluded from the present study that increased serum ferritin in type 2 diabetes maybe due to pathophysiological changes in liver, which is independent of antioxidant vitamin C. Although vitamin C is considered as an important factor for regulation of iron metabolism but possibly it does not influence ferritin regulation in type 2 diabetes. Small sample size was a limiting factor in our study. Further studies such as a prospective cohort study with large sample size would be required to evaluate the causal role of Iron overload, if any in our geographical area.
**Table 1:** Physical Anthropometrical measurements and Haematological Parameters of controls and type 2 diabetic patients using unpaired t test.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Haematological Parameters</th>
<th>Control</th>
<th>Diabetic</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age (years)</td>
<td>49.8 ± 6.9</td>
<td>52.7 ± 8.4</td>
<td>1.4116</td>
<td>0.1638</td>
</tr>
<tr>
<td>2.</td>
<td>BMI (Kg/M²)</td>
<td>22.3 ± 3.2</td>
<td>24.8 ± 3.6</td>
<td>2.7465</td>
<td>0.0082</td>
</tr>
<tr>
<td>3.</td>
<td>RBC Count (million/cu mm)</td>
<td>5.19 ± 0.57</td>
<td>4.80 ± 0.73</td>
<td>2.102</td>
<td>0.0404</td>
</tr>
<tr>
<td>4.</td>
<td>Hemoglobin (g/dL)</td>
<td>14.35 ± 1.58</td>
<td>13.78 ± 2.33</td>
<td>0.9990</td>
<td>0.3224</td>
</tr>
<tr>
<td>5.</td>
<td>Hematocrit (%)</td>
<td>43.30 ± 4.06</td>
<td>40.41 ± 6.11</td>
<td>1.9491</td>
<td>0.0577</td>
</tr>
<tr>
<td>6.</td>
<td>MCV(µ3)</td>
<td>83.25 ± 6.90</td>
<td>83.89 ± 8.63</td>
<td>0.2886</td>
<td>0.7732</td>
</tr>
<tr>
<td>7.</td>
<td>MCH (pg)</td>
<td>27.45 ± 2.87</td>
<td>28.42 ± 3.70</td>
<td>1.0181</td>
<td>0.3062</td>
</tr>
<tr>
<td>8.</td>
<td>MCHC (%)</td>
<td>33.09 ± 1.79</td>
<td>33.83 ± 1.71</td>
<td>1.5226</td>
<td>0.1313</td>
</tr>
</tbody>
</table>

The values are mean ± SD. RBC; red blood cell, MCV; mean corpuscular volume, MCH; mean corpuscular hemoglobin, MCHC; mean corpuscular hemoglobin concentration.

**Table 2:** Comparison of Biochemical and Immunological parameters of controls and diabetics by unpaired ‘t’ test

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Parameters</th>
<th>Controls</th>
<th>Diabetic</th>
<th>t</th>
<th>p</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FBS (mg/dL)</td>
<td>79.26 ± 7.79</td>
<td>155.15 ± 28.85</td>
<td>13.1973</td>
<td>0.0001</td>
<td>+96.2%</td>
</tr>
<tr>
<td>2.</td>
<td>PPBS (mg/dL)</td>
<td>105.37 ± 17.0</td>
<td>227.37 ± 46.86</td>
<td>12.7156</td>
<td>0.0001</td>
<td>+116.2%</td>
</tr>
<tr>
<td>3.</td>
<td>Serum ferritin (ng/mL)</td>
<td>77.45 ± 31.81</td>
<td>124.01 ± 63.28</td>
<td>3.4158</td>
<td>0.0012</td>
<td>+61%</td>
</tr>
<tr>
<td>4.</td>
<td>Serum vitamin C (mg/dL)</td>
<td>0.2007 ± 0.10</td>
<td>0.1724 ± 0.06</td>
<td>1.2320</td>
<td>0.2235</td>
<td>−14.1%</td>
</tr>
<tr>
<td>5.</td>
<td>Total Cholesterol (mg/dL)</td>
<td>168.08 ± 21.59</td>
<td>211.85 ± 33.89</td>
<td>5.5541</td>
<td>0.0001</td>
<td>+25.6%</td>
</tr>
<tr>
<td>6.</td>
<td>Triglycerides (mg/dL)</td>
<td>70.81 ± 18.18</td>
<td>157.35 ± 56.22</td>
<td>7.4688</td>
<td>0.0001</td>
<td>+124.2%</td>
</tr>
<tr>
<td>7.</td>
<td>HDL (mg/dL)</td>
<td>48.04 ± 6.3</td>
<td>42.50 ± 5.48</td>
<td>3.3837</td>
<td>0.0014</td>
<td>−12.5%</td>
</tr>
<tr>
<td>8.</td>
<td>LDL (mg/dL)</td>
<td>105.65 ± 136.73</td>
<td>136.73 ± 26.59</td>
<td>4.6348</td>
<td>0.0001</td>
<td>+29.5%</td>
</tr>
<tr>
<td>9.</td>
<td>VLDL (mg/dL)</td>
<td>14.38 ± 3.50</td>
<td>33.35 ± 10.52</td>
<td>8.7192</td>
<td>0.0001</td>
<td>+135.7%</td>
</tr>
</tbody>
</table>

The values are mean ± SD. FBS; fasting blood sugar, PPBS; post prandial blood sugar, HDL; high density lipoprotein, LDL; low density lipoprotein, VLDL; very low density lipoprotein.

**Table 3:** Pearson’s Correlation of fasting blood glucose & serum ferritin; FBS & serum vitamin C and serum ferritin & serum vitamin C

<table>
<thead>
<tr>
<th>Control</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FBS Vs S. ferritin</td>
<td>0.0770</td>
</tr>
<tr>
<td>2.</td>
<td>FBS Vs S. vitamin C</td>
<td>-0.1903</td>
</tr>
<tr>
<td>3.</td>
<td>S. ferritin Vs S. vitamin C</td>
<td>0.0102</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diabetics</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FBS Vs S. ferritin</td>
<td>-0.0155</td>
</tr>
<tr>
<td>2.</td>
<td>FBS Vs S. vitamin C</td>
<td>0.2244</td>
</tr>
<tr>
<td>3.</td>
<td>S. ferritin Vs S. vitamin C</td>
<td>-0.0903</td>
</tr>
</tbody>
</table>

**Conflicts of Interest if Any:** Nil

**Source of Funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Ethical Clearance:** The experimental protocol was approved by the Institutional ethics committee.

**References**


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An Epidemiological Study of Acute Respiratory Tract Infections among Under Five Children Attending Urban Health Centre of a Medical College

Hafsa Jabeen1, MSK Swarupa2, A. Chandrasekher3
1Post Graduate Student, 2Professor, 3Professor & Head, Dept. of Community Medicine, Deccan College of Medical Sciences, Hyderabad

Abstract

Introduction: In India, an estimated 26 millions of children are born every year.1 As per Census 2011, the share of children (0-6 years) accounts 13% of the total population in the Country. An estimated 12.7 lakh children die every year before completing 5 years of age.1 15% of the mortality in them is due to Acute respiratory Infections (ARI). The occurrence of ARI is related to various risk factors in the child and in the environment. Many of these risk factors are amenable to corrective measures.2 Therefore, the present study undertook to identify the prevalence and various risk factors for acute respiratory tract infection in under-five children.

Objectives:
1. To study the prevalence of ARI in under five children.
2. To study the risk factors associated with ARI.

Method: A cross sectional facility based study in Urban health centre of Deccan college of Medical Sciences. All under five children attending health centre during the study period of 6 months (November 2017–April 2017)

Results: The present study showed 56% of ARI prevalence. Majority (55.3%) of study subjects were females. More number of subjects(35.5%) belongs to 0-12 month age group. Least number of children belongs to 49-60 months age group. Majority (41.8%) of study population belongs to SES-III (according to Kuppuswamy classification). Only (47.7%) of the subjects were fully immunized.

The present study revealed that there is statistically significant association between age, type of family, socioeconomic status, Mothers education, Vitamin-A supplementation, Over-crowding, presence of separate kitchen and Family h/o parental smoking p=<0.05 with occurrence of ARI.

Conclusions: The present study found that age of the child, type of family, socioeconomic status, Mothers education, Vitamin-A supplementation, Over-crowding, presence of separate kitchen and Family h/o parental smoking were the significant risk factors responsible for ARI in under-five children.

Keywords: Acute respiratory infections (ARI), under five children, type of family, socioeconomic status Mothers education, Vitamin-A supplementation over-crowding, parental smoking.

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Professor, Dept. of Community Medicine, Deccan College of Medical Sciences, Kanchanbagh, Hyd-500058
e-mail: santhaswarupa@yahoo.com

Introduction

In India, an estimated 26 millions of children are born every year.1

As per Census 2011, the share of children (0-6 years) accounts 13% of the total population in the
Country. An estimated 12.7 lakh children die every year before completing 5 years of age. The international consultation on control of acute respiratory infections, December 1991 reported that there are links between environmental risk factors (such as smoke, outdoor and indoor pollution, passive smoking, overcrowding) and risk factors in the child (such as low birth weight, malnutrition, measles, breast feeding and vitamin ‘A’ deficiency) with acute respiratory infections. Many of these risk factors are amenable to corrective measures.

Therefore, the present study undertook to Study the prevalence and various risk factors for acute respiratory tract infection in under five children.

AIM & Objectives:
1. To study the prevalence of ARI in under five children.
2. To study the risk factors associated with ARI.

Methodology

Study Design: A cross sectional facility based study

Study Area: Urban health centre of teaching institute

Study Population: All under five children attending health centre during the study period

Study Duration: 6-months (November 2017–April 2018)

Inclusion Criteria: All under five children attending health centre during the study period.

Exclusion Criteria: Parents or guardians of patients not giving consent.

Data Collection: Informed parental consent was taken before enrolling in the study. Socio-demographic and epidemiological information of the cases were collected by interviewing the parents or guardian of the child using a pretested proforma. The operational definition of an ARI was based on a child having at least one of the following symptoms (cough, running nose, ear discharge, sore throat which might be associated with fever, chest retractions and fast breathing).

Statistical Analysis: The detailed data was entered into the Microsoft Excel 2010 spreadsheets and analyzed by using SPSS 23.0. Results were presented in the form of tables and figures and subsequently analyzed statistically using percentages, Chi-square test. For all the statistical tests, a ‘p value’ of less than 0.05 was considered as statistically significant.

Results

Socio-demographic profile of children: The study includes 600 under-five children. The number of female children were slightly more (55.3%) than the number of males. More number of subjects (35.5%) belongs to 0-12 month age group. Least number(13%) of children belongs to 49-60 months age group. Majority of study population belongs to SES-II & III (63.2%) followed by IV (36.8%) (according to Kuppuswamy classification). In nearly 55.5%of the houses kerosene is used as a source of fuel followed by LPG (39.7%). Only 47.7 % of children are fully immunized.

Table No.: 1 Association of socio-demographic variables and child’s risk factors with ARI

<table>
<thead>
<tr>
<th>Variable</th>
<th>ARI present</th>
<th>ARI absent</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the child in months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-12</td>
<td>135</td>
<td>78</td>
<td>213</td>
<td>p Value &lt; 0.05* X=10.63</td>
</tr>
<tr>
<td>13-24</td>
<td>67</td>
<td>63</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>25-48</td>
<td>100</td>
<td>79</td>
<td>179</td>
<td></td>
</tr>
<tr>
<td>49-59</td>
<td>34</td>
<td>44</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Type of family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>168</td>
<td>158</td>
<td>326</td>
<td>X²=5.77 P value &lt;0.05*</td>
</tr>
<tr>
<td>Joint</td>
<td>168</td>
<td>106</td>
<td>274</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Upper middle</td>
<td>82</td>
<td>46</td>
<td>128</td>
<td>X²=13.0 P value &lt;0.05*</td>
</tr>
<tr>
<td>Lower middle</td>
<td>151</td>
<td>100</td>
<td>251</td>
<td>100.0</td>
</tr>
<tr>
<td>Upper lower</td>
<td>103</td>
<td>118</td>
<td>221</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The present study showed 56% of ARI prevalence. More percentage of children with ARI are living in joint families (61.3%) than nuclear families (51.5%). Almost equal percentage of children with ARI are from upper and lower middle (64.1%, 60.2%) and upper lower classes (46.6% each). More number of children’s mothers are literate (69.4%). Slightly more (54.8%) number of children with ARI are having a birth weight of $\geq 2.5$ kg when compared to children without ARI (45.2%). Only 51.5% of children with ARI received vitamin A supplementation. Only (47.7%) of the subjects were fully immunized.

## Discussion

**Socio-demographic profile of children:**

Majority (55.3%) of study subjects were females. In a study done by Islam F et al., females were more than males. More number of subjects (35.5%) belongs to 0-12 month age group. Least number of children (13%) belongs to 49-60 months age group. In a study done by Zaman K et al., ARI is seen mostly in 18-23 month olds followed by 6-11 months. Singh MP, Nayar S also found high rate for infants. Majority (41.8%) of study population belongs to SES-III followed by IV (36.8%) according to Kuppuswamy classification. Similar findings were observed by Sebastian SR et al., but Goel K et al. found 10%, 20% in class I & II and 20% 67.7% in class III & class IV. This may be due to variation of the socioeconomic strata in different regions. Only (47.7%) of the subjects were fully immunized.
ARI Prevalence: The present study showed 56% of ARI prevalence which is similar to the study done by Kapil Goel et al5 in meerut district and Kumar SG et al13 found the prevalence to be 52%and 63.7%, but in the study done by Walke SP15 et al found the prevalence to be 35.4% and 34.3% respectively which are less compared to our study. It may be due to the variation of study settings.

Table no 1: Risk factors: The present study revealed that there is a statistically significant association between age (X^2=10.63), type of family (X^2=5.77), socioeconomic status (X^2=13.0), mothers education (X^2=17.87). In a study done by Madhav S.M et al6, Arnold monto S, Ulman B.M et al7 and Savitha MR et al11 also found significant association between maternal education and occurrence of ARI which is similar to our case findings. The study also found statistically significant association between vitamin A supplementation (X^2=11.10), presence of separate kitchen (X^2=12.577), overcrowding (X^2=3.696) and h/o parental smoking (X^2=3.773) and the occurrence of ARI which are proved to be their risk factors of ARI.

In a study done by Goel K et al5 (78.12%), Jha et al4 (75.3%) observed significant association of ARI with parental smoking and overcrowding. Other studies done by Kumar SG et al13 (OR=1.49) & Vinod K. Ramani et al12 (OR=1.84) also found significant association of ARI with overcrowding and history of parental smoking similar to the present study.

The factors like birth weight and immunization status are not found to be associated with the occurrence of ARI

Conclusion

The present study found that the age of the child, type of the family, socioeconomic status, mothers education, vitamin A supplementation, presence of separate kitchen overcrowding, and H/O parental smoking were the found to be statistically significant risk factors associated with the occurrence of ARI in under-five children. Based on the findings, occurrence of ARI could be reduced by improved living conditions (housing standards) and environmental conditions. There is a need to improve vitamin A supplementation, immunization and birth weight of the baby. Mother’s education may add to improvement in the socioeconomic conditions thereby living conditions of the family.

Conflict of Interest: Nil

Ethical Clearance: Ethical clearance has been obtained from IRB of the Institution.

Source of Funding: Nil

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Risky Driving Behaviour among the Motorized Two Wheeler Novice Riders in Davanagere City, Karnataka

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Abstract

Road traffic accidents (RTA) account for greater mortality and morbidity rates worldwide, resulting in considerable global burden. In India motor vehicle accidents are one of the common reasons for mortality among young riders. The present study provides insight to different aspects of risky driving behavior from individual attitudes, and psychological factors like, anger, mood and emotions. Road traffic accidents are the third leading cause of death among young people. If timely actions are not taken, road traffic accidents are predicted to become the fifth leading cause of death in the world. Considering the issue and concern about younger age group, this study was carried out to understand risky driving behaviour among young novice two wheeler riders. A cross sectional study was conducted among college students, findings from this study says young males are more involved in risky driving behavior. Finally, the results focus on the role that risky driving behaviour plays in two-wheeler motor vehicle accidents and suggests the need for further research in this area of risky driving behaviour to improve road safety education and law enforcement policies that focus upon ensuring good driving behaviours.

Keywords: Davanagere, Novice, Riding behaviour, Younger riders.

Introduction

Road Traffic Accidents (RTAs) are a major cause of death and injury and an increasing public health problem globally, causing more than 1.2 million deaths annually1. In India, the motor vehicle population is growing at a faster rate with growing number of fatal crashes it is due to “Human factors”, “Vehicle factors”, and “environmental factors”2. The physical characteristics of the vehicle coupled with unsafe behavioral factors of the rider expose the two-wheeler to high risks.

RTAs are most commonly affect the economically productive age group and is the leading cause of death among young people aged between 15 and 29 years3. According to the World Health Organization (WHO), RTAs are the sixth leading cause of death in India with a greater share of hospitalization, deaths, disabilities and socio-economic losses in the young and middle-aged population2. Young riders are at an increased risk of road traffic crashes and the reasons for higher rate of road traffic crashes amongst young riders are due to minimal information about road safety, not being aware about the dangers on the road, limited practice and an inexperience particularly in the necessary safe driving. Apart from these, young riders are having risk-taking behavior like negligent driving, speeding and mobile phone usage. There is a probable gap which remains to be addressed to change the behaviour of motor vehicle riders. The current study was investigated the risky driving behaviours like speeding, non-usage of helmet, mobile phone usage, anger, not following traffic rules which is present among the young motorized two-wheeler riders of Davanagere city and the findings of the study can be taken up by local authorities (RTO, Traffic police) to design behaviour specific intervention programmes.

Evidence from various national reports (NCRB, SRS, MCCD) as well as few independent studies indicate that RTAs and fatalities are five times higher in males (82-86%) compared to females, due to greater exposure to unsafe traffic environments as well as due to their greater risk-taking behaviours.

By the Ministry of Road Transport and Highways (MoRTH) for the year, 2016 shows 1, 50,785 people were killed and another 4, 94,624 were injured in 4,
80,652 road crashes in India. The numbers of road crash deaths have increased by 31% from 2007 to 2017 and fatal road crashes have increased by 25.6% during the same period.3

Davanagere is the sixth largest city in Karnataka and it is being recognized as knowledge city because the city is home to the headquarter of Davanagere University and several educational institutes providing general, professional, management and training courses including medical and engineering courses. Apart from this Davanagere is a commercial and trading center located in central Karnataka. According to 2011 census, Davanagere had 4,30,129 population and now it has crossed 5 lakh population. In the same period, Davanagere had 1,06,365 vehicle population of which 79,473 were motorcycles.4 In Davanagere, motor vehicle accidents are the most common contributory factors to trauma because of increased population with multiple vehicles, increased density of traffic especially at peak hours, faulty roads and traffic signals, poor maintenance of vehicles and Other contributory factors leading to motor vehicle accidents are speeding, mobile phone usage, consumption of alcohol and other drugs, including physiological condition such as fatigue, depression, stress and an immaturity among youths. In 2014 Davanagere was ranked second highest in Karnataka on the list of traffic violation and it had recorded 34,739 cases.4

**Materials and Method**

A cross sectional study was conducted among college students in Davanagere city, Karnataka between the age group of 18 years to 25 years who are holding learner’s license and permanent driving license from two years in Davanagere city. A sample size of 150 was calculated by considering proportion of the event in the population (P=50%), value at a specified level of confidence (Z=95%), the proportion of population risky driving behaviour among novice rider was estimated as 50%, the confidence level was estimated at 1.96. The desired precision of 8% was taken, considering response rate as 8%. Colleges were selected based on administrative permission. Colleges and classes were selected through purposive sampling method and then students from all classes were invited to participate in the survey, study purpose and their role in the study was explained. Students were enrolled after written informed consent and closed ended structured questionnaire was administered to collect quantitative data, participants were questioned about their involvement in risky driving behaviours over the period from age 18-25 years, using a rider behaviour questionnaire. A total of 150 forms were distributed and collected in all 6 colleges. A data was entered and analyzed in excel and SPSS version 16. Association among gender and age between various domains of risky driving behaviour was done by using chi-square statistical analysis test.

**Result**

A study was conducted in Davanagere city among college students, of the 150 participants 106(70.67%) and 44(29.33 %) males and females, respectively and 125(83.33%) were belong to 18-20 years of age, 25(16.67%) were belong to 21 and above age. Of 150 participants 26(17.33%), 11(7.33%) ride fast and aggressive respectively.

**Table 1: Various domains of risky driving**

<table>
<thead>
<tr>
<th>Riding Speed</th>
<th>n=150 Frequency = n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
<td>47 (31.33%)</td>
</tr>
<tr>
<td>Normal</td>
<td>61 (40.67%)</td>
</tr>
<tr>
<td>Fast</td>
<td>26 (17.33%)</td>
</tr>
<tr>
<td>Aggressive</td>
<td>11 (7.33%)</td>
</tr>
<tr>
<td>Slow</td>
<td>5 (3.33%)</td>
</tr>
</tbody>
</table>

In table 2, we look into various domains under risky driving behaviour. 75.3% of students drive fast when they get late to college or any work, 52% of participants crossed city speed limit, 35.3% of participants raced when lights went green in the traffic signal and 33.3% of participants overtook vehicle from left side, 118(78.67%) get angry when delayed to work/college due to the traffic jam. This shows that risky driving behavior is most common among novice riders. Among 150 participants 18(14.4%) aged between 18-20 years have never used a helmet while riding a two-wheeler. Based on these results, participants in the age group of 18-20 years are shown to nonuse of helmet. Then this study confidentially says that age was associated with helmet use. After performing Chi-Square test among these variables, it shows significance with a p-value of 0.044. Of 150 participants 11(25.6%) of females and 67(62.6%) of males have crossed city speed limit. Based on these results, males are shown to cross city speed limit. Then this study confidentially says that gender is associated with speeding. After performing Chi-Square test among these variables, it shows significance with a p-value of 0.001.
males and 0(0%) of females sent or read a text in mobile while driving. Based on these results, males are shown to send or read a text while driving. Then this study confidentially says that gender is associated with mobile phone usage while driving. After performing Chi-Square test among these variables, it shows significance with a p-value of 0.002. Among 150 participants, 2(4.7%) of females and 35(32.7%) of males talk in mobile and 18(41.9%) of females, 75(70.1%) of males use mobile phones to get direction based information while riding. Based on these results males are shown to use a mobile phone while riding. After performing Chi-Square test among these variables, it shows significance with a p-value of 0.001. Among 150 participants, 9(20.9%) of females and 50(46.7%) of males carrying more than one pillion in their two-wheeler. Based on these results males are showed that they carrying more than one pillion in their two-wheeler. After performing Chi-Square test among these variables, it shows significance with a p-value of 0.003. Among 150 participants 10(23.3%) of females and 45(42.1%) of males tried racing along with their peer in their two-wheeler. Based on these results males are showed that they racing along with their peer. Chi-Square test among these variables, it shows significance with a p-value of 0.031. Among 150 participants 10(23.3%) of females and 45(42.1%) of males driving are influenced by bad road condition. Based on these results females are showed that their driving is more influenced by bad road condition. Chi-Square test among these variables, it shows significance with a p-value of 0.003.

Discussion

The findings from this study says that there is a risky driving behaviour among young novice riders. In the present study, prevalence (24.67%) of mobile phone usage for talking while riding is high compared to the similar studies done in India so far. A study was done in Surat city by Mittal P, Garg R. (2013), reported prevalence of talking on cell phone while riding is 3.02%, these differences could be due to the variability in time demographic composition studied in these surveys.

The present study says, about 18(12%) of riders and 130(86.67%) of pillions never used a helmet while travelling in a two-wheeler. A report from National Institute of Mental Health & Neuro Sciences (NIMHANS) says that on an average about 100-120 two-wheeler riders and pillions sustain head injuries every month out of which 10-12 succumb to death.

In this present study male drivers are more commonly involved in risky driving behaviours than females. A study from S. Jafarpour. et al. says male drivers often show more aggressive violations than females. A study from G. Gururaj. et al. 2014 RTIs is a leading cause of mortality, morbidity and disability among the young and predominantly males and this study says, nearly 80% of RTIs occurred in the age group of 15-44 years, predominantly among males and those less educated, an observation that is similar to global findings.

Out of this study recommendations are behavioral change intervention strategies among the novice riders by involving local stakeholders like traffic authorities, parents and head of the educational institutes. Road safety knowledge and awareness can be created amongst the young population through education, public talk campaigns and in colleges, showing visuals of harmful effects of risky riding and unsafe riding behaviour, in collaboration with local stake holder. Awareness regarding safe driving among the youths can be created through the use of most popular used social media. Limitations of this study was, some colleges had exams schedules during the study period. The non-response rate was more among postgraduate college students.

Conflict of Interest: Data collected during the study is not disclosed and it is confidential.
Source of Funding: Self

Ethical Clearance: KMC & KH IEC in institutional ethics committee.

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The Prevalence of Potentially Malignant Disorder (Leukoplakia) among Tobacco Users

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Abstract

Introduction: Leukoplakia is the most common premalignant or potentially malignant lesion of the oral mucosa. The annual percentage of malignant transformation varies as a result of differences in tobacco and dietary habits. For both genders, cancer of the mouth and pharynx ranks sixth overall in the world. In industrialized countries, men are affected two to three times as often as women, largely due to higher use of alcohol and tobacco.

Methodology: Archives from the past 2 years (2017-2018) were accessed from Saveetha Dental College. The inclusion criteria was the type of leukoplakia, site affected, age and sex of the patient. The exclusion criteria were the non-tobacco users. The data was collected and statistically analysed.

Results: There exists a male predilection to the occurrence of leukoplakia among the screened population. A correlation between gender and leukoplakia had a positive correlation for the male gender and types 1,4 leukoplakia and had a slight positive correlation.

Conclusion: The incidence of leukoplakia among tobacco users is high as compared to the non tobacco users. The male population is at a higher risk. More incidences of homogenous and speckled leukoplakia has been reported within the 2 years.

Keywords: Premalignant; leukoplakia; lesion; homogeneous; tobacco.

Introduction

Cancers of the oral cavity and oropharynx represent approximately three percent of all malignancies in men and two percent of all malignancies in women all over the world [1]. Squamous cell carcinoma, which arises from the oral mucosal lining, accounts for over 90 percent of these tumors [2-4]. These start as premalignant lesions and if not treated in time they may turn malignant and lead to cancers of the oral cavity. Oral cancer most commonly occurs in middle-aged and older individuals, although a disturbing number of these malignancies is also being documented in younger adults in recent years [5-7].

One of the most common pre malignant lesions of oral cavity is Leukoplakia. Recently, WHO (2005) changed the definition of leukoplakia as “a white plaque of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer. Despite advances in surgery, radiation, and chemotherapy, the five-year survival rate for oral cancer has not improved significantly over the past several decades and it remains at about 50 to 55 percent [8]. The strong association between cancers of the oral cavity and pharynx with tobacco use is well established.

Epidemiological studies show that the risk of developing oral cancer is five to nine times greater for smokers than for nonsmokers, and this risk may increase to as much as 17 times greater for extremely heavy smokers of 80 or more cigarettes per day [8-13]. The percentage of oral cancer patients who smoke (approximately 80 percent) is two to three times greater than that of the general population. Snuff and chewing...
tobacco have also been associated with an increased risk for oral cancer\textsuperscript{[14]}. In India and Southeast Asia, the chronic use of betel quid (paan) in the mouth has been strongly associated with an increased risk for oral cancer\textsuperscript{[15-17]}.

Early oral cancers and precancerous lesions are often subtle and asymptomatic. Therefore, it is important for the clinician to maintain a high index of suspicion, especially if risk factors such as tobacco use or alcohol abuse are present. Invasive oral squamous cell carcinoma is often preceded by the presence of clinically identifiable premalignant changes of the oral mucosa. These lesions often present as either white or red patches, known as leukoplakia and erythroplakia. As the cancer develops, the patient may notice the presence of a nonhealing ulcer. Later-stage symptoms include bleeding, loosening of teeth, difficulty wearing dentures, dysphagia, dysarthria, odynophagia, and development of a neck mass\textsuperscript{[18]}.

**Materials and Method**

Archives from the past 2 years (2017-2018) were accessed from Saveetha Dental college. A total of 150 patient reports were assessed and data was collected accordingly.

**Inclusion criteria:**

- **type of leukoplakia**
  - homogeneous leukoplakia
  - Nodular leukoplakia
  - Verrucous leukoplakia
  - Speckled leukoplakia

- **site affected**
  - buccal mucosa
  - Tongue
  - Hard palate
  - Soft palate

- **age**
  - sex of the patient
    - Male
    - Female

**Exclusion criteria:**

- non-tobacco users

The data was collected and statistically analysed using various statistical tests.

**Results**

After a statistical analysis it can be seen, from chart 1, that there is a male prediction to the occurrence of leukoplakia among the screened population, Pearson correlation Test was run to check the and type of leukoplakia, it was observed that relationship between the site there was a negative correlation but the correlation was very weak with an R value of 0.0652 (Chart 2).

A correlation between gender and leukoplakia had a positive correlation for the male gender and types 1,4 leukoplakia and had a slight positive correlation with an R value of 0.0256. (chart 3).
Discussions

Leukoplakia is one of the most common form of premalignant lesions in India. Out of the various types of leukoplakia, Erythroplakia and speckled leukoplakia are oral precancerous lesions that have a high potential for malignant transformation.

The term erythroplakia is used to describe a red plaque or macular lesion in the mouth for which a specific clinical diagnosis cannot be established[19,20]. Lesions are named erythroleukoplakia, leukoerythroplakia or speckled leukoplakia when red and white areas are associated or white patches are present over the red plaque[21].

Risk factors for oral carcinoma, such as alcohol use and smoking, diets lacking antioxidants (such as vitamins C, E, and beta-carotenes), occupational exposure to carcinogens, viral infections, and genetic and hereditary factors, may affect how these precancerous lesions become established and develop[22].

Most of the patients with leukoplakia are over 40 years of age, mainly seen in fifth to seventh decades with average age to be 60 years. Its prevalence is higher with age in males. Leukoplakia is commonly seen on lips, buccal mucosa, tongue and gingiva. The site varies with the form of tobacco habit, like in beedi smokers the site is anterior buccal mucosa whereas in patients who chew tobacco, seen on the posterior buccal mucosa and is generally seen as gray, white or yellowish white in color[23].

Leukoplakia presents a diverse clinical appearance and with time its appearance often changes. Usually it takes about 2.4 y to diagnose the lesion. Initially the lesion appears as a thin, slightly elevated gray or grayish white translucent plaque. The lesion is characteristically soft and flat and is sometimes wrinkled or fissured. The borders of the lesion are usually sharply demarcated but rarely some lesions blend gradually into adjacent normal mucosa. Some authors have designated the term preleukoplakia to this early stage, few others have preferred to use this stage as thin leukoplakia[24].

Later, the lesions become thicker, extend laterally and become more whitish in colour. The fissures may become deep and leathery on palpation. This stage is referred as thick or homogenous leukoplakia. Some severe lesions develop surface irregularities and are designated as granular or nodular leukoplakia. Verrucous leukoplakias show sharp or blunt projections. The red and white lesions have designated terms erythroleukoplakia, speckled leukoplakia or non homogeneous leukoplakia. These lesions have been shown to have a higher malignant transformation rates[25].

Conclusion

Oral leukoplakia is the most common potentially malignant disorder. The lesion can be diagnosed with the history and clinical examination. Biopsy of such lesions should be carried out and it should be differentiated with other white lesions. Early detection of leukoplakia is necessary as it shows high malignant transformation rates. New non invasive method such as salivary markers in the detection of transformation should be carried out to control this lesion.

Conflict of Interest: Nil

Sources of Funding: Self

Ethical Clearance: Not required as this is a review article.

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Esthetic and Prosthetic Rehabilitation of Maxillary Lateral Incisor: A Case Report

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Abstract

The key factors in achieving successful outcomes after implant placement immediately after tooth extraction is a correct diagnosis and treatment planning. The efficacy of immediate implant placement has been established and shown to be predictable if reasonable guidelines are followed. The reasons for tooth extraction may include but not limit to: insufficient crown to root ratios, remaining root length, periodontal attachment levels, periodontal health of teeth adjacent to the proposed implant sites, unrestorable caries, root fractures with large endodontic posts and questionable teeth in need of endodontic retreatment. The most esthetically challenging in implant placement is the maxillary anterior region. The reason being that tooth loss leads to resorption of bone and collapse in gingival architecture leading to esthetic compromise and inadequate bone for implant placement. Also, the advantages of placing Immediate implant into freshly extracted socket reduces the treatment time, cost, and increases the patient comfort. This case report describes the procedure for immediate implant placement in fresh extraction socket. Clinical and radiographic examination revealed width and length of the tooth for selecting implant size and design. Implant was successfully loaded and was functional during 24 months follow up period.

Keywords: Immediate implant placement; fresh extraction socket; immediate loading.

Introduction

Hard and soft tissue preservation becomes a crucial goal once an implant treatment is initiated. One of the ways of achieving this is by immediate implant placement. Immediate implant placement also reduces the treatment timing. However, to achieve a successful result, an immediate implant requires a precise case selection. In situations where immediate implant is not conducive, a delayed implant placement can be considered. Along with a precise case selection, an appropriate surgical treatment, clinician’s experience and the restorative procedures play an important role when placing immediate implants.

Clinical Case: In 2017, a healthy 25-year-old male reported for evaluation of a fractured upper right lateral incisor (figure-1). On consultation with an endodontist, it was decided to extract the tooth and go for an immediate implant placement as the patient was very much concerned about esthetics. Patient was in good systemic as well as periodontal health. A thorough clinical evaluation and a CBCT was recorded (figure-2) and analyzed, after which the patient was posted for implant placement as he did not have any facial plate deformity. The patient was explained about the procedure and a consent form was duly signed by the patient. The area of interest was anaesthetized with 1:80,000 lignocaine hydrochloride. With a no. 15 scalp blade, the supracrestal fibers were dissected. This was followed by the use of a periotome to sever the periodontal ligament fibers from the alveolar bone so that the tooth becomes loose, thereby extracting the tooth atraumatically. The walls of the alveolar socket were found to be intact after extraction (figure-3). The socket was degranulated and curetted for any remnant of periapical lesion. Osteotomy was performed in a palatal position so as to not perforate the labial cortical bone, about 2mm apical to the apex. An implant of length 13mm and diameter 4.5mm was placed (figures 4-5).
primary stability was achieved with a torque of 20Ncm/2 was achieved. since the torque achieved was less, it was decided to go for delayed loading and a gingival former was placed. Post–operative instructions were given ad antibiotics (amoxicillin 200mg, thrice daily for 5 days) and analgesics (divon plus twice daily for two days) were prescribed.

After 5 months, an IOPA was taken to evaluate the implant and bone interface (figure-6). The gingival former was removed revealing a good soft tissue contour. Impressions were taken for prosthetic rehabilitation using putty with light body for the maxillary arch and an alginate impression for the mandibular arch. The final ceramic crown was cemented after 1 week. After 1 year, radiographic and clinical follow up demonstrated successful result, meeting aesthetic and functional requirements (Figure 7).

Discussion

A mandatory requirement when placing an immediate implant is atraumatic extraction. The best healing conditions is provided by attempting this\(^1\). Despite all the efforts, extracting a tooth results in severing the collagen fibers and blood vessels to the periodontal ligament causing trauma to the bundle bone. Extraction of tooth with or without flap elevation is a surgical consideration. Extracting a tooth with or without elevating a flap, is a surgical aspect that must
be considered. Covani et al affirmed that flap elevation may cause alveolar bone resorption in the exposed area, whereas a flapless technique reduces patient discomfort, alterations in alveolar crest dimensional alterations, and better soft tissue quality around implant. This also reduces post-surgical trauma, and by preserving the vascular supply integrity, as the periosteum is maintained. The stages of alveolar healing are initiated as soon as the tooth is extracted. It has been postulated that there is a horizontal resorption of bone dimension that amounts to 56% immediately after extraction.

Also, when an implant is inserted immediately after an extraction, there is a void created between the buccal wall and the implant. Some authors suggest the filling of this void with a biomaterial in order to maintain hard tissue contour. The clinician also has to consider that soft tissue will also go through the process of remodeling following implant placement.

Immediate implants require a complicated and precise soft tissue management. Moreover, De Rouck et al. demonstrate that using single immediate implants with instant provisionalization, can help optimize esthetics. It was concluded that this can limit the amount of midfacial soft tissue loss, being this area the most critical in aesthetic implant dentistry. Nevertheless, if primary stability is not achieved, or the patient’s case does not fit the ideal requirements for immediate provisionalization, this should not be done, and therefore, a different type of treatment should be considered.

Conclusion

Based on the outcomes of the present report, it can be concluded that immediate implant placement may be a viable treatment option for cases requiring earliest restoration of teeth to be extracted. However, this approach is considered highly technique sensitive and requires expert dental implant team for its execution. Careful selection of cases, proper treatment plan and follow-up of surgical and prosthetic protocols are the keys to success.

Conflict of Interest: None

Source of Interest: Self

References

Psychosocial Problems and Coping Strategies Among Peri-Menopausal Woman

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Abstract

Context: Peri-menopausal period is characterized by a continuous decline in ovarian function due to which women are vulnerable to various physical and psychosocial symptoms affecting their quality of life. There will be a chance that if their problems were left unnoticed they might become mentally ill in the future.

Aims: To assess the psychosocial problems and coping strategies among peri-menopausal women and to find out the correlation between psychosocial problems and coping strategies.

Method and Material: A cross sectional descriptive Survey research design was adopted for the present study. 200 women were recruited by Convenience sampling technique at selected PHC area, Bangalore urban and data was collected from June to December 2017. Psychosocial problems rating scale and checklist were used to assess psychosocial problems and coping strategies.

Statistical analysis used: Data were analyzed using Statistical package for the social Sciences software package (Version 23).

Results: The findings shows that 12% of respondents are having severe psychosocial problems, 28% of respondents are having moderate psychosocial problems and 30% of respondents are having mild psychosocial problems. With regards to coping strategies 40% of respondents are having Poor coping strategies, 38% of respondents are having moderate coping strategies and 22% of respondents are having good coping strategies. Psychosocial problems are negatively correlating with coping strategies.

Conclusion: The study concludes that peri-menopausal women are at risk for psychosocial problems and a negative correlation was observed between psychosocial problems and coping strategies.

Keywords: Psychosocial problems, Coping strategies and Peri-menopausal women. Psychosocial problems and coping strategies among peri-menopausal woman.

Introduction

Women experience various turning points in their life cycle, which can be developmental or transitional. Menopause is a major turning point in life of a woman which is directly related to her womanhood.¹ The exact age of menopause varies from woman to woman. In normal women, the menopause occurs between 45 to 50 years of age. It is characterized with cessation of menstruation and implies inability in child bearing capacity and aging.² Peri-menopause is a term used to specify “the time around menopause”.³ The World Health Organization defines peri-menopause as the period (2-8 years) preceding menopause and the one-year period after final menses, resulting from the loss of ovarian follicular activity.⁴ Approximately 70% of women experience some adverse symptoms during the peri-menopause stage that are caused due to the loss of estrogen.⁵
Peri-menopausal period is characterized by a continuous decline in ovarian function due to which women are vulnerable to various physical and psychosocial symptoms affecting their quality of life. Most of the women experience varying degrees of adverse symptoms such as vasomotor instability, headaches, hot flushes, and dizziness, diaphoresis, drying of the skin, sleeplessness and loss of hair. Several psychological factors were related to the process of physiological change. A woman may experience a fear of losing her appearance, uncertainty about her purpose in life as middle-aged woman, sadness at the passing of the fertile time of life. These feelings may even outweigh the physical discomfort caused by the complex hormonal changes.6-9

Peri-Menopausal women may be experiencing psychological problems like anxiety, depression, fear and anger, loss of memory and lack of concentration.10 The study conducted by Bromberger JT et al shows that women were two to four times more likely to experience major depression episode when they were perimenopausal or early postmenopausal11 and study conducted by Afshari P et al showed that 59.8% of the 1280 samples were depressed; in particular, 39.8% had mild depression, 16% moderate depression, and 4% severe depression among menopausal women.12

An explorative study conducted on Bio-Psychosocial Problems and Coping Strategies adopted by the Menopausal Women of the age group of 40–50 Years showed that women experienced mild to moderate Bio-Psychosocial problems and used both positive and negative coping strategies. The result also revealed there was significant but low negative correlation between the bio psycho social problems and coping strategies used by the menopausal women.13 The studies have shown that about one-third of the women suffered from decreased psychological well-being.14 Therefore, emotional balance, tolerance level, adjustment process and other personality attributes were under great threat, which negatively affect the mental health. There will be a chance that if their problems were left unnoticed they might become mentally ill in the future. Some suitable interventions and modifications in their life style and coping strategies especially during these periods of life may help to improve and maintain their good health.15 Hence, the investigator is interested to undertake this study to assess the psychosocial problems during perimenopause, with the view that this study might help the healthcare professionals to gain an insight in to the psychosocial problems faced by the peri-menopausal women.

The Objectives of the Study:
1. To assess the psychosocial problems and coping strategies among peri-menopausal women.
2. To find out the correlation between psychosocial problems and coping strategies among perimenopausal women.
3. To find out the association between psychosocial problems scores with selected socio-demographic variables.

Method

A cross-sectional descriptive Survey research design was adopted for the present study. 200 women were recruited by Convenience sampling technique at selected PHC area, Bangalore urban and data was collected from June to December 2017. The study included perimenopausal women who are willing to participate in the study and able to read and write English/Kannada. The study excluded Peri-menopausal women who are mentally ill. The study protocol was approved from Intuitional ethical committee. Formal permission was obtained from Medical Officer and informed consent was taken from subjects. Data were analysed using Statistical package for the social Sciences software package (Version 23) and results were presented in table form.

Data collection Instrument

1. Socio-demographic proforma: It includes questions on their age, marital status, educational status, occupational status, religion, type of family, family income, dietary pattern, number of children and age at menarche.

2. Rating Scale: It consists of 30 questions to assess the psychosocial problems among peri-menopausal women with possible scores ranging from 0 to 60. Each item is scored as follows: 0 = “Not At All” 1 = “some extent” 2 = “very much”. A total score of 15-30 are classified as mild, 31-45 as moderate and above 45 as severe psychosocial problems.

3. Checklist: It consists of 16 items which assess the coping strategies adopted by women during the peri-menopausal stage. The scores assigned are “always-2”, “sometimes-1” and “never-0. The maximum score is 30. A score of 1-15 consider as
Poor coping strategies, 16-22 as Moderate and 23-30 as Good coping strategies.

**Results**

In the present study, Majority (65%) of the respondents were in the age group 45-50 years, most of them were married (90%). Majority (70%) of the respondents were Hindus and majority (39%) of the respondent’s educational qualification is No formal education. Majority (65%) of the respondent’s occupation is House maker and Majority (60%) from Joint family. Highest number (65%) of the respondent’s family monthly income is Rs 5000-9000 and Majority (60%) of respondents’ dietary pattern is mixed. Majorities (70%) of the respondents are having two children and Majorities (62%) are attained menarche at age of 13-16 years.

The findings shows that 12% of respondents are having severe psychosocial problems, 28 % of respondents are having moderate psychosocial problems and 30% of respondents are having mild psychosocial problems. With regards to subscale majority (47%) of respondents scored positive for generalized anxiety followed by social problems (38%) and lowest number (10%) of respondents scored positive for depression problems. The overall mean for psychosocial problems is 26±1.26. With regards to coping strategies 40% of respondents are having Poor coping strategies, 38% of respondents are having moderate coping strategies and 22% of respondents are having good coping strategies. The mean for coping strategies is 13±2.43.(Table 1)

Pearson’s correlation was calculated to examine the relationship between the psychosocial problems and coping strategies. Psychosocial problems is negatively correlating with coping strategies (-0.45), indicating that as Psychosocial problems are increasing coping strategies will be decreased. Chi-square was calculated to examine the association between psychosocial problems with selected demographic variables. It is revealed that there is significant association found between psychosocial problems with age, occupation and age at menarche. No association was found between remaining demographic variables.

**Table 1: Frequency distribution of respondents on psychosocial problems and coping strategies, n=200**

<table>
<thead>
<tr>
<th>Psychosocial problems</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Coping strategies</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>60</td>
<td>30</td>
<td>Poor</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Moderate</td>
<td>56</td>
<td>28</td>
<td>Moderate</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>Severe</td>
<td>24</td>
<td>12</td>
<td>Good</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>Normal</td>
<td>60</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Mean &amp; SD</strong></td>
<td></td>
<td></td>
<td><strong>Overall Mean &amp; SD is 26±1.26</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The study revealed that 12% of respondents are having severe psychosocial problems, 28% of respondents are having moderate psychosocial problems and 30% of respondents are having mild psychosocial problems. Our findings echo previous research evidence which shows that menopausal women suffered from psychosocial problems more than twice the rate of women and those who reported their first severe depression episode were also affected by severe anxiety disorders and physical problems. Rates of persistent mood symptoms were higher among early peri-menopausal women (14.9%–18.4%) than among menopausal women (8%–12%) and early peri-menopausal women had higher odds of irritability, nervousness, and frequent mood changes. The study conducted by Yazdanpanhi et al shows that there is higher risk of stress, anxiety and depression among women who are experiencing menopausal symptoms. An Indian cross-sectional study shows that level of syndromal depression and anxiety was found to be 86.7% and 88.9%, respectively among women aged 40–60 years. The present study revealed that
Psychosocial problems is negatively correlating with coping strategies and this is supported study conducted by Lam shows that low negative correlation between the bio psycho social problems and coping strategies.13

There is a need to create nationwide public awareness campaign through media, newspapers, radio programs, involvement of non-governmental organizations, schools and colleges, and integrating distribution of public education materials with multipurpose workers so that early detection of psychosocial problems among menopausal women is possible at the grass route level and future complication can be prevented.

**Limitations:** The study is limited to small sample size (200) and small number of subjects limits generalization of the study.

**Conclusion**

The study findings shown that peri-menopausal women are at risk for psycho-social problems and peri-menopausal women are using poor coping strategies to overcome the psychosocial problem. A psycho-social problems can results in major psychiatric illness, so early identification by health care team is very important for prevention of complications. Further research is needed to identify effective strategies for treating psycho-social problems among menopausal women.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


Comparative Study of Laproscopic Cholecystomy with Drain Versus no Drain

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Abstract

Out 50 patients of laparoscopic cholecystomy 25 patients group as LC with drain and 25 patients without drain and post laparoscopic colostomy (LC) complications of both groups of were noted. In group A(drain) 14 (56%) had infection of wound and in group B (No drain) had 2(8%), 9(36%) pain in group A and 3(12%) in group B (No drain)7(28%) of group A(drain) had blockage in pipe and 7(28%) patients had more length of stay at hospital and 3(12%) of group B had long stay at hospital 5(20%) morbidity in group A (drain) and 2(8%) morbidity in group B 4(16%) of group A (drain) had chest infection. This study was unable to prove that, drains were useful in reducing complications in laparoscopic cholecystomy.

Keywords: LC = Laparoscopic cholecystomy, GB = Gallbladder, Group A (drain) Group B (No drain).

Introduction

Study Gall bladder (GB) is a pear shaped temporary reservoir of bile situated on the inferior surface of the liver partially covered by peritoneum(1). G.B by virtue of its anatomical position at the gateway to the hilum of liver and by the virtue of its embryological development including its numerous variations is the commonest component of gastrointestinal tract, after the appendix requiring surgical invention. Gall stone disease is of the commonest biliary tract disorders known since ages require surgical intervention for total cure. In India gallstone are most common and costly digestive disease and major cause of hospitalization(2)(3).

Cholecystectomy without sub hepatic drainage was first described in 1913, and since then surgeons were divided weather to use it as a routine drainage or not in uncomplicated cases(4). Most surgery continues to use routine sub hepatic drain for the fear of bile leak and bleeding(5). Such complications invariable occurred in spite of sub-hepatic drainage. Easier convalescence decreased rate of complications and shortened hospital stay were the advantages of no drainage(6). Laparoscopic cholecystectomy (LC) after the advent in 1987 rapidly established itself as the gold standard method of gall stones. Arguments of drainage from open era continue into laparoscopic era, also. Hence attempt was made to compare the post-LC complications in drain and no drain patients groups.

Material and Method

Total numbers of 50 patients were selected for Laparoscopic cholecystectomy (LC). The selected patients were suffering with ACute cholecystitis with cholelithiasis. Acute cholecystitis with GB sludge. A calculus cholecystitis, symptomatic cholelithisis, chronic calculus cholecystitis, patients were divided 25 each as group A and B. Group A was choosen for LC with drain. Romovac suction drain was inserted after LC in sub-hepatic space and no drain tube was for group B patients. Post operatively both groups were treated with same antibiotics.

The patient had cholelethiasis withcholedocolithiasis with Juinside, carcinoma of G.B, Pyogenic mucocele G.B, cholecystohepatic duct, congenital anomalies of GB were excluded from the study.

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The pre-anesthetic check-up and fitness for all 50 patients were carried out. LC was done by standard four port method. Post operatively all the patients were given broad spectrum antibiotics, analgesia injections. The purpose is to study the pros and cons of placing a routine drain in the case of LC and evaluate the complications. Patient’s tolerance, comfort and morbidity, length of hospital stay.

The complications of drain and no drain were classified with percentage. The duration of the study was adult 2 years and 6 months.

**Observation and Results**

**Table-1 Comparative study of post LC complicate patients–14(56%) had infection in would in group A (Drain) patients while 2(8%) had infection in Group B (No drain), 9,(36%) had pain in group A (drain) and 3(12%) had pain in group B (No drain) 7(28%) patients had blockage in tube of drain, 7(28%) of the patients had long stay at hospital and 3(12%) had to stay long in hospital 5(20%) had morbidity in group A (drain) and 2 (8%) had morbidity in post LC surgery 4 (16%) had chest infection in group A (drain).

**Discussion**

In the present study of laparoscopic cholestectomy drain versus, no drain, 14(56%) of infection of wound observed in group A(drain), 2(8%) in group B(no drain) 9(36%) pain in group A(drain) and 3(12%)in group B(no drain)7(28%) blockage of drain in group A(drain), 7(28%) patients of group had to stay in hospital for longer time and 3(12%) in group B(no drain) had to stay for longer time in hospital, 5(20%) post LC morbidity in group A (drain) and 2(8%) in group B (No drain), 4(16%) chest infection in group A(drain) (Table-1). This findings were more or less in agreement with previous studies (7)(8).

It was also observed that quantity of sub hepatic fluid collection in both drain and no drain patients after LC was insignificant (9) and pain was very less in no drain patients as compared to drained patients.

Any drain, regardless of type is a foreign body that maintains a fistulous communication between a given tissue plane or cavity space and external environment.

Drain being a foreign body local infection is more likely consequences. In addition there is a threat of erosion into some adjacent structure, such as major blood vessels or on intestine. When in place the drain keeps tissue along the entire length of its passages separated and there by permits the egress of accumulated fluid and smaller matter.

Moreover the tract created is not a one-way street, for bacteria can migrate inward and colonize or supplant the microbial flora at the deepest extremely of drain(10). Hence the role of prophylactic drainage is much more uncertain. Despite being an established part of surgical practice there is little evidence to support the routine use of prophylactic drainage. In areas of gastro intestinal surgery evidence exists that drain placement has no demonstrable benefits.

**Summary and Conclusion**

The present study of comparison between laparoscopic cholecystectomy with drain versus, no drain can be concluded that there is no any practical benefit of post operative drain insertion in the patients with laparoscopic cholecystectomy. It offers no benefit in terms of post operative abdominal pain reduction shoulder pain reduction, nusea vomiting and fever in post-operative period. On the other hand it prolongs the hospital stay can also increase the chances of infection. In addition to pain and discomfort on the drain site so drain is not recommended as routine practice in LC.

This research paper was approved by ethical committee of Mamata Academy of Medical Sciences, Bachupally-500090 (Telangana)

**Conflict of Interest:** No

**Source of Funding:** No

**Table 1: Comparative study of post Laparoscopic cholecystectomy (LC) drain with no drain patients**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Complications</th>
<th>LC Group A with Drain patients</th>
<th>LC Group B with No Drain patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infection of wound</td>
<td>14</td>
<td>5.6</td>
</tr>
<tr>
<td>2</td>
<td>Pain</td>
<td>9</td>
<td>3.6</td>
</tr>
<tr>
<td>3</td>
<td>Blockage</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>The length of hospital stay</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>Post LC morbidity</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Chest infection</td>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>
References


7- Marcello, picchio, pierono lucarelli-Meto analysis of Drainage versus no drainage After laparoscopic cholecystectomy. JSLS. www.sls.org, viewdon 20-11-2018


Correlation of Glycaemic Control, Age and Duration of Disease with the Quality of Life in Type 2 Diabetes Mellitus Patients in the Field Practice Area of a Medical College

Novmeet¹, Varsha Parihar², Anshu Mittal³, Parul Sharma⁴

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Abstract

Diabetes is a chronic progressive endocrine disease characterized by elevation of blood glucose level. This disease is associated with decreased life expectancy; increased morbidity and diminished quality of life. Measuring QOL is important, because by doing so we can predict the patient’s capacity as well as ability to manage the disease and to maintain overall well-being and the long-term health. The objective of the study was to study the correlation of glycaemic control, age and duration of disease with quality of life in patients with Type 2 Diabetes Mellitus.

Material and Method: A cross-sectional study was conducted 200 patients, 100 each from rural and urban centers, at field practice area of Department of Community Medicine, MMIMSR, Mullana. The survey has been conducted with the help of pretested, semi-structured questionnaires. The softwares used for the data-entry and the analysis of the data are Microsoft Excel and IBM SPSS (Statistical Package for Social Sciences) version 21. FINDINGS: 42% of the subjects were between 61-70 years of age. 55.5% were males and 44.5% were females. 24% were having the disease for last 11-15 years. Males had higher QOL scores than females. Scores were more for the patients of rural areas than urban areas, those patients who did not develop any complications or co-morbidity, patients who were employed. Scores were also better for those patients who had HbA1c level less than 7. Scores were minimum for those subjects belonging to the age group of >70 years and belonging to upper socio-economic class.

Conclusion: Poor QOL was associated with increasing age, duration of disease and poor glycaemic control.

Keywords: Type 2 Diabetes Mellitus, Quality of life, HbA1c.

Introduction

Diabetes is a chronic progressive endocrine disease characterized by elevation of blood glucose level leading to various complications which further lead to morbidity and mortality. According to WHO, Diabetes Mellitus is defined by the level of hyperglycaemia giving rise to risk of microvascular damage (retinopathy, nephropathy and neuropathy). Abnormal high level of blood glucose is called as Hyperglycaemia which, if severe, acute and untreated, can be life threatening. It is associated with decreased life expectancy, increased morbidity, increased risk of macrovascular complications and diminished quality of life. Type 2 diabetes is characterized by insulin resistance in peripheral tissue and a delay or deterioration of insulin secretion, due to gradual deterioration of β-cell function. The onset of this
The current WHO diagnostic criterion for fasting plasma glucose is \( \geq 7.0 \text{mmol/l} (126 \text{mg/dl}) \), Blood Sugar (F): Shows the Fasting blood sugar of the respondent. The current WHO diagnostic criterion for post prandial (two hours after meal) plasma glucose is \( \geq 11.1 \text{mmol/l} (200 \text{mg/dl}) \), HbA1c: To check the Hemoglobin A1c to detect the glycaemic control of the patient. We took the cut off level of HbA1c as 7%. Section C: This section contained the SF 36 Questionnaire which is a generic questionnaire accommodating 36 items which measures Quality of Life (QOL) across eight subscales, which are both physically and emotionally based. For each subscale, scores are transformed to a scale from 0 (worst health) to 100 (best health). The eight different subscales or domains that the SF36 measures are as follows: Physical Functioning, Role Limitations due to Physical Health, Role Limitations due to Emotional Problems, Energy/Fatigue, Emotional Well-being, Social Functioning, Pain, General Health. STRATEGY: All the eligible patients were interviewed after taking due consent. The observations were noted as told. Height and weight for each of the patient was noted. After this, patient underwent laboratory investigation for FBS, PPBS and HbA1c to know the control. The findings regarding the investigations were noted from the lab. ANALYSIS OF DATA: The softwares used for the data entry and the analysis of the data are Microsoft Excel and IBM SPSS (Statistical Package for Social Sciences) version 21. Quantitative data has been presented as mean and standard deviation. Qualitative data has been presented as percentage to depict proportions. T-test and ANNOVA tests were applied to show the difference of scores among various categories of a particular variable, P value less than 0.05 was taken as significant at 95% confidence interval. Before getting the proforma filled, due consent was sought from all the subjects. Those not willing were respectfully excluded from the study. The study did not impose any financial burden in form of any drug usage or conduction of laboratory tests etc. Confidentiality was maintained throughout the study.

**Material and Method**

STUDY AREA: The area under study was Ambala and it was conducted in the Field Practice area of Department of Community Medicine, MMIMSR, Mullana. The health services in this area are catered through three rural and one urban health centres. STUDY DESIGN: Cross-Sectional study. STUDY PERIOD: Conducted over a period of one year from January 2015–December 2015. STUDY POPULATION: Inclusion Criteria: Subjects aged 20 years or above who had been diagnosed to have Type II DM attending the OPD of Urban and Rural health centers of the Community Medicine Department were included in the study. Exclusion Criteria: Those not willing were excluded. SAMPLE SIZE: 200 patients of Type II DM: 100 each from rural and urban centers. Previous experience showed that annually more than 100 patients of Type II DM reported to each of the health centers. Hence, it was decided to study at least 100 patients from each centre. STUDY TOOLS: Questionnaire The survey has been conducted with the help of semi-structured questionnaires. The questionnaire was divided in the following three sections: Section A: This section contained the socio-demographic profile of the study participants. The social demographic profile consisted of following areas: Age: The age of every subject was recorded to the nearest completed year. Sex: It determined whether the subject is male or female, Address: The address of the subject was also entered to ensure the area of the study. Section B: In this section the information was ascertained about the variables related to the disease. The variables are as follows: Duration: It shows that for how many years the subject is suffering from the disease, Blood Sugar (F): Shows the Fasting blood sugar of the respondent. The current WHO diagnostic criterion for fasting plasma glucose is \( \geq 7.0 \text{mmol/l} (126 \text{mg/dl}) \), Blood Sugar (PP): Shows the post prandial blood sugar of the respondent. The current WHO diagnostic criterion for post prandial (two hours after meal) plasma glucose is \( \geq 11.1 \text{mmol/l} (200 \text{mg/dl}) \), HbA1c: To check the Hemoglobin A1c to detect the glycaemic control of the patient. We took the cut off level of HbA1c as 7%. Section C: This section contained the SF 36 Questionnaire which is a generic questionnaire accommodating 36 items which measures Quality of Life (QOL) across eight subscales, which are both physically and emotionally based. For each subscale, scores are transformed to a scale from 0 (worst health) to 100 (best health). The eight different subscales or domains that the SF36 measures are as follows: Physical Functioning, Role Limitations due to Physical Health, Role Limitations due to Emotional Problems, Energy/Fatigue, Emotional Well-being, Social Functioning, Pain, General Health. STRATEGY: All the eligible patients were interviewed after taking due consent. The observations were noted as told. Height and weight for each of the patient was noted. After this, patient underwent laboratory investigation for FBS, PPBS and HbA1c to know the control. The findings regarding the investigations were noted from the lab. ANALYSIS OF DATA: The softwares used for the data entry and the analysis of the data are Microsoft Excel and IBM SPSS (Statistical Package for Social Sciences) version 21. Quantitative data has been presented as mean and standard deviation. Qualitative data has been presented as percentage to depict proportions. T-test and ANNOVA tests were applied to show the difference of scores among various categories of a particular variable, P value less than 0.05 was taken as significant at 95% confidence interval. Before getting the proforma filled, due consent was sought from all the subjects. Those not willing were respectfully excluded from the study. The study did not impose any financial burden in form of any drug usage or conduction of laboratory tests etc. Confidentiality was maintained throughout the study.

**Findings:** A total of 200 Type 2 Diabetes Mellitus patients participated in the study. Majority (42%) were between 61 to 70 years of age. 30% were between 51 to 60 years, 15.5% were between 41 and 50 years of age, 7.5% were above 70 years and 5% were 40 years and below. 55.5% were males and 44.5% were females.
Majority (24%) were having the disease for last 11-15 years, 23% were having the disease for less than 5 years, 22.5% were having the disease for last 6-10 years, 19.5% were having the disease for last 16-20 years and 11% of all the subjects were having the disease for more than 20 years.

Table 1: Average SF 36 score as per age

<table>
<thead>
<tr>
<th>Age</th>
<th>≤40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>&gt;70</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF</td>
<td>81 ± 20.111</td>
<td>77.42 ± 17.362</td>
<td>61.83 ± 19.593</td>
<td>56.13 ± 22.871</td>
<td>50.33 ± 23.258</td>
<td>61.95 ± 22.666</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>RLPH</td>
<td>65 ± 45.947</td>
<td>83.87 ± 33.880</td>
<td>67.92 ± 40.151</td>
<td>68.75 ± 39.170</td>
<td>45 ± 48.366</td>
<td>68.88 ± 40.373</td>
<td>0.045</td>
</tr>
<tr>
<td>RLEP</td>
<td>56.66 ± 47.27</td>
<td>76.34 ± 37.705</td>
<td>68.88 ± 40.651</td>
<td>67.85 ± 42.182</td>
<td>55.56 ± 41.152</td>
<td>67.99 ± 41.181</td>
<td>0.492</td>
</tr>
<tr>
<td>EF</td>
<td>68 ± 12.293</td>
<td>69.19 ± 12.322</td>
<td>59 ± 15.617</td>
<td>54.70 ± 21.476</td>
<td>46.33 ± 19.130</td>
<td>52.56 ± 22.762</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>EWB</td>
<td>71.6 ± 12.14</td>
<td>72.23 ± 14.87</td>
<td>59 ± 15.617</td>
<td>45.38 ± 21.476</td>
<td>47 ± 18.879</td>
<td>58.85 ± 20.898</td>
<td>0.022</td>
</tr>
<tr>
<td>SF</td>
<td>65 ± 9.86</td>
<td>64.91 ± 16.9</td>
<td>52.91 ± 23.383</td>
<td>48.08 ± 20.346</td>
<td>52.27 ± 23.741</td>
<td>41.55 ± 22.681</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PAIN</td>
<td>67 ± 22.724</td>
<td>66.69 ± 16.824</td>
<td>56.75 ± 20.038</td>
<td>51.19 ± 21.486</td>
<td>40 ± 24.183</td>
<td>53.68 ± 21.442</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>GH</td>
<td>54 ± 14.491</td>
<td>59.84 ± 17.392</td>
<td>42.58 ± 22.690</td>
<td>35.83 ± 20.997</td>
<td>47 ± 18.879</td>
<td>52.56 ± 22.762</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

PF: Physical Functioning, RLPH: Role Limitation due to Physical Health, RLEP: Role Limitation due to Emotional Problems, EF: Energy/Fatigue, EWB: Emotional Well-Being, SF: Social Functioning, GH: General Health

Table No. 2: Average SF 36 score as per duration of the disease

<table>
<thead>
<tr>
<th>Duration</th>
<th>≤5 years</th>
<th>6-10 years</th>
<th>11-15 years</th>
<th>16-20 years</th>
<th>&lt; 20 years</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF</td>
<td>77.07 ± 15.26</td>
<td>69.11 ± 18.25</td>
<td>56.46 ± 23.383</td>
<td>48.08 ± 20.346</td>
<td>52.27 ± 23.741</td>
<td>61.95 ± 22.666</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>RLPH</td>
<td>82.07 ± 32.772</td>
<td>77.78 ± 35.843</td>
<td>60.94 ± 40.903</td>
<td>56.41 ± 45.421</td>
<td>62.5 ± 44.152</td>
<td>68.88 ± 40.373</td>
<td>0.009</td>
</tr>
<tr>
<td>RLEP</td>
<td>76.81 ± 37.756</td>
<td>76.29 ± 38.681</td>
<td>62.49 ± 40.468</td>
<td>59.82 ± 44.711</td>
<td>59.09 ± 44.761</td>
<td>67.99 ± 41.181</td>
<td>0.117</td>
</tr>
<tr>
<td>EF</td>
<td>69.02 ± 10.253</td>
<td>60.78 ± 16.024</td>
<td>53.96 ± 17.442</td>
<td>53.85 ± 16.20</td>
<td>47.95 ± 17.57</td>
<td>58.28 ± 16.832</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>EWB</td>
<td>71.83 ± 12.392</td>
<td>65.71 ± 21.647</td>
<td>45.33 ± 21.506</td>
<td>42.67 ± 21.684</td>
<td>37.09 ± 17.639</td>
<td>52.56 ± 22.762</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>SF</td>
<td>63.85 ± 14.488</td>
<td>60.27 ± 19.454</td>
<td>46.35 ± 23.057</td>
<td>47.75 ± 21.435</td>
<td>45.45 ± 22.673</td>
<td>53.68 ± 21.442</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>PAIN</td>
<td>63.37 ± 18.357</td>
<td>65.27 ± 20.185</td>
<td>55.62 ± 21.742</td>
<td>54.42 ± 20.714</td>
<td>51.13 ± 21.736</td>
<td>58.85 ± 20.898</td>
<td>0.014</td>
</tr>
<tr>
<td>GH</td>
<td>59.67 ± 13.84</td>
<td>47.56 ± 23.37</td>
<td>33.54 ± 21.337</td>
<td>29.74 ± 18.28</td>
<td>29.77 ± 18.675</td>
<td>41.55 ± 22.681</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table No. 3: Average SF 36 score as per HbA1c level

<table>
<thead>
<tr>
<th>HbA1c (%)</th>
<th>Less than 7</th>
<th>7 and above</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF</td>
<td>80.54 ± 13.354</td>
<td>48.49 ± 18.036</td>
<td>61.95 ± 22.666</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>RLPH</td>
<td>83.04 ± 30.350</td>
<td>58.62 ± 43.627</td>
<td>68.88 ± 40.373</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>RLEP</td>
<td>80.95 ± 34.819</td>
<td>58.61 ± 42.989</td>
<td>67.99 ± 41.181</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>EF</td>
<td>70.83 ± 8.208</td>
<td>49.18 ± 15.589</td>
<td>58.28 ± 16.832</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>EWB</td>
<td>74.81 ± 6.565</td>
<td>36.45 ± 15.557</td>
<td>52.56 ± 22.762</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>SF</td>
<td>66.96 ± 13.109</td>
<td>44.07 ± 21.204</td>
<td>53.68 ± 21.442</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>PAIN</td>
<td>69.19 ± 18.392</td>
<td>51.35 ± 19.410</td>
<td>58.85 ± 20.898</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>GH</td>
<td>62.68 ± 12.740</td>
<td>26.25 ± 14.519</td>
<td>41.55 ± 22.681</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

In this study 55.5% subjects were males and 44.5 were females. Similarly, in the study conducted by Mathew et al (2014), 53% were males and 47% were females. In role limitation due to physical health domain better results were observed in the age group of 41-50 years and the difference was significant. Similarly, in role limitation due to emotional problems domain better results were observed in the age group of 41-50 years but the difference was statistically significant this time. Again, in the Energy/fatigue domain, better results were observed in the age group of 41-50 years and the difference was statistically significant. For the rest of the domains, age group ≤40 years had better results and the difference was significant. Spasić et al (2014) also concluded that patients in the younger age groups had better QOL as compared to their older counterparts and
this association was significant. These findings were in agreement with the study conducted by Papadopoulos et al (2007) in Greece, in which they found that the patients from younger age groups scored higher for all the eight domains. In the present study it was observed that with increase duration of disease quality of life tends to decline for all the domains with highest scores for the subjects having disease for less than 5 years and lowest for those having the disease for >20 years. It was also found that this association was significant for all the domains except role limitations due to emotional problem domain where these results were not significant. Similarly, in the study conducted by Thommasen et al, they found that as the duration of the disease increased, declines in “physical functioning,” “role physical,” and “general health” scores was observed. In this study we found that scores were better for patients who had HbA1c level less than 7 than those who had it more than 7. Similar observations were also found in the study conducted by Imran et al (2010) in Malaysia, in which they found that patients with poor glycaemic control had the lowest scores in all the scales of the SF-36. The two scales that were most severely compromised were the Physical Functioning and Role Physical scales. Similar trend was observed for all the remaining domains. The difference was statistically significant. This observation shows that good control of diabetes plays important role in improving the quality of life. Similarly, Akinci et al (2008), in a study they conducted in Turkey, found that the patients with higher levels of HbA1c had poor quality of life scores than the patients with low HbA1c levels.

**Conclusion**

Type 2 diabetes mellitus is linked to a poorer perception of health-related quality of life. Diabetic patients have comparatively poorer quality of life than non diabetic population. QOL is especially affected with increasing age, increased duration of disease and poor glycaemic control. Therefore, it must be kept in mind that diabetes have a great impact on patient’s life that cannot be measured solely by the quantification of objective clinical parameters (like morbidity and mortality). We recommend that efforts should be put on to improve the QOL in combination with medical treatment in order to achieve the overall wellbeing and health status of the patients.

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**Ethical Clearance:** The study was approved by the Institution Ethics Committee of the University.

**References**

Tuberculosis and Mental Health: The Interface

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Abstract

In the era of the Sustainable Development Goals and the ambitious End TB Strategy, it is vital to recognize that only the microbiological cure of tuberculosis (TB) will not be adequate for bringing this public health adversity under control, let alone its eradication. Mental disorder which is an important risk factor as well as a ramification of TB, very often escapes attention during deliberations and discourses on TB. Mental illness in its various forms contributes significantly to the global burden of death and disability. The comorbid conditions of TB and mental health add to the challenges that already prevail in the management of each. This study tries to look into the inter-linkage between TB and mental health by exploring existing literature and identifying the pathways through which each becomes a fuelling factor for the other. Designing of policy to effectively address each of these health conditions within the conceptual as well as technical and operational framework for dealing with the other is the need of the hour.

Keywords: Tuberculosis, Mental health, Comorbidity, Burden of disease.

Introduction

Tuberculosis (TB) remains a public health emergency. It currently stands as the leading cause of death from a single infectious agent, ranking above HIV-AIDS and substantially contributing to the global burden of disease. India, bearing a staggering 27 per cent of incident TB cases worldwide, tops the list of the 30 high TB burden countries and accounted for a glaring proportion of ‘missed cases’ globally, reflecting a mixture of under-diagnosis and under-reporting of TB cases. TB was declared a public health emergency by the WHO in 1993 followed by most countries adopting the DOTS strategy in their national TB control programmes. The standard treatment regimen for drug sensitive TB comprises a six months course of four first-line anti-TB drugs. Treatment default has been one of the prime reasons for the rampant emergence of multi drug-resistant TB which takes a longer treatment span with second line drugs that are both more toxic and expensive. TB is strongly related to the socioeconomic gradients of a population. The association between TB and poverty is well documented. Although not exclusively a disease of the poor, deprivations typically associated with poverty like malnutrition, crowded and unsanitary living conditions, substance abuse and lack of disease related awareness due to illiteracy substantially increase the risks of infection and disease. The disease also happens to be associated with severe social stigma.

Several medical conditions present risk factors for TB like HIV, diabetes, silicosis, use of tobacco and alcohol abuse and are also responsible for detrimental TB treatment outcomes. Also, TB can make the course of such diseases more complex. Either way, prevalence of such comorbidities in the population adds to the burden of TB. An important comorbidity associated with TB but less deliberated on is mental disorder. The inter-linkage between mental health and TB often escapes attention in practice and in policy prescriptions while each continues to contribute to the dilemma in management and control of the other. The paramount significance of mental health has been quite succinctly brought out through the definition of ‘health’ by the WHO as constituting a state of complete physical, mental and social well-being and not just the absence of disease or infirmity. Mental illnesses in varied forms like anxiety disorders, depression, schizophrenia and dementia to name a few are responsible for nearly 13 per cent of the global burden of disease, besides being important catalysts for other diseases. The low and middle income countries are home to 80 per cent of people living with some mental disorder and the increasing burden may be traced to factors like paucity...
of resources allocated towards mental health particularly in these settings and underutilization of existing services due to lack of awareness as well as stigma attached to mental illness\textsuperscript{9}. A plethora of social, psychological and biological factors are responsible for preserving the mental health of an individual at any point of time. People with mental health conditions are often deprived of opportunities of education and income, impeding their scope for socioeconomic development and resulting in marginalisation and increased vulnerability.

The liaison between TB and mental health, despite its implications on the disease burden of each condition, remains a largely under-researched area.

**The interface: mental health implications of TB:**
The impact of an infectious disease of chronic nature like TB with a typically lengthy duration of treatment transcends mere physical impairment. According to the WHO, “depression has been an invisible burden for people with TB” and “the mental well-being of TB patients during their treatment has often been overlooked”.

TB affects people mostly in their productive years of life resulting in grave socioeconomic consequences for the household. In the developing countries that bear the major brunt of TB, despite availability of free of charge diagnostic and treatment services provided by the national tuberculosis programmes directed towards TB control, barriers like geographical distance of health facility from patient’s residence, direct costs of travel, food and accommodation, inconvenient timings of DOTS clinics, indirect costs of foregone earning and lack of information about service availability compel patients to fall back on easily accessible private sources of care both formal and informal as they navigate through not so efficiently functioning health systems seeking relief from symptoms. This often results in a ‘medical poverty trap’ situation for households particularly the economically vulnerable ones, even before such patients can be put on effective treatment\textsuperscript{9,10}. TB is thus not only a result but also a cause of poverty. Financial hardship in the household following catastrophic expenditures on diagnosis and treatment of TB on one hand and dwindling income due to inability to work for reasons of physical incapacity caused by the disease is a pressing reason for development of stress and anxiety in the patient particularly if he or she happens to be the sole bread winner in the family. Studies hint at exposure to chronic and stressful life events and financial predicament as important mediators in stimulating mental ill health\textsuperscript{11}.

Strong social stigma shrouds TB. Studies have highlighted the social implications of getting diagnosed with TB or being under TB treatment as constituting rejection from family, friends and neighbours, social ostracisation, discrimination and fear of being thrown out of job on revelation of positive TB status. Stigma affects health seeking behaviour as people with symptoms hesitate to go for diagnosis, patients tend to conceal their disease status from family and relatives and those on treatment face difficulties in continuing with it. Social adversities are felt more by women with diagnosed TB, in the form of difficulties in getting married, harassment by in-laws and other members of family, broken marriages and dismissal from work\textsuperscript{12,13,14}. Getting diagnosed with TB or undergoing treatment for the same has been found to be associated with mental anguish, depression, feelings of loneliness and uselessness, anxiety and low self-esteem. It has been documented in the context of another communicable disease, HIV, that stigma and discrimination in all forms are ultimately linked with depressive traits among people living with HIV\textsuperscript{15}. The potential pathways through which a physically impairing condition like TB may culminate into a mental affliction thus seem to be economic crisis and social crisis. The impact of TB on mental health may be analysed at two levels—first, at the level of diagnosis of the disease where the perceived social stigma associated with TB instils in the patient fear of social isolation, estrangement from kins and job loss; additionally, perception of self as transmitter of infection leads to a sense of guilt and inferiority that in turn reinforces stigma. The burden of stigma itself jeopardises mental well-being. The second level constitutes the treatment phase where common side-effects of anti-tubercular drugs like gastrointestinal complaints, vertigo, nausea, headache, skin rash, dizziness and mood disorders cause irritability and depression among patients. Several anti-TB medications like cycloserine, isoniazid, ethionamide and linezolid may trigger severe forms of mental disorders. Drug-induced psychosis can potentially fuel self-harming thoughts like suicide. Mental illness, in particular severe depression, are highly prevalent among patients undergoing multi drug resistant TB treatment\textsuperscript{16}. Studies conform to poor quality of life of TB patients with frequent bouts of depression, feelings of anxiety on diagnostic disclosure and as well as development of drug-induced psychiatric symptoms in patients under treatment ultimately leading to extreme outcomes like suicidal deaths\textsuperscript{17,18}. Also, physical weakness resulting from the disease and side-effects of drugs lead to
frequent absence from work and loss of income. Besides travel, accommodation and the like during the course of treatment, nutritious food constitutes an indispensible component of expenditure which adds to financial burden and consequently mental strain.

Mental disorders have been estimated to be prevalent among 40 to 70 per cent of people with diagnosed TB. Presence of the comorbid condition of mental illness in TB patients, if left unscreened and untreated, leads to poorer outcomes of TB treatment and adds to the burden of disease and disability.

Mental disorders as a risk factor for TB:
Patients with mental illnesses are also at an increased risk of exposure to TB infection with higher rates of homelessness, poor nutrition, addictions to smoking and alcohol and co-morbidities like diabetes and HIV. Limited and mostly crowded accommodation options for patients with mental disorders like group homes and rehabilitation centres rather provide a congenial environment for an outbreak of TB. Studies have identified that patients with depression are at a significantly higher risk of pulmonary TB as compared to those without depression while controlling for age, sex and comorbidities. Patients with mental illness are more likely to exhibit inadequate health seeking behaviour due to a number of reasons like inability to recognize disease related symptoms, lack of clarity regarding who in the family or otherwise is responsible for the healthcare of such patients and ineffective communication between the patients and their providers about symptoms and risk factors. These contribute to diagnostic delays among patients suffering from mental disorders resulting in prolonged periods of transmission of infection in the family and community with subsequent outbreaks of TB.

Discussion
TB management and control strategies particularly in the high burden developing countries mostly remain preoccupied with symptoms remission, drug regimen and treatment. With excessive emphasis on only the medical aspect of the disease, ancillary facets like individual care and counselling of the patient and family members, psychological assistance, provision of treatment adherence support and nutritional support that are equally significant for ensuring desired treatment outcomes, have taken a back seat. Counselling constitutes an inevitable part of TB treatment by providing the much needed support system to patients to help them cope with the woes of lengthy and sometimes expensive treatment, reduced income due to inability to work, responsibilities in the family, perceived loss of social standing and similar unsettling factors. Also, side-effects of anti-tubercular drugs in the form of physiological disturbances, anxiety, mood fluctuations and even depression can potentially hamper the effectiveness of treatment. Experiences of discomfort often induce TB patients to abandon treatment midway, the moment they start feeling better. Treatment non-compliance can have serious consequences for community health including continued transmission of infection and emergence of multi drug-resistant and extensively drug-resistant strains of TB. At the level of the patient, quitting treatment leads to development of drug resistance with greater morbidity and mortality. Timely health seeking and treatment adherence are additional challenges for patients living with TB and mental illness with consequent unfavourable treatment outcomes. Family support assumes a greater role in TB control as the duration of treatment is an extended one as compared to other clinical conditions so that patients are expected to be requiring greater care as well as nutritional and livelihood support. Compassion and cooperation of family members become extremely important in helping the patient tide over disease related mental anguish and cope with the stresses of diagnostic revelation and treatment. Educating the patient’s family and community at large about TB, its mode of transmission, prevention, importance of treatment compliance and curability of TB are vital besides medical intervention as it helps raise disease related awareness on one hand and reduce stigma and negative attitudes about TB on the other. Adopting means to ensure greater acceptability of TB patients in the mainstream of society should essentially constitute an important element in TB management and control efforts so that their mental health can be preserved along with restoration of physical health. In India for example, the Revised National Tuberculosis Control Programme (RNTCP) has largely been target oriented focusing on detection and cure of TB, with little attention to mental health. Scarcity of official data on depression and other mental health complaints or even suicidal attempts by TB patients bears testimony to this gap in the treatment regime. Nevertheless, the RNTCP lays down counselling as a vital component of treatment in the guidelines that it provides for the management of drug resistant TB. Scaling up of professional counselling services and the ratio of counsellor to patients which may serve as an effectiveness index, needs to be addressed.
Concluding Remarks: Both TB and mental illness have substantial individual contributions towards the global burden of disease. Further, each constitutes an important comorbidity factor for the other, adding to the challenges that already exist in the management and control of each. Mental ill health, besides being a disabling factor in the individual concerned, also results in poor treatment outcomes for TB patients with greater morbidity, mortality, treatment default and resistance to drugs and increases transmission in the community. Yet, there remains a dearth of measures in the TB control programmes across developing countries in particular to adequately address their mental health care needs. Lack of a compulsory and in-built mental health support apparatus undertaking routine delivery of screening and counselling services constitutes a conspicuous lacuna in the TB management and control efforts that requires to be urgently looked into. Detection and proper management of mental and behavioural disorders improve patients’ quality of life as well as ensure better attainment of treatment objectives. That caring for the mental health of TB patients is intrinsic to their treatment of TB needs to be recognised, promoted and implemented at the earliest. This calls for physicians treating TB patients and psychiatrists addressing mental aberrations in patients to be aware of the pathways of interaction between these two conditions, particularly with respect to drugs administered in the treatment of each. Synergy between national TB control programmes and mental health campaigns in countries can be an effective step and is important for accommodating and addressing the disease burden caused by comorbid conditions of mental ill health and TB. Collaborative endeavours like the “Let’s talk about depression and TB” campaign as part of the broader “Depression: let’s talk” campaign launched by the WHO are optimistic developments that can guide nations towards this end. Without the alignment of consolidated efforts directed towards regular detection and management of mental disorders within TB control programmes and screening of patients with mental health complaints for TB, the ambitious targets of the End TB strategy and the Sustainable Development Goals calling to ensure healthy lives and well-being for all at all ages will be hard to achieve.

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Emerging Trends of Pharma Industry Policies for Ensuring Women Retention

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Abstract

Today, behaviour of women employees has changed the environment of the private organization. Young women employees always ready to switch over whenever she dissatisfy with any reason in the job. Retention strategy is a powerful recruitment tool. Private organizational issues matters as lost knowledge and training time. HR managers should identify the needs of the women employee and then devises the retention strategies. As different individuals have different priorities does not fit one strategy. HR professionals face the vital challenge to retain talented women employees. Retention strategies are fall into four categories—job enrichment, salary, working conditions and education, addressing these issues this article demands a specialized approach that emerge new fangled women friendly policies which foster gender neutral workplace in developing retention strategies.

Keywords: Retention strategies for female employees, scope, trends and policies.

Introduction

“New-Fangled Women Friendly Policies Which Foster Gender Neutral Workplace”

The fast developing knowledge economy coupled with the information technology during the last two decades has totally changed the complexion of our business and employment relations. The globalized economy and the labour market have further added new dimensions to this phenomenon. India has taken advantage of this growing trend entering the Pharmaceutical sector of economy and industry¹. Though the Indian is fast responding and taking the challenge head on and competing effectively in the new Pharmaceutical dominated global market the industrialist-employer in the Pharmaceutical industry are facing another challenge, namely, finding suitable people to recruit to the jobs being generated by them. When and where they are able to find people who can meet their expectations, they are facing the new challenge that this is coming their way in the form of retaining the people working with them. In fact, recruitment and retention are two sides of the same coin. Economically and financially employee retention, of late has acquired greater significance.² It is much more costly and time consuming to find the right replacements. Resultantly the employee retention has turned out to be a critical challenge to the employers. They have become very sensitive to the problem of employee retention. Researchers also are seized of the situation and getting involved in this challenge.

Researchers have found that workplace culture and women’s personal character traits play major roles in retention. So what are the things that make a difference? Women prefer workplaces that are collaborative rather than hierarchical, explains Heather Metcalf, director of research and analysis at the Association for Women in Science³. And they are more apt to stay in work environments that allow for creativity and flexibility, she says. Conversely, women are fleeing companies that encourage employees to practically live at work, she says. While 71 percent of women with young children work outside the home, according to the Pew Research Center, women still shoulder more responsibility for child care and elder care than men. So living at the office to show they are committed to their jobs is not an option."Creating workplaces that have a lot of flexibility, that allow for people to work in a way that fits best with them, boosts creativity and job satisfaction," Metcalf says, and these are the settings where women stay and thrive. No matter what type of organization women work for, large or small, public or private, their
relationships with their immediate bosses are critical to whether they feel engaged and content. The ideal supervisor is committed to his or her subordinates’ advancement and development, assigns stretch projects, and provides necessary support and feedback to help them be successful, Bilimoria says. And workplaces that employ women in higher levels are more apt to retain women at the lower levels.

Objectives of the Study
1. To identify the emerging trends and policies for retaining women employees in Pharmaceutical industry
2. To identify the scope of ensuring women retention in Pharmaceutical industry
3. To suggest new policies that are women friendly and that will foster gender neutral work place

Scope of the Study: Keeping in view the critical problem the organizations in the Pharmaceutical industry have been facing ever since the Pharmaceutical industry came into existence in India to retain their performing employees at different levels, this study seeks to understand the different strategies of different organizations for retaining their employees and examine whether those strategies have any universal base and comparison with the experiences of high-tech organizations or organizations depending on the knowledge workers or professional employees and if so what are these common employee retention strategies being in practice in different organizations in the Pharmaceutical industry in Chennai.

The scope of this study is confined to Pharmaceutical industry in Chennai. The study throws light through valuable suggestion to increase the female employees’ retention in the organization. This study can help the management to find the weaker parts of the female employee feels towards the existing organization retention strategies and also helps in converting those weaker part in to stronger by providing the optimum suggestions or solutions. This study is a clear guide for the solution seeker about the factors which induced women employees to stay back in the same organization. Special attention has been shown in this research about their empowerment in the society economically as well as professionally. Career development is an existing trend to be stay in their organization and how these factors induced them; all those answers will be make this research unique and an find an enhanced approach towards balancing gender at workplace.

Emerging Trends For Retaining Women Employees:

More Women Leaders: The first thing that gives a woman confidence at her workplace is having women leaders to look up to. This also indicates that the company offers them an environment conducive to scale the corporate ladder. It would be more beneficial if women leaders took on the role of mentors in mentorship programmes that are already at work in certain companies.

Sexism-Free Work Culture: Every workplace must offer a safe and secure environment for employees that help them grow personally and professionally. But it is a sad reality that this is not always true in India. Some of the biggest companies here lack sexual harassment cells and policies against discrimination at the workplace. Create a culture that does away with sexism at work by educating your employees about ‘unconscious biases’ and ‘benevolent sexism’.

Pay men and women equally: When you hire talented women, understand that they put in the same amount of hard work and time as the men and acknowledge that with equal pay. Offer them equal opportunities and trust them with responsibilities similar to what their male counterparts are given to foster increased confidence and professional growth.

Transparent Performance Evaluation Policy: Make it clear to all employees how they are going to be evaluated and about the requirements to be met to make career advancements. It is commonly seen that most organisations promote men on potential and women only on measurable and proven performance. Check your talent management systems and do away with such biases.

Flexible Work Schedules: Many Indian companies already offer flexible schedules to their employees, but most often they turn out to be only the freedom to choose their shifts. True flexibility means allowing your employees to adjust their work schedules to maintain a healthy work-life balance without being penalised. As long as they turn in their work on time and are producing results, their physical absence from office shouldn’t be a concern. Having flexible schedules end up in happier, more satisfied and extremely productive employees. Good intentions, alone, are not enough to make women
employees want to work for your company. Treat them well, provide them opportunities for professional development and create a culture that values their talents and respects them as individuals.

**Paternity Leave:** Reputation being known as a company that promotes gender equality will go a long way in attracting top female talent. And offering a generous paternity leave policy is one of the most effective ways to demonstrate a commitment to women and working families. While paternity leave is designed for men, it ultimately benefits working mothers and children. Furthermore, since most states don’t require it by law, implementing paternity leave shows that an employer is willing to go above and beyond to promote equality and inclusion.

**Empower Female Employees to Shape Company Culture:** Startup land has become famous for offering a fraternity-like atmosphere: free beer, video games, and personalized goodies. While it’s not fair to say women don’t like these perks, tech companies should include women on the teams that are shaping company culture. Expanding the activities beyond those evoking college dorm rooms will help attract talented women who don’t feel connected to those traditions.

Finally, it should go without saying that the best way to attract female talent is to offer competitive wages and excellent benefits that will support them in their life choices regardless of if they decide to have children or not. While the grand gesture of Face book and Apple will surely help their recruitment efforts, our corporate culture as a whole needs to focus on making small, but important, everyday changes and sticking with them

**Career Development Program:** Every individual is worried about her career. You can provide them conditional assistance for certain courses which are beneficial from your business point of view. Conditional assistance means the company will bear the expenses only if she gets an aggregate of certain percentage of marks. And entrance to that course should be on the basis of a Test and the number of seats to be limited. For getting admitted to such program, you can propose them to sign a bond with the company, like they cannot leave the company for 2 years or something after the successful completion of the course.

**Timely increments:** Timely Increments in salary makes talented employees to stick to the organisation for long time. Many researchers have found that the salary and increments were the core reasons behind leaving of employees to other organisations and competitor organisations attracts talent by showing sole monetary benefits, indeed most of the talent is getting attracted for this reason. It is universal fact and one has to accept that the monetary benefit is the core reason for an employee decision-making on retention in the organization

**Conclusion**

In a competitive business climate, retaining key employees is vital for the health of the company. But when these key employees are women, many corporations and industries continue to be befuddled as to how to retain this valuable cohort. Indeed, it’s surprising how many supposedly modern institutions are caught in a time-warp. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small. The good news is, above few simple strategies can vastly improve conditions for female employees. Women who are trained to develop an executive-type persona in terms of gravitas that is, confidence, poise under pressure and decisiveness—as well as communication and appearance become more confident and are better able to command a room, thereby clearing a path to high-stakes and high-visibility positions. By utilizing some or all of these ideas, companies can benefit from a healthier and more balanced work environment. It just makes sense.

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Prevalence of Molar Incisor Hypomineralization among School Children Aged 9 to 12 Years in Virajpet, Karnataka, India

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Abstract

Aim: To determine the prevalence of molar incisor hypomineralization among school children aged 9 to 12 years in virajpet, Karnataka.

Method: This cross-sectional descriptive study consisted of 1600 school children aged 9-12 years selected by stratified cluster sampling procedure. The European Academy of Pediatric Dentistry criteria were followed for MIH diagnosis. Chi-square test was used to analyze the categorical data. \( P \leq 0.05 \) was considered for statistical significance.

Results: The prevalence of MIH is 13.12 % with no gender predilection. 10 year old children showed the highest prevalence (15%) among all the age group. Majority of children with MIH (70.2%) have lesions in both molars and incisors with demarcated opacities and atypical restorations being the most frequent defect type.

Conclusion: Prevalence of MIH was 13.12% in the 9-12 year child population in Virajpet. There is a need for a proper planned preventive and restorative program with regard to the increasing prevalence of MIH.

Keywords: First permanent molar, Developmental Defects, Hypomineralization, Post eruptive breakdown, Incisors.

Introduction

Dental enamel has a number of properties making it a unique tissue. It is the hardest tissue in the body and has a very high proportion of inorganic matter, mainly hydroxyapatite. The ameloblast has a limited reparative capacity; therefore disturbances occurring during the mineralization of enamel will remain as permanent marks. Defects in enamel quality or in other dental hard tissues are important implications for the understanding of evolution, function, origin and relation to etiological factors behind developmental disturbances but also how environmental factors may influence on the mineralization of the dental hard tissues. These unique properties of teeth have been widely used in research within biology, anthropology, archeology and several other areas.\(^1\)

\(^{1,2}\) The molar incisor hypomineralization (MIH) is defined as a qualitative defect of the enamel characterized by the progressive and simultaneous hypomineralization of the enamel structure of the first permanent molars which is of systemic origin, which may be associated frequently with incisors.\(^3\)
It was first defined by Weerheijm et al. in 2001. It is also called as “hypomineralized permanent first molars (PFMs)”, “idiopathic enamel hypomineralization”, “nonfluoride hypomineralization” “dysmineralized PFMs” and “cheese molars”. Knowledge about the magnitude of MIH seems desirable as it is vulnerable for consequences like rapid caries development, early enamel loss, soft structure and sensitivity.  

MIH is recognized as a global dental problem and epidemiologic reports from all over the world are continuously published. The global prevalence of MIH ranged from 2.4% to 40.2%. Majority of the studies that reported MIH were from European countries with a prevalence range of 3.6% to 37.5%. Prevalence in middle and South East Asian countries ranged from 9.25% to 20.2%. Prevalence data from India were scant and reported a prevalence of 6.31% to 9.46%. The prevalence is almost 40% percent in Denmark and Brazil. As many as 5% of the children in a Swedish population have a severe form of MIH and will experience extensive and difficult treatment. It has been reported that children with MIH have ten times more dental treatment compared with a group of children with clinically healthy first molars.  

The prevalence of MIH was not well documented due to several diagnostic classification in the literature. The various indices used are Alaluusua et al. criteria (1996), developmental defects of enamel index (DDE), Kemoli criteria (2008), Koch et al. criteria (1987), and the European Academy of Pediatric Dentistry (EAPD) 2003 criteria. Knowledge about the magnitude of MIH seems desirable as it is vulnerable for consequences like rapid caries development, early enamel loss, soft structure and sensitivity.  

Severe clinical manifestations and their consequences associated with MIH, indicates the need for research to increase knowledge about its prevalence and risk factors in developing countries. Thus, the aim of this study was to evaluate the prevalence MIH in a group of children aged from 9 to 12 years in Virajpet, Karnataka, India.  

Material and Method  

The present, descriptive cross sectional study conducted during January 2018–March 2018, the study population comprised of 9 to 12 year old School children belonging to Virajpet taluk. Total numbers of school students were 9792. Sample size was estimated and obtained as 400 per each age group and among 4 age groups (9, 10, 11 and 12 years) the total of 1600 samples. Stratified Cluster Sampling Method was followed. Total of 171 schools in Virajpet taluk was divided into 10 clusters based on location. Each cluster contains 17 schools. Considering 10% of schools from each cluster 2 schools were chosen randomly. Total schools considered were 20. Considering the number of schools included and the sample size (400 per age group), 20 students from each age group from each school was taken. Subjects who were willing to participate and whose parents/guardians have given written informed consent and children having fully erupted all permanent first molars and incisors were included in the study. The children with amelogenesis imperfecta, dentinogenesis imperfecta, white spot lesions, tetracycline stains, erosion, fluorosis and Turner’s tooth, with appliances, undergoing orthodontic treatment, Restorations and Crowns on any of the first permanent molars and incisors were excluded. Ethical clearance was obtained from the Institutional Review Board of Coorg Institute of Dental Sciences, Virajpet. Diagnosis of MIH was done using EAPD Criteria 2003.

An examination for MIH should be performed on wet teeth after cleaning. Teeth to be examined are the 4 first permanent molars (occlusal, buccal, lingual/palatal surfaces) and 8 permanent incisors (incisal, labial, lingual/palatal surfaces) following Type III Clinical examination with adequate natural light. The oral examination of all the study subjects was carried out by a single investigator. Each participant was meticulously examined and the findings were compared to know the diagnostic variability agreement. The agreement was found to be 80%.  

The data was collected and transferred from pre-coded proforma to computer. The data will be analyzed using SPSS (IBM) version 23. Descriptive statistics included mean, standard Deviation, Frequency and Percentage. Inferential statistics included Chi square test. The level of significance was set at 0.05 at 95% confidence intervals.  

Results  

Distribution of study subjects comprised a total of 1600 (100%) participants. Among them, 786 (49.1%) were males and 814 (50.9%) were females. MIH was found to be present in 210 (13.12%) subjects and the rest 1390 (86.87%) subjects were unaffected. Among
210 subjects affected with MIH, 58 (14%) subjects were 9 years, 60 (15%) subjects were 10 years, 49 (12.25%) subjects were 11 years and 43 (10.75%) subjects were 12 years of age.

Table 1: Tooth wise Prevalence of MIH

<table>
<thead>
<tr>
<th>Tooth Number</th>
<th>MIH</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Absent</td>
<td>1445 (90.3%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>155 (9.7%)</td>
</tr>
<tr>
<td>12</td>
<td>Absent</td>
<td>1463 (91.4%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>137 (8.6%)</td>
</tr>
<tr>
<td>21</td>
<td>Absent</td>
<td>1450 (90.6%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>150 (9.4%)</td>
</tr>
<tr>
<td>22</td>
<td>Absent</td>
<td>1509 (94.3%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>91 (5.7%)</td>
</tr>
<tr>
<td>16</td>
<td>Absent</td>
<td>1396 (87.3%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>204 (12.7%)</td>
</tr>
<tr>
<td>26</td>
<td>Absent</td>
<td>1394 (87.1%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>206 (13.1%)</td>
</tr>
<tr>
<td>31</td>
<td>Absent</td>
<td>1534 (95.9%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>66 (4.1%)</td>
</tr>
<tr>
<td>32</td>
<td>Absent</td>
<td>1535 (95.9%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>65 (4.1%)</td>
</tr>
<tr>
<td>41</td>
<td>Absent</td>
<td>1532 (95.8%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>68 (4.3%)</td>
</tr>
<tr>
<td>42</td>
<td>Absent</td>
<td>1550 (96.9%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>50 (3.1%)</td>
</tr>
<tr>
<td>36</td>
<td>Absent</td>
<td>1398 (87.4%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>202 (12.6%)</td>
</tr>
<tr>
<td>46</td>
<td>Absent</td>
<td>1395 (87.2%)</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>205 (12.8%)</td>
</tr>
</tbody>
</table>

Table 2: Prevalence of MIH according to EAPD diagnostic criteria

<table>
<thead>
<tr>
<th>MIH type</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White/creamy demarcated opacities, no PEB</td>
<td>15</td>
<td>(7.9%)</td>
</tr>
<tr>
<td>White/creamy demarcated opacities, with PEB</td>
<td>7</td>
<td>(2.6%)</td>
</tr>
<tr>
<td>Yellow/brown demarcated opacities, no PEB</td>
<td>70</td>
<td>(32%)</td>
</tr>
<tr>
<td>Yellow/brown demarcated opacities, with PEB</td>
<td>26</td>
<td>(13.7%)</td>
</tr>
<tr>
<td>Atypical restoration</td>
<td>72</td>
<td>(34.3%)</td>
</tr>
<tr>
<td>Missing because of MIH</td>
<td>20</td>
<td>(9.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>210</strong></td>
<td><strong>(100%)</strong></td>
</tr>
</tbody>
</table>

Table 3: Comparison of prevalence of MIH based on Gender and Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Prevalence</th>
<th>Chi Square and significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 years</td>
<td>33 (31.1%)</td>
<td>1.745 p=0.627 (NS)</td>
</tr>
<tr>
<td>10 years</td>
<td>26 (24.5%)</td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>23 (21.7%)</td>
<td></td>
</tr>
<tr>
<td>12 years</td>
<td>24 (22.6%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 years</td>
<td>25 (24%)</td>
<td>7.068 p=0.132 (NS)</td>
</tr>
<tr>
<td>10 years</td>
<td>33 (31.7%)</td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>26 (25%)</td>
<td></td>
</tr>
<tr>
<td>12 years</td>
<td>19 (18.3%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Prevalence of MIH based on Arch and Segments

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>MIH</th>
<th>Chi Square and significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Maxilla</td>
<td>Incisors</td>
<td>1407 (87.9%)</td>
</tr>
<tr>
<td></td>
<td>Molars</td>
<td>1391 (86.9%)</td>
</tr>
<tr>
<td>Mandible</td>
<td>Incisors</td>
<td>1451 (90.7%)</td>
</tr>
<tr>
<td></td>
<td>Molars</td>
<td>1393 (87.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>Incisors</td>
<td>1406 (87.9%)</td>
</tr>
<tr>
<td></td>
<td>Molars</td>
<td>1390 (86.9%)</td>
</tr>
</tbody>
</table>

Discussion

The study recruited children aged 9 to 12 years for the assessment of MIH. Garg N et al\textsuperscript{12} stated that at this age, most children would have had all four first permanent molars and the majority of incisors, but these teeth would not have been exposed to the oral environment long enough to develop dental caries.

In the present study, prevalence of MIH was 13.12% among 9-12 year old children. This is in accordance with the study conducted by P.C. Calderara\textsuperscript{13} among school children aged 7.3–8.3 years living in Lissone, Northern Italy, wherein the prevalence of MIH was 13.7%. In a study conducted by Sulaiman Mohammed Allazzam\textsuperscript{14} in Jeddah, Saudi Arabia, prevalence of MIH was 8.6% among a group of 8-12-year-old children. In a study conducted by Rahil Ahmadi\textsuperscript{15}, the prevalence of MIH in a group of Iranian children aged 7-9 years was 12.7%. A study conducted by H.T
in Mangalore, Karnataka among 6-12 year school children, prevalence of MIH was found to be 17.2%. In a study conducted by ShubhaArehalli Bhaskar¹⁶ done among school children aged 8-13 years from Udaipur, Rajasthan, MIH prevalence was 8.9%. The prevalence in another study conducted by M Kirthiga et al⁴ among children aged 11-16 years of a city in Karnataka, Davangere was 8.9%. According to study conducted by SavithaDeepthiYannam et al¹¹ in the child population aged between 8-12 years residing in Chennai, the prevalence of MIH was 9.7%. The study conducted by Cervantes Mendez MJ et al¹⁷, in South Texas, among 6-14 years subjects showed a prevalence rate of 29.5% which is on the higher side. According to Cho Syet al¹⁸, the difference in MIH prevalence seen in various parts of the world may be due to the heterogeneity in ethnic and age groups being studied and the retrospective nature of the studies conducted.

In the present study, 10 year old subjects showed comparatively higher prevalence (15%) than the other age groups and the least prevalence of MIH (10.75%) was seen in 12 year old children. These results are in accordance with the study conducted by SavithaDeepthiYannam¹¹ among the age group of 8-12 years, wherein the prevalence of MIH was highest among 10-year-old children (12.9%) and least prevalence of MIH (7.4%) was seen in 12-year old children. In a study conducted by Cristiane Maria Da Costa-Silva et al¹⁹,there was a higher prevalence among children with 10 years old or older (16.6%).

In the present study, it was observed that maxillary molars were more effected as compared to maxillary incisors, but the difference was not statistically significant (p=0.728). This could be explained by the contribution of Lunt and Law²⁰ who modified the chronology of the deciduous human dentition and concluded that maxillary teeth are generally ahead of the mandibular teeth in development.

**Conclusion**

Recent research supports the assumption that MIH is a widespread problem all over the world. Findings from the present study show the following:

- The prevalence of MIH in 9–12-year-old children is 13.12 % with no gender predilection.
- 10 year old children showed the highest prevalence (15%) among all the age group.
- Majority of children with MIH (70.2%) have lesions in both molars and incisors with demarcated opacities and atypical restorations being the most frequent defect type.

Hence, it appears that this condition is more prevalent than was recognized until recently. Assuming the low awareness of this condition among the dentists and general population of India, the demanding nature and the costs involved, the urgent need for further investigations into this problem becomes clearly evident. A diligent follow up and recall program for children who are affected is essential for developing preventive and therapeutic measures. There is also a need for formulating public awareness and prevention programs. A nationwide survey to find the prevalence of MIH is recommended.

**Conflict of Interest:** No

**Source of Funding:** Indian Council of Medical Research (Grant–INR 50000/-).

**Ethical Clearance**

**References**

6. Wogelius P, Haubek D, Poulsen S. Prevalence and distribution of demarcated opacities in permanent


Self Reported Oral Pain and Dysfunctions Associated with Radiation Induced Oral Mucositis among Head and Neck Cancer Patients: A Prospective Observational Study

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Abstract

Objectives: This study aimed at identifying and describing self reported oral pain and dysfunctions associated with oral mucositis among patients with head and neck cancer treated with radiation.

Method: A prospective observational study was conducted on 30 head and neck cancer patients who were undergoing radiation therapy and consented to participate. Data was collected by using a baseline proforma, WHO Oral Toxicity scale and Patient reported oral mucositis symptom scale. The patients were followed up during the entire course of radiation therapy and were monitored for the development of oral mucositis and were asked to rate their pain and associated dysfunctions on 100 mm scale.

Result: The present study findings revealed that all the subjects developed oral mucositis at the end of third week which was progressed to grade 3 or 4 mucositis by the end of therapy. The scores of oral pain and oral dysfunctions were progressively increased during the course of treatment with its peak at the end of treatment. Cumulative dose of radiation therapy and receipt of concurrent chemotherapy were found to have a significant association with oral dysfunction. The study also noted a significant positive correlation with severity of mucositis and oral dysfunctions.

Conclusion: Severe and painful oral mucositis is a dose limiting adverse effect of radiation therapy and its detrimental effect on oral functions is significant. Hence adequate preventive measures of mucositis to be identified to enhance the quality of life of head and neck cancer patients receiving radiation therapy.

Keywords: Oral pain, oral dysfunctions, head and neck cancer patients.
often progresses to skin loss and ulceration. Ulcers are typically covered by a white pseudo membrane\textsuperscript{2, 3}.

Mucositis is a clinical challenge with an incidence of 36-100\% among head and neck cancer patients receiving radiation therapy\textsuperscript{4} and is a major burden on head and neck cancer patients as it adversely affects the oral functions. Oral pain associated with radiation therapy induced mucositis is a significant contributor to emotional distress and often leads to lower food intake potentially resulting in undernourishment and weight loss\textsuperscript{5}. In radiotherapy-induced mucositis, the pain intensity escalates at week 3, peaking at week 5 and persists for weeks. Pain is intense and interferes with oral functions\textsuperscript{6} and results in dry mouth, dysgeusia, dysphagia, altered speech, and chewing or eating difficulties\textsuperscript{7}.

Oral mucositis, pain, dysphagia, and altered taste perception may lead to loss of appetite, malnutrition, reduced treatment compliance and radiation treatment breaks with a possible interference on tumour control. A systematic review conducted on literature on pain in chemoradiotherapy treated head and neck cancer patients reported that mucositis pain is frequent (80\%), and interfere with daily activities (40\%) and social activities (60\%)\textsuperscript{8}. These consequences greatly affect the patient’s total quality of life\textsuperscript{9} and may lead to severe disability which can increase the costs of care, tube feeding, extended hospitalization, or unanticipated re-hospitalization, and can cause modification to or interruption of the cancer therapy itself\textsuperscript{10}.

Hence an investigation of self reported oral pain and oral dysfunctions associated with radiation induced oral mucositis could help to reduce the patients anxiety by explaining them how the oral pain will affect their oral function. Addressing the patient reported clinical outcomes during cancer therapy helps the care givers to identify and institute possible novel protocols for reducing and managing the complications during head and neck irradiation.

**Method**

**Population and sampling of study:** The study employed a descriptive approach and 30 histopathologically confirmed patients of head and neck cancer scheduled to receive radiotherapy at Sri Shankara Cancer and research institute, Bangalore were selected randomly as per the inclusion criteria. Exclusion criteria included patients younger than 18 years, patients who had oral surgery within the previous 6 weeks, and patients with co morbid conditions. The study was approved by the hospital ethical committee. Informed written consent was obtained from the subjects and the subjects were followed up during the entire course of radiation therapy.

**Data collection method:** Base line Performa was used to collect demographic data and the clinical data regarding the site of cancer, daily and cumulative dose of radiation therapy, type of chemotherapy medications were obtained from the subjects’ medical records. The clinical manifestations of oral mucositis was evaluated by WHO toxicity criteria every week till the end of radiation therapy and was graded in to 4 categories ranging from 0-4 based on soreness, erythema, presence of ulcerations, ability to swallow solid food and the extent to which alimentation is not possible. At each clinical examination the participants completed a Patient reported oral mucositis symptom scale (PROMS) to appraise how oral mucositis affected common oral functions. The PROMS scale consists of 10 questions that are answered on a visual analogue scale (VAS), by setting a mark on each horizontal line measuring 100 mm. Two questions focused on mouth pain and change in taste and the other 8 questions focused on how much their mouth sores affected different oral functions on the day of the clinical examination.

**Data analysis:** The data were typed into spreadsheet and SPSS (Statistical package for Social Science, IBM Corporation) version 23 was used for statistical analysis. Descriptive statistics using frequency, mean and standard deviation were employed to summarize the demographic and clinical characteristics of the participants and severity of oral pain and dysfunctions. Chi square test was computed to determine the association between oral dysfunctions and clinical characteristics. Spearman rank correlation was computed to identify the correlation between oral mucositis and oral dysfunctions.

**Results**

**Description of characteristics of the subjects:** A total of 30 patients who fulfilled the eligibility criteria were included in the study and the study comprised of 77\% males. The mean age was 60.9 years and 23\% of them were educated up to higher secondary. The participants were diagnosed with carcinoma of oral cavity (63\%), Laryngeal cavity (23\%) and pharyngeal cavity (13\%). A high proportion of tumours were classified as T2 (44\%), followed by T3 (30\%); T4 (23\%) and T1...
(3%) and 92% of the subjects had undergone surgical resection of the primary tumours site. Majority (47%) of the patients received a cumulative dose of 70 Gy and a fractionated dose of 2Gy per day (73%). 46.66% of the subjects received concurrent chemotherapy during radiation therapy and all of them received Cisplatin and 5 Fluorouracil.

**Onset and severity of oral mucositis:** The analysis revealed that the early manifestations of oral mucositis (grade 1 or grade 2) appeared in 43% of the patients by the end of first week and all the subjects developed Radiation induced oral Mucositis at the end of third week. Grade 3 or 4 mucositis was present in all the subjects by seven weeks and Ryles tube feeding was initiated for 4 subjects who developed grade 4 mucositis. (Fig 1). The cheeks, lower lip and ventral and lateral tongue were the predominant sites of ulceration. Mean mucositis score was increased from 0 at baseline to 3.4 ± 0.31 at the end of the treatment. (Fig 2).

![Percentage of radiation induced oral mucositis](image1)

**Fig 1:** Onset and severity of radiation induced mucositis

![Percentage of radiation induced oral mucositis](image2)

**Fig 2:** Mean mucositis scores during the course of radiation therapy
Oral pain and oral dysfunctions associated with radiation induced oral mucositis: The scores of all the ten components of PROMS increased gradually during the cancer treatment period. Oral pain scores associated with mucositis were progressively increased from 17.3± 1.53 at the end of first week to 75.45 ± 1.95 at the end of seven weeks. Ninety percent of the subjects (n=27) were taking analgesic medication more or less constantly during the course of radiation therapy and despite this medication the participants reported consistently increasing pain score throughout the entire period of radiation therapy. Difficulty eating hard foods, Change of taste and difficulty in swallowing were considerably more affected by oral mucositis than the other components of the Patient reported oral mucositis symptoms scale (Table.1)

<table>
<thead>
<tr>
<th>SL. No</th>
<th>Items</th>
<th>First week</th>
<th>Second week</th>
<th>Third week</th>
<th>Fourth week</th>
<th>Fifth week</th>
<th>Sixth week</th>
<th>Seventh week</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oral pain</td>
<td>17.3</td>
<td>26.6</td>
<td>38.65</td>
<td>46.14</td>
<td>57</td>
<td>63.93</td>
<td>75.45</td>
<td>46.44</td>
</tr>
<tr>
<td>2</td>
<td>Difficulty speaking</td>
<td>16.13</td>
<td>22.3</td>
<td>32.73</td>
<td>40.7</td>
<td>49.7</td>
<td>57.15</td>
<td>63.25</td>
<td>40.28</td>
</tr>
<tr>
<td>3</td>
<td>Restriction in speaking</td>
<td>8.33</td>
<td>17.66</td>
<td>28.88</td>
<td>48.13</td>
<td>56.17</td>
<td>59.85</td>
<td>60.25</td>
<td>39.9</td>
</tr>
<tr>
<td>4</td>
<td>Difficulty eating hard food</td>
<td>23.16</td>
<td>35.46</td>
<td>53.3</td>
<td>64.1</td>
<td>78.8</td>
<td>85</td>
<td>88.9</td>
<td>67.59</td>
</tr>
<tr>
<td>5</td>
<td>Difficulty eating soft food</td>
<td>13.56</td>
<td>21.1</td>
<td>36.07</td>
<td>46.8</td>
<td>58.93</td>
<td>66.2</td>
<td>77.1</td>
<td>45.68</td>
</tr>
<tr>
<td>6</td>
<td>Restriction in eating</td>
<td>11.37</td>
<td>20.9</td>
<td>38.7</td>
<td>50</td>
<td>66.2</td>
<td>66.56</td>
<td>69.6</td>
<td>46.19</td>
</tr>
<tr>
<td>7</td>
<td>Difficulty in drinking</td>
<td>12.7</td>
<td>18.8</td>
<td>32.67</td>
<td>41.33</td>
<td>48.76</td>
<td>55.43</td>
<td>60.45</td>
<td>38.59</td>
</tr>
<tr>
<td>8</td>
<td>Restriction in drinking</td>
<td>9.2</td>
<td>17.16</td>
<td>29.06</td>
<td>37.56</td>
<td>48.4</td>
<td>54</td>
<td>56.25</td>
<td>35.95</td>
</tr>
<tr>
<td>9</td>
<td>Difficulty in swallowing</td>
<td>15.46</td>
<td>27.26</td>
<td>40.5</td>
<td>54.26</td>
<td>65.06</td>
<td>75.8</td>
<td>82.85</td>
<td>51.59</td>
</tr>
<tr>
<td>10</td>
<td>Loss of taste</td>
<td>17.4</td>
<td>27.76</td>
<td>50.56</td>
<td>63.7</td>
<td>76</td>
<td>85.03</td>
<td>91.47</td>
<td>58.84</td>
</tr>
</tbody>
</table>

Chi square analysis revealed a significant association between daily & cumulative radiation dose and receipt of concurrent chemotherapy with oral dysfunction among head and neck cancer patients (Table 2). Spearman rank correlation was computed and revealed a significant correlation between mucositis and prom aggregate score at the end of therapy (r=0.79, p=0.02)

Table 2: Association between selected clinical variables and oral dysfunction among head and neck cancer patients N=30

<table>
<thead>
<tr>
<th>Variables</th>
<th>Less than median</th>
<th>More than median</th>
<th>Chi value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-60</td>
<td>5</td>
<td>8</td>
<td>0.832</td>
<td>0.858</td>
</tr>
<tr>
<td>&gt;60</td>
<td>6</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site of cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>9</td>
<td>10</td>
<td>3.45</td>
<td>0.178</td>
</tr>
<tr>
<td>Pharyngeal</td>
<td>0</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laryngeal</td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT</td>
<td>10</td>
<td>6</td>
<td>5.12</td>
<td>0.023</td>
</tr>
<tr>
<td>CT+CT</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily RT Dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.8-2 Gy</td>
<td>9</td>
<td>5</td>
<td>5.67</td>
<td>0.017*</td>
</tr>
<tr>
<td>&gt;2Gy</td>
<td>4</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative RT Dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Gy</td>
<td>5</td>
<td>2</td>
<td>10.28</td>
<td>0.006**</td>
</tr>
<tr>
<td>61-70</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;70Gy</td>
<td>1</td>
<td>13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*significant at 0.05, **significant at 0.01
Discussion

Head and neck irradiation is often accompanied by significant and profound acute oral mucositis which adversely affects many of the oral functions. Clinical significance of oral mucositis is attributed to a complex interaction of the patient’s perception of the altered oral function\textsuperscript{11}. The present study observed that all the subjects developed oral mucositis by the end of 3rd week and intensified in severity by sixth or seventh week of radiation therapy. This finding supports the previous findings that oral mucositis is a distressing condition which is observed at the first week of head and neck irradiation and reaches its maximum intensity at the end of the treatment\textsuperscript{12}.

The suffering caused by oral mucositis is multifaceted. Pain due to oral mucositis is the most frequently reported patient related complaint affecting quality of life\textsuperscript{9}. In the present study the subjects reported a consistently increasing pain score during the course of radiation therapy despite the intake of analgesics. These findings corroborates the observations made by a previous prospective observational study conducted on head and neck cancer patients which reported a poor pain control and high intake of analgesics during radiation therapy indicating neuropathic nature of pain which adversely affect activities of daily living and require a greater dose of analgesics\textsuperscript{13}.

Severe and painful oral mucositis is associated with a high level of oral dysfunctions and in general, the most common presentations of oral mucositis-related dysfunction are dysphagia, changes in food tastes, dry mouth, eating and drinking difficulties and inability to speak\textsuperscript{12,14}. It is observed in the current study that the oral functions eating, drinking, swallowing, speaking and sense of taste were affected and change of taste, difficulty eating hard foods and difficulty in swallowing were the most affected dysfunctions. Previous studies have reported similar findings that dysphagia (88%), change of taste (92%)\textsuperscript{12}, and difficulty in eating solids (90%)\textsuperscript{13,15} were the most prevalent oral dysfunctions among patients during head and neck irradiation. A cumulative dose of more than 30 Gy can cause damage to the taste buds and salivary glands and impairs the individual’s ability to detect basic tastes (sweetness, sourness, saltiness, and bitterness)\textsuperscript{16}. Dysphagia combined with loss of taste can interfere with the patients’ food and fluid intake with significant weight loss and malnutrition\textsuperscript{12}.

Cumulative radiation dose and receipt of concurrent chemotherapy were found to have a significant association with the severity of oral dysfunctions (p =0.01) and the study also observed a significant positive correlation between mucositis and oral dysfunctions. Similar findings have been reported in a cross sectional study on eighty eight head and neck cancer patients with oral mucositis receiving cancer therapy in which intensity of oral mucositis were significantly correlated with distress score of oral dysfunction (r = .791, P < 001), dysphagia (r = .513, P < 001) and loss of taste (r = .578, P < 01)\textsuperscript{12}. The findings indicate that oral mucositis adversely affects oral functions and an altered oral function is common sequelae of oral mucositis.

The current study is limited to a small sample size of 30 and to a single setting. The study was aimed to quantify the severity of oral dysfunctions perceived by head and neck cancer patients during radiation therapy and hence did not involve any objective measurement of these dysfunctions.

Conclusion

The findings have demonstrated that the intensity of oral dysfunction during head and neck irradiation were moderately high from the patients’ point of view and hence increased attention and treatment of oral dysfunctions are essential to achieve the best outcomes of cancer therapies.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Clearance: The study was approved by the hospital ethical committee. Patients and their caregivers indicated their willingness to participate in the study after the details of the study had been explained to them. The subjects were also informed that they had the right to withdraw from the study at any time during the course of the study and written informed consent was obtained from them.

Source of Support: Self

References


Asituational Analysis of Oral Health Programs in the Primary Schools of Pune City (India)

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Abstract

Objective: To evaluate (situational analysis) the status of oral health programs in the primary schools of Pune city.

Method: A cross sectional questionnaire study was conducted among the principals of the primary schools. A structured set of 16 questions were designed for the three domains of school oral health program. The choices of the questions were based on the 5 point Likert scale. 85 schools from Pune were selected for the study.

Results: 65 schools responded for the study, yielding a response rate of 76.4%. Majority of the school health care provided was in the form of health and oral health check up. The teacher (47.7%) and physical education teacher (12.3%) were mostly involved in coordinating school oral health care program. 93.9% of the schools have reported that their school have guidelines regarding oral health services for school children. Almost 89.2% schools have banned tobacco use among their teaching and non-teaching staff. Teachers (72.3%) and government (73.8%) are reported to play a key role in oral health program/policies to be implemented in the school. The principals reported positively to all the healthful school living statements.

Conclusion: The school health programs are being functionally conducted in majority of schools but hardly there are any services being provided for oral health.

Keywords: School oral health program, children, oral health, school services.

Introduction

Though there has been considerable improvement in the oral health of children in the last few decades, dental caries remains one of the most commonly occurring oral health problems in the children all over the globe.¹ There is no single country that claims to have caries free children.² Adverse dental experience during childhood can lead to phobia and further impact their attitude towards oral health in the adult life.

According to the literature, the services of special oral health workers, dental hygienists, school teachers and parents for oral health education of the school children have proven to be an effective method for prevention of various oro-dental problems.³-⁶ School-based oral health programs are one way to ensure equal access to oral health services for all children. However these services have not developed and remain a neglected area⁷. In India, over the years umpteen number of health check-ups and dental check-ups in the schools have been carried out and voluminous data is collected, conversely without any action resulting in oro-dental problems to be the leading cause of morbidity in primary school children⁸. School oral health programs include three important elements: school oral services, school health education and healthful school living.

Pune (Maharashtra, India) is referred as “The Oxford of the East” due to the well-known academic and
research institution. Owing to this background, a need was felt to understand whether such upright scenario is also seen with regards school oral health programs. Hence, this present study is conducted to evaluate (situational analysis) the oral health program in the primary schools of Pune city.

**Material and Method**

A total of 192 primary schools under the Education Department of Pune Municipal Corporation Jurisdiction and 391 private primary schools in Pune city were considered. Out of the 583 schools, 85 schools were recruited for the study using convenience sampling.

The situational analysis was conducted by interviewing the school principal to evaluate their perception about school oral health programs. A structured set of questions were designed for the three domains of school oral health program. 9 questions were designed for the combined domain of school oral health services and school oral health education. Each question had a fixed set of choices which the principals had to choose except for question no 1b which was open ended. 7 questions were separately designed for the domain of healthful school living. The choices of the questions were based on the 5 point Likert scale.

The participants were included in the study on giving written consent. Their participation was voluntary and assurance of confidentiality of the collected information was given.

**Results**

85 primary schools of Pune city were contacted, but only 65 schools were willing to participate, 12 schools were not willing and 8 schools did not respond. The response rate was 76.4%. The results are presented in Table 1 and 2.

**Table:1 Perceptions of school Principals regarding “School oral health services” and “School oral health education”.

<table>
<thead>
<tr>
<th>School Oral health services and School Oral health education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which of the following are the oral health care service providers in your school?</td>
</tr>
<tr>
<td>• We have our own school clinic-(3.1%)</td>
</tr>
<tr>
<td>• Through Civil/Municipal hospital-(9.2%)</td>
</tr>
<tr>
<td>• Through a Non-Governmental Organisation-(6.2%)</td>
</tr>
<tr>
<td>• We have a school appointed dentist-(7.7%)</td>
</tr>
<tr>
<td>• Through the private medical/dental Institutions in the city-(15.4%)</td>
</tr>
<tr>
<td>• None-(64.6%)</td>
</tr>
</tbody>
</table>

| 1a. If services do exist then specify which of the services are being provided? |
| • Oral health check up only-(18.5%) |
| • Health and Oral health check up-(36.9%) |
| • Fillings-(7.7%) |
| • Simple Extraction of teeth-(7.7%) |
| • Professional cleaning of teeth-(12.3%) |
| • Only referral(16.9%) |

| 1b. Reasons why school health services do not exist---------- (open ended) |
| • Curriculum is packed |
| • Not possible to spend time on providing oral health services in school. |
| • Extra burden on children |
| • No school policy |
| • It is not mandatory in curriculum |

| 2. Who is in charge for coordinating school oral health care programs? |
| • Teacher(47.7%) |
| • School Counsellor(9.3%) |
| • Physical education teacher(12.3%) |
| • Healthcare staff(1.5%) |
| • Nobody(29.2%) |

| 3. Is there any provision for oral health education being provided in your school? |
| • Yes(59.60%) |
| • No(40.40%) |

| 4. If yes, when is the oral health education scheduled? |
| • During the school hours(29.2%) |
| • After school hours(70.8%) |

| 5. Does your school have any guidelines regarding oral health services for schoolchildren? |
| • Yes(93.9%) |
| • No (1.5%) |
| • Don’t Know(4.6%) |

| 6. Is the oral health service guideline implementation mandatory? |
| • Yes(50.8%) |
| • No(49.2%) |

| 7. Is the sale of tobacco products banned in and around the school premises ? |
| • Yes(64.6%) |
| • No(35.4%) |

| 8. Is the use of tobacco banned for the teaching and non-teaching staff in the school ? |
| • Yes(89.2%) |
| • No(10.8%) |

| 9. According to you, who do you think should play a key role in oral health programs/policies being implemented in schools? |
| • School authorities(49.2%) |
| • Teachers(72.3%) |
| • Parent association(63.1%) |
| • Government(73.8%) |
| • NGO’s (21.5%) |
| • Dental institutions(20%) |
Table 2: Perceptions of school Principals regarding “Healthful School Living”

<table>
<thead>
<tr>
<th>Perceptions</th>
<th>Strongly agree (%)</th>
<th>Agree (%)</th>
<th>Neither (%)</th>
<th>Disagree (%)</th>
<th>Strongly disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every school should have an oral health service policy.</td>
<td>35.4</td>
<td>58.5</td>
<td>4.6</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Oral health services are beneficial and should exist in schools</td>
<td>38.5</td>
<td>61.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oral health services should be made mandatory in school by the government.</td>
<td>33.8</td>
<td>46.2</td>
<td>6.2</td>
<td>10.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Oral health education should be included in school curriculum</td>
<td>32.3</td>
<td>43.1</td>
<td>1.5</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>There is sufficient time in the curriculum to spend on oral health education.</td>
<td>32.3</td>
<td>27.7</td>
<td>9.2</td>
<td>21.5</td>
<td>9.2</td>
</tr>
<tr>
<td>The activities like demonstrations and special tooth brushing drills should be included to improve knowledge and practices of school children.</td>
<td>43.1</td>
<td>49.2</td>
<td>3.1</td>
<td>4.6</td>
<td>-</td>
</tr>
<tr>
<td>It is important to have control over unhealthy food (junk food) served in the school canteens and food shops in the school.</td>
<td>47.7</td>
<td>44.6</td>
<td>4.6</td>
<td>3.1</td>
<td>-</td>
</tr>
</tbody>
</table>

Discussion

In India, there is no school oral health policy. Major part of the work in this area is because of the Department of Public Health Dentistry and Pedodontics which conduct dental screening and treatment camp or undertake school projects as part of postgraduate student dissertation. While some NGO’s work in this area and meagre number of schools take interest and arrange for school dental program. Bright Smile Bright future program organized by the IDA and Colgate Palmolive Pvt Ltd under the aegis of NOHCP is mounted since July 2003 targeting 45 lakh school children across India. In this program it has been ritual to distribute colgate toothpaste and brush to children and conduct teacher training program using imported charts and visuals and alien films. The program does not ensure any follow up or maintenance of data. It is criticized and called an advertisement gimmick of the colgate product rather than actual oral health benefitting program. Since, 2014 IAPHD has initiated national toothbrushing program to be conducted on 7th November of every year and appealed to all the dental colleges to promote this activity. In a nutshell, this is the reality prevailing regarding school oral health services.

The schools actually provide a valuable site for community based education. School oral health service is totally a virgin soil; anything invested would certainly bear the fruits. But in Pune also, the situation is discouraging. Out of the 65 schools, analyzed in the study, 42 schools do not have any provision, while 23 schools have tried to provide oral health services and they have taken help of different organization, while five schools have appointed a dentist. The sample of the study is a mix of private and government school principals. The majority are from the government school where no school program exists. It is because they have no policy and directive to start school oral health program, there is lack of funds and neither the health nor education department has taken any initiative for implementing school oral health programs. Some of the private schools do not have school oral health program. This is because, they give more stress on the academic activities and do not have any stipulated time in their calendar to conduct oral health activities. The school programs conducted are majorly for general health screening followed by oral health. None of the schools conduct any primary preventive school programs like the pit and fissure sealant, topical fluoride application and mouth washing program.

School teachers may be utilized as good medium for oral health promotion among school children in India and other developing countries. In the present study teachers were majorly responsible for co-ordinating the oral health programs. A Primary Preventive Dental Health Education Programme implemented through school teachers for primary school children resulted in bringing about an enhancement in the KAP towards oral health and also an improvement in dental caries, oral hygiene, and gingival health status of the school children. As the teachers are in constant, contact with the children, they are in a position to notice any deviation of the children from their normal health and behaviour. Further, teachers words are highly valued by the school children. Byalakere R et al recommends training the teachers on short term basis which is to be included.
in their curriculum regarding how to provide dental health education to students and perform screening for any gross deposits of food and calculus. This can bring about a change in oral hygiene behavior which in turn can bring about a change in lifestyle practices.

It has been found that, there is involvement of health care providers in school health services in Kendriya Vidyalaya, while in other schools the health services are provided by the NGO’s who are contracted for a short time, but carry out only medical examination of students.

Only, 59.60% arrange for school oral health education program. Health education is an essential aspect of oral health promotion. It is one of the cost-effective oral health programs aimed at prevention of oral diseases and promotion of good oral health. Gambhir RS et al conducted a systematic review on the impact of school based oral health education programs in India and concluded that the most favorable environment to impart oral health education to children is schools and that there is a positive outcome of the school dental health education programs with respect to plaque, gingival health and dental caries. Studies recommend utilizing teachers to improve the oral health of the children.

The present study results indicate that the government (73.8%) and teachers (72.3%) should play a key role in oral health programs and the policies being implemented in the schools. Unfortunately, oral health is given last priority by policy makers in India. The relevant authorities are inadequately informed about the burden of dental problems and its association with systemic health.

Though majority of principals responded that the law is being implemented regarding ban of sale of tobacco products in and around the school premises (64.6%). Majority of the principals responded that ban on use of tobacco use by the teaching and non-teaching staff is not implemented 100%; school authorities should be held responsible for the above as, Ministry of Health and Family welfare, Government of India says that school authorities should be held responsible if not implemented and it has provided anti-tobacco cell with a toll free number across India to report about violation of this law. Secondly, it is the prime duty of teachers and non-teaching staff of being a good role model and students would like to emulate them.

The principals have positively responded for all the seven questions under the Healthful school living. Majority of the principals felt that it is important to have control over unhealthy food served in the school canteens but again the percentage of responses is low; teachers and principals may feel that it is not their responsibility of what the schoolchildren should eat, as it is totally dependent on parents. Secondly, there are no such regulations from the government on what is to be served and kept for sale in school canteens. Sale of healthy and nutritious food should be promoted in schools, as it is being laid down in the pilot project. Pictorial statutory warnings stating that “sweets can cause tooth decay” to be made compulsory on the confectionary wrappers and promotion of tooth friendly sweets.

Overall, the survey indicates that very little is been done in the area of school oral health programs. There is a need to create awareness regarding the importance of school oral health activities so that the dental burden can be addressed at the very initial stages. Schools are the ideal places for such activities and the school authorities and the government can take steps to strengthen this area.

Conclusion

This questionnaire based study concluded that oral health programs are functionally conducted in majority of schools but hardly there are any services being provided for oral health. There are no guidelines and the principal feel that it is the responsibility of the teachers and government majorly. It will be very beneficial to the children and their parents, if school based oral health programs are started.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained from Institutional Ethics Committee of Dr D Y Patil Dental College and Hospital, Pimpri, Pune.

References


17. See: http://www.mohfw.nic.in/ accessed on 20.07.2018

Skeletal Maturity as Seen in the Transverse Sectional Slices of Mandible: A CBCT Study

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Abstract

Human growth is very complex in nature characterised by considerable variation in an individual’s rate of physiologic and skeletal maturity. Variability is the law of nature because of infinite number of genetic possibilities present. No individuals are ever exactly alike. The growth factor is a critical variable in orthodontic diagnosis and treatment planning. Predicting the outcome of treatment results in a growing patient is often more difficult than in a non growing patient. Prior knowledge of the amount along with rate, timing and direction of maxilla–mandibular growth in any given patient would be extremely useful for forecasting treatment outcome.

Skillful evaluation of growth left in a patient makes a difference in such growth modulations. Having an intrinsic indicator could be a boon for the clinician. Hence the search for such an intrinsic indicator was initiated in this study.

Keywords: Mandibular Corpus Index; Cervical Vertbral Maturation stage; CBCT; Skeletal Maturity of the mandible.

Introduction

Human growth is very complex in nature characterised by considerable variation in an individual’s rate of physiologic and skeletal maturity. Variability is the law of nature because of infinite number of genetic possibilities present. No individuals are ever exactly alike.

The growth factor is a critical variable in orthodontic diagnosis and treatment planning. Predicting the outcome of treatment results in a growing patient is often more difficult than in a non growing patient. Prior knowledge of the amount along with rate, timing and direction of maxilla–mandibular growth in any given patient would be extremely useful for forecasting treatment outcome.

As Scammon has shown in his growth curves that the brain and the central nervous system grows faster than the muscular and skeletal elements. The overall pattern of growth is the reflection of the growth of various tissues making up the whole organism. This phenomenon is seen not only with different tissue systems but also with in each system too. The skeletal system undergoes similar spurts of growth rate, amount direction and timing of growth which differ from one bone to another.

A number of methods have been developed for the estimation of skeletal maturity. Nanda⁶, Hunter¹³, Bjork², Brown and Bishara all used body height as a measure of general skeletal maturation when discussing the timing of mandibular growth. Johnston, Bergersen¹, Grave¹⁰, Piteski and Fishman⁸ related facial growth to hand wrist growth. Hagg¹¹, Lewis and Derinjian all used sexual maturity as their scale to evaluate craniofacial growth.

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Chertkow, Engstrom and Coutinho used the teeth such as the canine, lower premolars and third molars as dental indicators of skeletal maturity. Lamparski used the cervical vertebrae to assess skeletal age and O’Reilly studied growth of the cervical vertebrae as it relates to the mandibular growth. The mandible is the longest and strongest bone in the face. Variations in the mandibular morphology, which is prone to ontogenic and phylogenetic changes contribute significantly to most of the mal occlusions.

The mandible is an intra membranous bone which also has a cartilaginous head. Mandibular growth has shown to be controllable by various growth modulation procedures. Various parameters have been used to predict mandibular growth. Bjork used implants to describe multiple structural signs seen in extreme types of mandibular rotations. Jarabak used cephalometric analyses to predict direction of mandibular growth rotation. Skieller predicted the direction of mandibular growth using four variables (mandibular inclination, intermolar angle, shape of lower border and inclination of symphysis).

Ricketts used the mandibular symphysis to predict mandibular growth .Aki et al predicted the direction of mandibular growth using the morphological characteristics of the symphysis. The growth of the mandible occurs in several principle directions. Increase in width, height and depth occurs simultaneously .

The terminal growth of the mandible can be utilised in various growth modulation procedures. Having an intrinsic indicator could be a boon for the clinician. Hence the search for such an intrinsic indicator was initiated in this study.

**Materials and Method**

This cross sectional study was based on 60 individuals, who consisted of Group A 30 males and Group B 30 females who were of good health, physically and mentally. None of them had any developmental disorders. The subjects were within age group of 8-16 years. Standardised lateral cephalometric radiographs were taken from the left side of all the individuals by a PM 2002 Cephalostat on a 8” by 10” Kodak X–Omat K X K-5 dental film.. The transverse slicing section were obtained in the pre molar region of all the individuals using CBCT (Figure 4).

**Measurements:** Various measurements recorded were a) The Ascending Ramus Length (Ar-Go) b) The Mandibular Corpus length (go-gn) c) Total mandibular length (Co-Gn) (figure 1) The dimensions of the transverse slicing section of the mandible were measured in the following method. The outline of the mandibular corpus was traced, the buccal cortex, lingual cortex and lower border were measured and recorded. Then a line joining the buccal and lingual alveolar crest line was made, a grid was formed with lines of the grid parallel and perpendicular to the constructed alveolar crest line.

The superior line was taken as the alveolar crest line and inferior anterior and posterior limits were taken at the most inferior, anterior and posterior borders of the transverse section of the mandibular corpus. The measurement taken were a) Buccal cortical thickness (BCC) b) Lingual cortical thickness (LCC) c) Lower border thickness (LBC) d) Mandibular corpus height (HC) the linear distance between the superior and inferior limit of the grid e) Mandibular corpus depth (DC)the linear distance between the anterior and posterior limit of the grid f) Corpus ratio–(H/D) corpus height divided by corpus depth(figure 2)

**Cervical Vertebrae Assessment:** Cervical vertebrae development of the sample was evaluated by Hassel and Farman modifications of Lamparskis criteria which assess maturation changes of the second, third and fourth cervical vertebrae. The sample was divided into distinct stages according to this.

**Findings:** The results include the values of Thickness of buccal cortex, lingual cortex and lower border and the height and width of the symphysis.

The height, width and height width ratio of the mandibular corpus were compared with the lengths of the ramus, mandibular corpus and the effective length of the mandible.

**Intrinsic Indicator Scoring:** Group A The mean height–width ratio for the stage of acceleration was 1.81+0.08 The mean height–width ratio for the stage of transition was 2.05+0.02 The mean height–width ratio for the stage of deceleration was 2.15+0.01 The mean height–width ratio for the stage of maturation was 2.35+ 0.01 The mean height–width ratio for the stage of completion was 2.56+ 0.02.
GROUP B The mean height–width ratio for the stage of acceleration was 1.81 + 0.03 The mean height–width ratio for the stage of transition was 2.06 + 0.03 The mean height–width ratio for the stage of deceleration was 2.15 + 0.03 The mean height–width ratio for the stage of maturation was 2.36 + 0.02 The mean height–width ratio for the stage of completion was 2.53 + 0.01

Discussion

In the growing years skeletal indicators of the level of maturational development of an individual provide the best means of evaluating biologic age. The skeletal maturity was found to have a definite correlation with craniofacial skeletal growth and is a critical factor in orthodontics.

Numerous method have been employed for the study of skeletal maturation over the years. The simplest of them is the use of standing body height as a measure of general skeletal maturation. Even though correlation between craniofacial growth and standing height have also been studied and positive correlation found at most levels of maturation, the use of standing height to assess skeletal maturity how ever has been inadequate.

Lamparski\textsuperscript{15} in 1972 was the first person to study cervical vertebrae and he found them to be as reliable as a hand wrist film. He developed a series of standard for assessing skeletal age in both females and males based on cervical vertebrae. It was O’Reilly\textsuperscript{17} in 1988 who related mandibular growth changes to maturation of cervical vertebrae maturation.

The area used to calculate the corpus index was the premolar region. Only the left side was taken to standardize the study. The premolar region was taken because in various studies\textsuperscript{21,14} under it was observed that its proportion of cortical bone and trabecular bone corresponds well with bone mass in the cortical bones of the skeleton.

The intrinsic indicator (corpus index) was calculated by dividing the height by width of the corpus. To determine the height and width of the corpus firstly, a line was drawn joining the buccal and lingual alveolar crest. A grid was constructed with lines parallel and perpendicular to alveolar crest line.

The linear distance between the superior and inferior limit of the grid was taken as the corpus height and the linear distance between the anterior and posterior limit of the grid was taken as the corpus width. A definite curvi linear increase was observed between the values of mandibular corpus index and the effective mandibular length.

A similar increase of corpus index was observed corresponding with each stage of cervical vertebrae maturation. A definite intrinsic indicator scoring (corpus index) was observed with each stage. According to Hassel and Farman’s\textsuperscript{12} description of the cervical vertebrae maturation stages, 65% to 85% of remaining pubertal growth is estimated at the acceleration stage(Figure 3). Hence it was observed that a corpus index scoring of 1.81 (average effective mandibular length of 101 mm) represent a remaining pubertal growth potential of 65% to 85% present, like wise a scoring of 2.05 (corresponding to transition), (2.15 corresponding to deceleration), (2.35 corresponding to maturation) represents a remaining growth potential of respectively of each stage. Similarly a corpus index scoring of 2.56 (average effective mandibular length of 121 mm) represents completion of the pubertal growth. The mandible where the greatest growth occurs in the craniofacial region is also the strongest and largest bone in the face.

As the cephalo caudal gradient of growth shows the mandible being further away from the brain grows for a longer time and more than the maxilla. This growth can be utilised for various growth modulation procedures to successfully correct jaw discrepancies in an early age of itself. Unfortunately untimely treatment may lead to relapse due to continual growth of the mandible. Hence a reliable indicator for estimation of the skeletal maturation is essential for successful treatment.

Orthopaedic treatment can be accomplished when the patients shows a corpus index score of 1.81 (corresponds to acceleration phase of cervical vertebrae maturation) as there is good amount of adolescent growth potential still left. The same is difficult to accomplish during the stage of transition which shows a corpus score of 2.05 where in probably fixed functional orthopaedic treatment can be accomplished successfully.

Once the patient reaches a score 2.15 the end of transition stage and start of deceleration stage orthopaedic appliances can bring only minimal skeletal changes and more of dental changes. The same becomes unrealistic when the score reaches 2.35 corresponding to the stage of maturation where the bone is completely matured.
Carrying out dentofacial orthopaedic treatment when the score is 2.5 is not possible as growth phase is completed and orthopaedic remodelling cannot be attained.

Hence it is advisable to treat with dentofacial orthopaedic appliances till a score of after which the patient should undergo orthodontic treatment alone or surgical orthodontic intervention depending on the magnitude of discrepancy. There is definitely a need for further study with a larger sample as it can show much higher correlation than the reading we have seen in this study and hence can confirm to say it is a better method of skeletal maturation indication.

The need for longitudinal study is necessary and if done will be useful and appreciated. This is because it is more reliable than a cross-sectional study. In a cross-sectional study the amount of variation is too much such as the socio-economic status, nutritional status can vary very much in individuals. But whereas in a longitudinal study the samples being the same the degree of variation is much less or negotiable.

![Figure 1: Mandibular Corpus Length](image1)

![Figure 2: Mandibular Corpus Height/Width](image2)
Figure 3: Cervical Vertbral Maturational Stages (CVM)

Figure 4: CBCT Slice of the Mandible

Conclusion

This study presents some of the basic relationships associated with skeletal maturation during the growing phase, with a new technique of skeletal maturation assessment. We have utilized the transverse slicing sections of the mandible taken with CBCT to facilitate the evaluation of maturational developmental.

The results of this study provide evidence that there is a significant and relatively simple relationship between structures of the mandibular body and its maturity. These findings demonstrated the validity of the method of use of an intrinsic indicator such as the corpus index for the evaluation of skeletal maturity.

Further observations showed that with increase in mandibular growth there was a subsequent increase in the mandibular corpus index. Mandibular corpus index value showed a definite score for each stage of cervical vertebrae maturation showing a gradual increase with each stage. No significant differences were observed between group A (males) and group B (females) values of the corpus measurements.

Intrinsic Indicator (Corpus Index) Scores Were

Group A (Boys) The mean height–width ratio for the stage of acceleration was 1.81+ 0.08 The mean height–width ratio for the stage of transition was 2.05+ 0.02 The mean height–width ratio for the stage of deceleration was 2.15+ 0.01 The mean height–width ratio for the stage of maturation was 2.35+ 0.01 The mean height–width ratio for the stage of completion was 2.56+ 0.02.

Group B (GIRLS) The mean height–width ratio for the stage of acceleration was 1.81+0.03 The mean height–width ratio for the stage of transition was 2.06+0.03 The mean height–width ratio for the stage of deceleration was 2.15+0.03 The mean height–width ratio for the stage of maturation was 2.36+0.02 The mean height–width ratio for the stage of completion was 2.53+0.01.

Conflict of Interest: No relevant conflict of interest among the authors.
This Dissertation was self funded and no grants were availed for the study.

Institutional Ethical Clearance

References

Status and Effectiveness of Implementation of Weekly Iron and Folic Acid Supplementation Scheme in Schools in Central India

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Abstract

Objective:
1. To study the coverage of weekly iron folic acid supplementation scheme in schools of Wardha block.
2. To know about prevalence of anaemia among students benefitting with WIFS (WIFS group) and those who are not getting benefit from WIFS (Non WIFS group)
3. To study the factors affecting the implementation of the scheme.

Study design: Study was conducted in adolescents of rural schools of Wardha Block. Mixed method was used for the study. During the first stage both Quantitative and Qualitative technique (In-depth interview) was used to collect information about implementation of the Weekly IFA supplementation scheme in various schools. Second stage study was a cross-sectional study to assess the prevalence of anemia among WIFS group and Non WIFS group. In-depth interviews of key holders like medical officers of concerned schools, district drug distribution incharge and principal of concerned schools were taken to know about the factors affecting scheme implementation.

Results: Coverage of WIFS scheme was found to be 11.54%. The mean haemoglobin level was 11.84 +1.82 mg/dl among WIFS group while the mean haemoglobin levels among Non-WIFS group was 11.8±1.56 mg/dl. These values are not found to be statistically significant. The in-depth interviews led to conclusions regarding lack of monitoring and supervision of the programme, poor supply of WIFS tablets in the district drug store, which leads to further reduction in distribution of tablets to the ANM, lack of training of school teachers regarding drug administration and management of any side-effects, lack of IEC material in the school which may be used to increase compliance and adherence of students towards WIFS.

Conclusion: To gain maximum benefit for such an important and Highly demanding scheme, proper information regarding Weekly Iron Folic acid Supplementation (WIFS) should be communicated by appropriate channels so that awareness about the modus operendi and benefits of the program can reach to beneficiaries. Periodic trainings of teachers and health workers should be held jointly regarding the programme. Supply of medicine should be uninterrupted.

Keywords: WIFS, Anaemia, Adolescents.

Introduction

Around 1.6 billion people, almost a quarter of the world’s population, are anemic¹. Despite considerable economic and scientific advancement during recent decades, only marginal reduction in the global prevalence of anaemia occurs.² The World Health Organization (WHO) estimates that worldwide, 42% of pregnant
women, 30% of non-pregnant women (aged 15 to 50 years), 47% of preschool children (aged 0 to 5 years), and 12.7% of men older than 15 years are anemic.\textsuperscript{2} WHO has also estimated that half of these anaemia cases are due to iron deficiency.\textsuperscript{3,4} Iron deficiency is the most prevalent and also the most neglected nutrient deficiency in the world.\textsuperscript{5}

According to NFHS-III data, over 55% of adolescent boys and girls in the age group of 15-19 years are anaemic. Adolescent girls in particular are more vulnerable to anaemia. To address this problem Ministry of Health & Family Welfare launched Weekly Iron Folic Acid Supplementation Program for Adolescents on 2013, under this supervised IFA supplementation is being given weekly to adolescents. Sessions on Nutrition and Health Education are planned at the schools and Anganwadi centres to inform and counsel adolescents and their care givers on nutrition and related health issues. The program is implemented across the country, covering 13 crore adolescents. The key feature of WIFS is administration of supervised Weekly Iron Folic Acid Supplements of 100mg elemental iron and 500mg Folic acid. Since there are many research studies on prevalence of Irondeficiency anemia among adolescents but very few studies are on program implementation. So this study is to assess the implementation of WIFS programme in Schools in central India.

**Objectives**

1. To study the coverage of weekly iron folic acid supplementation scheme in schools of Wardha block.
2. To know about prevalence of anaemia among students benefitting with WIFS (WIFS group) and those who are not getting benefit from WIFS (Non WIFS group)
3. To study the factors affecting the implementation of the scheme.

**Material and Method**

**Study setting:** Study was conducted in the schools of Wardha block. In first stage List of all schools in rural area of Wardha block was prepared. In all schools a predesigned pretested questionnaire was used to assess the coverage of Weekly IFA supplementation among adolescents. On the basis of coverage of Weekly IFA supplementation, high coverage and low coverage schools was selected for the study to assess the prevalence of anemia among school-going adolescents.

**Study design:** Mixed method was used for the study. During the first stage both Quantitative and Qualitative technique (In-depth interview) was used to collect information about implementation of the Weekly IFA supplementation scheme.

Second stage study was a cross-sectional study to assess the prevalence of anemia among school-going adolescents.

**Study period:** This study was carried out over a period of 1 and half year (2014-16).

**Study subjects:** School going adolescents (10-19 years).

**Sample size:** Considering 50% prevalence of anemia, the sample size required at 5% precision, alpha error of 5% with design effect of 1, was calculated using the Open Epi-software (version 3.01), sample size is 384. A total of 768 students was studied (384 students from schools with high coverage of Weekly IFA supplementation and 384 students with low coverage of IFA supplementation).

**Data Collection:** Coverage of Weekly Iron and Folic acid supplementation was studied using a pre-designed, pre-tested self administered questionnaire. On the basis of coverage, high coverage schools and low coverage schools was selected for the study. Data was collected by interview method using a predesigned and pretested questionnaire. The data collection tool includes socio-demographic profile, dietary history, information on Weekly IFA supplementation, anthropometric measurements, medical history, menstrual history (adolescent girls) and hemoglobin estimation using cyanmethemoglobin method using filter paper technique.

**In-depth Interview of Health-care providers/ School Principal/School teachers:** In-depth interview was conducted to collect information about implementation of the Weekly Iron and Folic Acid supplementation scheme from Health care providers (District RCH officer, Medical officer of Primary Health Centre), Nodal teachers and District level supply officer to study the mechanism of procurement and supply of IFA tablets to the schools using a structured In-depth interview guideline.

The data entry and analysis was done in Epi_Info software (version 6.04d).
Results

1. Coverage of WIFS Supplementation: Coverage of WIFS scheme was found to be 11.54%. Out of 52 rural schools in Wardha block, only 6 schools were found to implement WIFS and in 46 it was not implemented at all. Thus it was found that the coverage of WIFS is very poor in the block.

2. Prevalence of anaemia among the students receiving WIFS and Not receiving WIFS

Table 1. Grades of Anaemia

<table>
<thead>
<tr>
<th>Grades of Anemia</th>
<th>WIFS group</th>
<th>Non WIFS group</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Anemia</td>
<td>189</td>
<td>179</td>
</tr>
<tr>
<td>Mild Anemia</td>
<td>107</td>
<td>121</td>
</tr>
<tr>
<td>Moderate Anemia</td>
<td>73</td>
<td>75</td>
</tr>
<tr>
<td>Severe Anemia</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>384</td>
</tr>
</tbody>
</table>

Prevalence of Anaemia: The mean haemoglobin level was 11.84 $\pm$1.82 mg/dl among WIFS group while the mean haemoglobin levels among Non-WIFS group was 11.8 $\pm$1.56 mg/dl. These values are not found to be statistically significant.

Table 2. Mean Haemoglobin Levels

<table>
<thead>
<tr>
<th>WIFS group Haemoglobin (mean$\pm$SD) (n=384)</th>
<th>Non-WIFS group Haemoglobin (mean$\pm$SD) (n=384)</th>
<th>p-value (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.84 $\pm$1.82 mg/dl</td>
<td>11.8 $\pm$1.56 mg/dl</td>
<td>0.7438</td>
</tr>
</tbody>
</table>

3. Findings of In-depth interview for studying the factors affecting the implementation of WIFS

In-depth interview was conducted to study the factors affecting the implementation of WIFS. A total of 8 In-depth interviews were conducted using an In-depth interview guide.

The following personnel’s were interviewed:

1. Principal of Schools (4)
2. Medical officer of Primary Health Centre (2)
3. District RCH Officer (1)
4. District Drug store In charge (1)

Findings of In-depth interview with School Principals: In most of the school’s Principal was aware of other programs which were implemented in their school. They also shared that they are notified periodically by their Block Education Officer and ANM regarding any new programme. While in case of WIFS, most of them requires help of other teacher whenever questions regarding WIFS were asked to them. Some were confused between deforming and Iron folic acid tablets. Some Principals were inquisitive to know about WIFS.

Almost all of the schools did not assign any teacher as nodal teacher to manage WIFS. In few of the schools register is maintained by the class teachers for WIFS. In almost all the schools no teacher had participated in any training held for WIFS program in health department, education department or in ICDS. In only one school a teacher was assigned to administer IFA WIFS tablets to adolescents. No committee has been formed for the program separately at school level. Similarly student wise register that meant to be formed for information regarding WIFS is available only in one school.

Almost all the principals responded that they have not received IFA WIFS tablets in the year 2015; they got supply of IFA WIFS only a single time during 2014. Even most of them did not know, from where they receive the supply and where they have to put forth the demand. Principals received a letter from Block Education officer in 2014 to stop administration of WIFS after a few cases of nausea; vomiting and diarrhea which lead to hospitalization in students of one of the block was reported. After that incident IFA WIFS tablets were checked in laboratory and found to be safe for adolescents, but no Principal received any letter to restart the WIFS. No significant health related complaint was noticed by the school teachers in WIFS received adolescents.

On asking for suggestions to improve the programme, most of the Principals told that they are not thoroughly informed regarding newly implemented programmes. One of the Principal told that there teachers are anxious while giving tablets to adolescents because if anything happens to students due to any cause, parents will blame them. Principals also suggested that teachers should be trained to treat minor side effects of IFA tablets. Health education sessions should be organized periodically for students regarding usefulness of WIFS. One of the Principal told that most of the sessions conducted in their schools are focused on hygiene and sanitation, students are not informed or motivated to take WIFS by their own. In one of the school where they administer all the supplied IFA tablets to students, they were unaware about how they indent for more tablets and what the
According to drug store In-charge, they indent IFA got all distributed by 17/06/2014 to all the 27 PHC’s. received on 28/02/2014 of 37,62,000 tablets which this year. The first and only supply of WIFS tablets was no supply of IFA WIFS has been received in the district stock of IFA in district drug store, it was found out that Store In-charge: consumption of IFA tablets by adolescents. they have not observed any serious complication by IFA tablets. Medical Officers of the PHCs also said that there should be demand from the school side for instead of providing in schools. They also suggested that ANM will distribute tablets to pregnant mothers of IFA tablets should be adequate otherwise it’s obvious WIFS, Medical Officer suggested that the regular supply ANM collects IFA tablets from the pharmacist of the PHC. On observing registers from pharmacist, it was found that they did not make a separate entry sheet for WIFS till 2015. They are confused regarding use of WIFS and regular Iron folic acid tablets, since both have same content and also they have not received appropriate information regarding their use. Thus they might supply IFA-WIFS tablets to pregnant women in case of shortage of regular IFA tablets. Meanwhile PHC’s drug registers shows that PHC has not received IFA tablets in 2015. Only IFA tablets for pregnant women are present in the PHCs and pharmacist distributed all the WIFS to the ANM previously. Regarding suggestions to improve WIFS, Medical Officer suggested that the regular supply of IFA tablets should be adequate otherwise it’s obvious that ANM will distribute tablets to pregnant mothers instead of providing in schools. They also suggested that there should be demand from the school side for IFA tablets. Medical Officers of the PHCs also said that they have not observed any serious complication by consumption of IFA tablets by adolescents.

Findings of In-depth interview with District Drug Store In-charge: On collecting information about the stock of IFA in district drug store, it was found out that no supply of IFA WIFS has been received in the district this year. The first and only supply of WIFS tablets was received on 28/02/2014 of 37, 62,000 tablets which got all distributed by 17/06/2014 to all the 27 PHC’s. According to drug store In-charge, they indent IFA tablets with priority every time. They have not received the demands from PHC’s or Education Department. He also narrated similar incident of gastric trouble noticed in schools of one of the block which led to panic among school teachers regarding distribution of IFA tablets to adolescents. According to him it is also one of the reasons for the decrease in demand of IFA WIFS tablets.

Findings of In-depth interview with RCH Officer: RCH officer told that ARSH, WIFS and Menstrual hygiene programme are run by government for adolescents. Except menstrual hygiene programme others programs are running satisfactorily in the district. He was surprised of the fact that WIFS tablets do not reach to schools properly, as they are receiving reports of program running regularly by their field workers as ANM, MPW and HS (health assistants). Also he shared that they cross check the ANM’s information during monthly meetings. On asking for their awareness regarding the stock status in district drug store for WIFS, he confidently told that as far as his information, it is sufficient. Regarding the mechanism through which Principal demands IFA, he replied that school should demand to their respective MO’s of PHC and then from there the demand will reach the drug store. On asking about collaboration between Education Department, ICDS and Health department, he said that there was no meeting conducted. He also told that Education Officer should contact them to get uninterrupted supply of WIFS, but they do not communicate but said that it is essential that the two departments must play an important role for making the program effective. Health department should come forward to create awareness in the schools about complications of IFA supplementation and how to handle if they arose. He also suggested that Education department should consult Health department regarding stocks and any obstructions that they are facing for implementing the program.

Proper information regarding health programs should be communicated by appropriate channels so that awareness about the modus operendi and benefits of the program can reach to beneficiaries. Periodic trainings of teachers and health workers should be held jointly regarding the programme.

Summary and Conclusion

Since it is the evaluation of an ongoing programme, so to keep it in proper pace and the scheme is not being implemented in so many schools the major factors are
firstly their is lack of communication between health and education department. Even after completion of 2 years of the programme, no meeting has been organised between them. So without any coordination, there is improper monitoring and supervision of programme. Training of drugs provider also needed to make the primary provider of the scheme more efficient. There is also lack of IEC material in the school which may be used to increase compliance and adherence of students towards WIFS. Lastly inadequate supply of WIFS-IFA tablets in the block. These challenges make the programme difficult to run till now. There are certain limitations of the study like it was school based study and healthy worker effects can’t be taken in consideration.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Informed consent was taken from the adolescents and School teachers. Confidentiality of information was maintained. Adolescents suffering from severe anemia referred to appropriate health care facility for treatment. The study is done after article acceptance from the ethical committee members of MGI SMS Sewagram.

### References


IoT Based Ketoacidosis Detection

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Abstract

Ketoacidosis also known as DKA (diabetic ketoacidosis) is a serious condition which occurs in patients who suffers from diabetes. It affects people above 25 years of age. It occurs due to insufficiency of insulin. Detection of ketone is done by the nitroprusside-based urinary dipstick ketone test and plasma/serum ketone analyses. Non-invasive detection of ketoacidosis is done by breath analyzer. In this paper we are using breath acetone as a biomarker for ketoacidosis. The resultant ketoacidosis values are transmitted through ESP8266. The ESP8266 sends the sensor values to think speak (private cloud). The new channel is created in Think Speak private clouding and Channel API keys are generated to read and write the sensor data from ESP8266. Through this simple IoT device the physician is always connected to the patient and can be able to monitor the ketoacidosis condition of the subject

Keywords: Ketoacidosis, think speak, IoT, API keys.

Introduction

Ketoacidosis is related to concentration of ketone bodies which are high. The human produced ketones are of two types such as acetoacetic acid and β-hydroxybutyrate. It causes accumulation of ketacids and pH change in blood. It mainly occurs in type 1 diabetes mellitus patients but also seen in type 2 diabetes mellitus. No proper treatment of ketoacidosis can lead to coma or fatal. In this paper ketoacidosis data is acquired and transmitted to doctor via internet.

The condition called as Diabetes Mellites which is a great threat to the healthcare and its detection in noninvasive is rare methodology [1]. The Diabetic patients does not produce enough insulin, the fat molecules stored in the body is converted as energy. If the fat is converted as ketones, then it produces the acetone. Hence the acetone can be used as biomarker for the detection of Ketoacidosis condition [2][3] and the hydrogen Sulphide can be used as biomarker for detection of Halitosis [4] condition. The diabetic patients have sweet odor in the breath because of acetone mixed with the exhalation of the patients.

Diabetic ketoacidosis (DKA) is a buildup of acids in your blood. [5] It can happen when your blood sugar is too high for too long. It could be life-threatening, but it usually takes many hours to become that serious. You can treat it and prevent it, too. It occurs when the body doesn’t have enough insulin. The cells can’t use the sugar in their blood for energy, so they use fat for fuel instead. Burning fat makes acids called ketones and, if the process goes on for a while, they could build up in the blood. That excess can change the chemical balance of blood and throw off the entire system. People with type 1 diabetes are at risk for ketoacidosis, since their bodies don’t make any insulin. DKA can happen to people with type 2 diabetes, especially in older people.

In human breath, diverse components are found including water vapor, hydrogen, acetone, toluene, ammonia, hydrogen sulfide, and carbon monoxide, which are more excessively exhaled from patients [6]. Some of these components are closely related to diseases such as asthma, lung cancer, type 1 diabetes mellitus, and halitosis. Breathe analysis for disease diagnosis started from capturing exhaled breaths in a Tedlar bag [7] and subsequently the captured breath gases were injected into a miniaturized sensor system, like an alcohol detector. It is possible to analyze exhaled breath very rapidly with a simple analyzing process. The breath analysis can detect trace changes in exhaled breath components [8], which contribute to early diagnosis of diseases [10], a system for detecting halitosis that comprises a gas sensor for generating a sensor signal signaling the detection of compounds indicative of halitosis exhaled through

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an oral cavity, an image sensor for capturing an image of a dental condition and/or tongue condition in said oral cavity and a processor communicatively coupled to the gas sensor and the image sensor and adapted to process the sensor signal and the image in order to determine if in case of the sensor signal signaling the presence of a compound indicative of halitosis, said halitosis originates from said oral cavity by determining the dental condition and tongue condition in said image. Thus, the result states it 85% accurate to the gas chromatography.\cite{11} A non-invasive breath test to monitor the condition of diabetic patients where it is identified as an easier technique and quick diagnoses of diabetic ketoacidosis that prevent acute complication of type 1 diabetes mellitus. A method of monitoring ketone level by using breath measurement is done. An easy handheld health care on monitoring diabetic level with breath is presented. Method presented a development of hardware connection with Internet of Things (IoT) system to facilitate the process of patients’ diagnosis and personal monitoring. An Arduino board is used to read the sensor with sense the breath. Breath value level is log to system using wireless communication. Data collection is interfaced to web page. Ketone level is measured as the amount of breath acetone is collected when patients exhale into a mouthpiece that consists of gas sensor. This research is identified as a significant research where patients can independently monitor their diabetic health and the IoT system can be alerted directly to medial officers in the hospitals. The analysis of ketone level from the breath is based from the resistance of the gas sensor. FIGARO TGS 822 gas sensor is used to detect the amount of gas acetone in a person’s breath. When the concentration of the acetone gas increases, the resistance of the sensor is decreased. The decrease of resistance is depending on the three factors; gas concentration, humidity and temperature. To get an accurate concentration of acetone gas in a person’s breath, humidity and temperature sensor (DHT11) is added. This is due to the sensitivity of the electrochemical gas sensor towards other gasses other than acetone. As the reading from sensor is sent to Arduino, the data is shared to the database via Wi-Fi module ESP8266. ESP8266 gives Wi-Fi networking with TCP/IP protocol stack which can give Wi-Fi connection to Arduino board so that the data can be processed and shared to the web database. Thus the result shows that the amount of breath acetone method to determine the ketone level of diabetic patients is applicable as there is a good correlation between breath acetone levels and blood ketone levels developed a new generation of diagnostics for halitosis, replacing the subjective organoleptic assessment, a series of exhaled breath analyzers has been developed and assessed. All three devices rely on the assessment of exhaled Volatile Sulfuric Compounds (VSCs), which are mainly generated in and emitted from the oral cavity, contributing to the malodor. Portable, on-site and easy to use, these devices have potential for non-invasive diagnosis of halitosis. However, global assessment of exhaled VSCs alone has two main drawbacks: (1) the absence of VCSs does not rule out halitosis; (2) non-sulfuric volatile compounds that could be biomarkers of systemic diseases, found in up to 15% of halitosis cases, are neglected. The field of oral/exhaled volatile compounds as potential noninvasive diagnostics for halitosis. Thus, cross-reactive (semi-selective) sensors are used to analyze patterns qualitatively. the system is not capable of quantitative analysis or identifying the exact VOCs/VSCs in a given sample. Therefore, prior to the clinical phase, it is critical to study the identity of the targeted compounds in vitro and in vivo, by chromatography and spectrometry. In addition to this, a wide database of breath samples from oral and extra-oral halitosis patients should be used for clinical validation of the sensors for use as a database of pattern references that the software would use to match the pattern and classification of each newly obtained breath sample.

Proposed an apparatus for detecting and separating specific compounds in breath gas mixtures for halitosis analysis consisting of a line for delivering a pressure-controlled neutral gas; a removable connected sample chamber of specific volume for receiving the gas mixture to be evaluated; an electronically controlled valve for injecting the gas sample into the line a temperature-controlled micro-fabricated separation capillary column arranged to receive the gas sample injected into the line a gas sensor at the outlet of the capillary column and a control interface for managing the measurement and evaluating the obtained data stated Sensitive detection of acetone and hydrogen sulfide levels in exhaled human breath, serving as breath markers for some diseases such as diabetes and halitosis, may offer useful information for early diagnosis of these diseases. Exhaled breath analyzers using semiconductor metal oxide (SMO) gas sensors have attracted much attention because they offer low cost fabrication, miniaturization, and integration into portable devices for noninvasive medical diagnosis. However, SMO gas sensors often display cross sensitivity to interfering species. This
work reports on highly sensitive and selective acetone and hydrogen sulfide detection achieved by sensitizing electrospin SnO\textsubscript{2} nanofibers with reduced graphene oxide (RGO) nanosheets. SnO\textsubscript{2} nanofibers mixed with a small amount (0.01 wt %) of RGO nanosheets exhibited sensitive response to hydrogen sulfide (R\text{air}/R\text{gas} = 34 at 5 ppm) at 200 °C, whereas sensitive acetone detection (R\text{air}/R\text{gas} = 10 at 5 ppm) was achieved by increasing the RGO loading to 5 wt % and raising the operation temperature to 350 °C. The detection limit of these sensors is predicted to be as low as 1 ppm for hydrogen sulfide and 100 ppb for acetone, respectively. These concentrations are much lower than in the exhaled breath of healthy people. This demonstrates that optimization of the RGO loading and the operation temperature of RGO–SnO\textsubscript{2} nanocomposite gas sensors enables highly sensitive and selective detection of breath markers for the diagnosis of diabetes and halitosis. The result was highly selective and remarkably sensitive sensors to H\textsubscript{2}S and acetone were produced by mixing SnO\textsubscript{2} NFs with RGO NSs. The SnO\textsubscript{2} NFs were produced by electrospinning, a simple and versatile method for the fabrication of NFs of different materials. Subsequently the SnO\textsubscript{2} NFs were mixed with GO NSs at loading levels of 0.01 or 5 wt % GO, and eventually the GO NSs were reduced to RGO by annealing in forming gas. This resulted in porous nanocomposite layers of SnO\textsubscript{2} NFs mixed with RGO NSs. The SnO\textsubscript{2} NFs were produced by electrospinning, a simple and versatile method for the fabrication of NFs of different materials. Subsequently the SnO\textsubscript{2} NFs were mixed with GO NSs at loading levels of 0.01 or 5 wt % GO, and eventually the GO NSs were reduced to RGO by annealing in forming gas. This resulted in porous nanocomposite layers of SnO\textsubscript{2} NFs mixed with RGO NSs. At the small RGO loading level (0.01 wt %) the electrical transport and gas sensing properties of the nanocomposite layer were dominated by the SnO\textsubscript{2} NFs, but at the high loading level (5 wt % RGO) the RGO NSs formed continuous percolation pathways and they became the dominant component controlling the electrical transport through the nanocomposite layer. This enabled tuning the gas sensing characteristics of the RGO NS–SnO\textsubscript{2} nanocomposite sensors to achieve enhanced sensitivity and selectivity to traces of H\textsubscript{2}S or acetone in humid air for sensors with low or high levels of RGO loading, respectively. Besides changing the RGO/SnO\textsubscript{2} ratio we also found that tuning the operation temperature of the sensors enabled achieving high selectivity between H\textsubscript{2}S and acetone.

**Methodology**

The subject blows into the gas chamber which contains temperature and humidity sensor (DHT-11) and gas sensor (MQ-138). The gas sensor measures the concentration of acetone gas in the chamber and the temperature and humidity sensor measures the temperature and humidity of the chamber. The sensed data is sent to the Arduino uno. The microcontroller processes the output and displays it in the LCD. The microcontroller sends the output to the ESP8266 and is uploaded in the internet in real-time.

**MQ-138 Formaldehyde sensor:** The MQ-138 sensor is used to detect the acetone from the forceful blow of patient breath. The sensor is placed in a gas chamber where based on the gas concentration the acetone range is detected and displayed in serial monitor and LCD. This sensor can also detects Aldehydes, alcohols, ketones, aromatic compounds which are volatile compounds.

**DHT-11 Temperature and Humidity sensor:** The DHT-11 is a digital temperature and humidity sensor from micropik. A capacitive humidity sensor and a thermistor to measure the surrounding air is used which ranges from 20-90% with a resolution of 1 temperature from 0-50°C with a resolution of 1 at accuracy of 2°C.

**ESP 8266 WIFI module:** The ESP8266 microcontroller is integrated with a Tensilica 32-bit processor, which reaches a maximum clock speed of 160 MHz. The RTOS and Wi-Fi stack allow about 80% of the processing power to be available for user application programming and development.

**Thing Speak:** Thing speak is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. Thing Speak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates.

**Gas chamber:** The gas chamber contains two sensors. One is gas sensor and another one is temperature sensor. The gas sensor is designed similar to gas chamber. The dimension of the gas chamber is 255cm³. The gas chamber in this project can hold up to ppm of acetone gas.

**Results and discussion:** The Ketoacidosis condition is a pathological Condition in which it is important to monitor regularly for the diabetic patients. In this paper the noninvasive method of monitoring the ketoacidosis is designed using the gas sensor. The gas sensor is placed in the gas chamber with that of Digital temperature and humidity sensor. The subject is guided to blow into the gas chamber, based on the gas concentration of acetone inside the chamber the acetone ppm values are displayed in the LCD as well as serial monitor and
the acetone values are transmitted to the Thing Speak cloud individual private channel using ESP8266 (via API key). The ketone, temperature, humidity values are plotted in Thing speak web channel in real time. The real time plotted values are monitored by the physician and it is easy to get connected with the patients online. The recent trends in IoT development makes the patient get connected with the physician. The subject used to test for ketoacidosis conditions are diabetic as well as non-diabetic. The subject 1, 2, 3 are healthy individual and subject 4 and 5 are diabetic individuals. The subject 4 and 5 exhibit abnormal acetone values because all the subject has undergone two hours of fasting and acetone values are measured. For diabetic subjects the stored fats are converted into ketone bodies and that ketone bodies produces acetone, if food is not taken at proper intervals, that’s why the diabetic subjects always have fruity odor in their breath. This methodology is very helpful for noninvasive monitoring of ketoacidosis than measuring invasively by blood and urine. The work is then extended in future by making it very compact and mobile application-based monitoring and guiding the diabetic subjects for proper ketogenic di

Table 1: Acetone values of the subjects

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Age</th>
<th>Acetone Value in PPM Per Litre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Subject 1</td>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Subject 2</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Subject 3</td>
<td>39</td>
<td>2</td>
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</tr>
<tr>
<td>5</td>
<td>Subject 5</td>
<td>44</td>
<td>21</td>
</tr>
</tbody>
</table>

Ethical Clearance: The Study is based on the Digital Processing of the sensor and its connectivity via IoT (Internet of Things). The Study is been conducted by the guidance of Head of the Department, Ms. R.J. Hemalatha.

This Study does not require Ethical Clearance. This Study is conducted in the Biomedical Instrumentation Lab of Vels Institute of Science Technology and Advanced Studies-Department of Biomedical Engineering, Chennai-117.

Source of Funding: It is one of the Self-funding projects of Department of Biomedical Engineering.

Conflict of Interest: Nil

Reference

Smart Aid for the Blind

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Abstract

The assist device for blind people is much needed in recent days. The gadgets in recent trends are digitized that the blind people are not capable of handling digitized applications hence in our project we design text to voice converter, that converts the eBooks, audiobooks to voice format. In this project the audiobook eBooks are fed into SD card reader after that the sd card reader is interfaced and the Arduino UNO converts the text file to Audio output. The audio books can be heard in headphone/speaker using Arduino UNO. This project is low cost it will be more useful for blind people.

Keywords: Braille; Arduino Uno; SD card module, jump wire.

Introduction

The Braille Displays, Books, Gadgets are the best companion for the Blind people. In order to make them ease in reading any text, the Braille pattern books are developed. In recent days the Braille Electronic Keyboards, Braille Display Electronic Gadgets are available for the Blind people. In this project we propose an idea of making a smart Braille device in which it can able to read any e-books and convert the text to voice format. This smart Braille device will be a best companion for the blind people. The objective our study is to assist the visually impaired people with reading text and converting text into audio format using micro controller at low cost and more reliable

Literature survey: Text to braille interpreted printed document through (OIP)optical text to braille converter device for aiding visually impaired individuals to read printed materials-this system will give visually impaired people chance to read any printed reading paraphernalia-components-camera, optical image processing, USB to UART device, microcontroller, braille cells

Teaching interface of finger braille teaching system using smartphones finger braille teaching system between non-disabled senders’ deaf blind receiver has been developed single column teaching interface for more easily viewable double column teaching interface promoted better performance (response time dotting speed and accuracy) using smartphone component-deafblind, finger braille, teaching interface, smartphone

Braille based mobile communications translations glove for deaf blind people the literate deaf blind population, into text and vice versa, and communicates message via SMS to remote contact it enables to convey simple message by capacitive touch sensor input sensor placed on palmer side of glove and converted to text by PC/smartphone added min vibrational motor-assistive technology; braille; deafblind; haptic; human computer interaction; mobile communications; sensory impairments; wearable device

Smart reader for visually impaired-OCR-the optical character recognition functions of MATLAB for converting image to text this paper proposes smart reader system for visually impaired here proposed novel audio tactile user interface that supports user to read information, component-MATLAB, OCR, text to speech, Web cam

Methodology

The usage of electronic gadgets by the blind people when compared to the normal people is low because of its in-accessibility. Most of the electronic gadgets are created for the use and easy access of the normal & healthy people whereas the blind people cannot be able to access the electronic gadgets easily, voice recognition in mobile based application will be more helpful to the blind people. The blind people cannot be able to read an e-book or any e material It is very important to develop electronic gadgets for blind people with universal design. Voice recognition will be
more helpful for blind \cite{5,11}. The universal design plays an important role in day to day life of the blind people. It is the primary responsibility for the society to create an easy and comfortable environment that are usable by all kind of people braille will be much more helpful in reading books for the blind \cite{7,12}. The people with low vision or poor vision should also be considered as a user of electronic gadgets and the devices should strictly follow the universal design protocol for the easy access by the blind and low vision people. IOT are the recent in connecting blind people with technologies \cite{12}.

**Hardware Required:** The Arduino Uno is an open source microcontroller board based on the microchip ATMEGA328P microcontroller and developed by Arduino Uno the board is equipped with sets of digital and analogue input/output pins that may be interfaced to various expansion board and other circuit the Arduino guanine board, or other microcontroller. The ATMEGA328 provide UART TTL (5v) serial communication, which is available on the digital pin 0(RX) and (TX) an ATMEGA16 U on the board channel this serial communication over USB and appears as virtual com port to the computer software.

SD card module mostly useful for projects that require data logging the Arduino can create file in an SD card to write and save data using SD library there are different models from different supplier but they all work in similar way, using SPI communication protocol the module used in the tutorial The module comes with voltage regulator therefore the Arduino 5V and 3.3v pin can be used for voltage supply the modules communicates via SPI (serial peripheral interface) to the Arduino Uno.

**Software Required:** The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS and Linux. The environment is written in Java and based on Processing.

**Result and Discussion**

In this study the SD card reader is interfaced with the Arduino Uno. The Pdf file is fed into the SD card reader and the Arduino converts the text file to audio format. Pulse Width Modulation, or PWM, is a technique for getting analog results with digital means. The speaker wire or headphones are connected to the 9th pin of Arduino which is PWM pin of the Arduino. However, the output should be amplified using external audio amplifier. This study can also read the audio books and plays via speaker/headphones. In this study the SD–Card is interfaced with the Arduino Uno controller. The SD-Card reader can be expanded up to 120 GB. In this prototype we have used 8 GB memory card, that is loaded with audio books, readable pdf and word documents. Arduino Uno reads the all the text files in the SD card reader and displays in the serial monitor and converts the text in to speech using PWM technique and plays the audio file via head phone and speakers. The voice output is not clearly audible hence an external audio amplifier is required to amplify and filter out the noises. In future the project can be extended by adding suitable braille keys, so that the voice synchronous with the braille texts.

**Future Scope:** The project can be extended in future by converting text to Braille keys. The rotatable Braille keys from A to Z or raised Braille dots (keys) can be used to design a Braille keypad. The fully refreshable Braille keypad can be developed in future for easy text to Braille converter.

**Ethical Clearance:** The Study is based on the Digital Processing of the sensor and its connectivity via IoT (Internet of Things). The Study is been conducted by the guidance of Head of the Department, Ms. R.J. Hemalatha.

This Study does not require Ethical Clearance. This Study is conducted in the Biomedical Instrumentation Lab of Vels Institute of Science Technology and Advanced Studies–Department of Biomedical Engineering, Chennai-117.

**Source of Funding:** It is one of the Self-funding projects of Department of Biomedical Engineering.

**Conflict of Interest:** Nil

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A Novel Design of Wearable Automatic Stress Detecting Device for Women Safety Using Heart Rate Variability

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Abstract
This paper presents the design of novel device to identify abnormal heart rate variability (HRV) due to anxiety in threatening circumstances, and to automatically relay alert along with location coordinates to the pre-saved phone numbers through global system for mobile communication (GSM), in order to acquire help. Physical activities change heart rate but not HRV whereas fight-or-flight response causes change in both. It is found that, with the help of HRV measurement it is possible to distinguish the changes in electrical activity of the heart due to physical activities and acute stress. The proposed design can also be used to know the abnormal conditions of heart patients and to provide timely help.

Keywords: Heart rate, Heart rate variability, HRV abnormality, GSM and GPS module, Pulse sensor.

Introduction
Marching towards technological augmentation, restless toil is to confer the capital that makes our living. In such an eventful life women face a lot of disquieting situation. Counting from a teenage girl to a married woman, women from all walks of life are being assaulted, molested and violated every single day. The streets, public transport, public spaces in particular have become the territory of the molesters. Millions of crimes against women were reported over the past decade \textsuperscript{(1)}. Women are more at risk from gender based violence than war, malaria or cancer. There are a lot of legal solutions to the issue but it becomes difficult to provide a timely help. With our proposal “The Guard Watch” we aspire to develop an embedded device that can afford well-timed help rather than abandoning the women in crisis. There is no system to absolutely stop the crimes against women but at least we can ensure the safety of our loved ones instantly when there is a jeopardy waiting. The entire hardware for the detection of anxiety contributes to the innovation of this solution.

The existing devices designed for women safety embraces a manual alert system which entails a person to physically operate the device to acquire help. Many devices in the form of hair clip, smart dresses, and smart jewelry have this facility. Other smart watches existing in the market, which are generally designed for sports persons, compute heart rate, blood pressure and other related parameters to estimate the health condition of the person wearing the device \textsuperscript{(2)}. Thus, such devices focus only on health and fitness alert. Some system available in market propose to identify stress which either involves techniques like salivary test, adrenaline measurement etc., or involves the prolonged measurement of heart rate to compute stress\textsuperscript{(3,4)}. None of these tests can be done instantaneously and noticeably differentiate the diversity between flight/flight stress and the habitual stress.

For example, the heart rate increases during extreme anxiety and also due to exercise. It is impossible to categorize this systematic activity from the atypical fear. Heart rate focuses on the average beats per minute while heart rate variability (HRV) measures the specific change in time between successive heart beats. HRV is non–invasive and provides more accurate stress measurements by measuring the timely variation when a person is undergoing fear \textsuperscript{(5-9)}.

The projected design uses Heart Rate Variability as a factor to measure the fretfulness of the women in danger by continuously monitoring the HRV. The Guard Watch involves the unification of technologies like a pulse sensor to record the electrical activity of the heart through the reflection of light from blood vessels and compute HRV, Global System for Mobile communication (GSM) and Global Positioning System.
(GPS) modules to send the alert message, in case of menacing situations, along with the location coordinates to the pre saved phone numbers. methodology

In this section heart rate variability, the main parameter that is going to be used in the proposed device, its features, measurement procedure and the use of Photo Plethsmo Graph sensor to measure heart rate are discussed.

**Heart rate Variability:** An ECG graph consists of five regions (PQRST) with respect to the functionality of the chambers of the heart. HRV is the time difference between the R-R peaks in an ECG waveform. Fig. 1a and Fig. 1b show respectively the ECG waveform with equal and unequal R-R intervals. Under normal body conditions, the time difference between the successive R-R peaks (HRV) remains almost constant. However, when a person is in fear the heart beat occurrence varies and hence the time difference between the adjacent R-R peaks (consecutive HRV measured) varies abruptly. This occurs because the heart may skip a beat (due to extreme anxiety). The interesting feature of HRV is, it can reflect changes in mental stress while other physiological parameters, like blood pressure, are still in normal or accepted ranges. HRV changes are different for fight/flight response compared to customary physical activities like exercise.

**Photo Plethsmo Graph Sensor:** Optical heart rate sensors use a methodology called Photo Plethsmo Graph (PPG) to measure heart rate. PPG is an optical sensor that measures the electrical activity of the heart based on the fact that light entering the body will scatter in a predictable manner as the blood flow dynamics change, such as with changes in blood pulse rates (heart rate) or with changes in blood volume (cardiac output). PPG provides accurate inter pulse intervals from which HRV measures can be accurately derived\(^\text{(10)}\).

**HRV measurement:** A threshold is set to detect the R peaks from PPG sensor output. Since the optical reflectivity from PPG sensor varies for persons with
different muscle densities, color tones, age groups and
gender, the R peak amplitude also varies from person
to person. So it has to be manually determined for a
particular person under complete physical and mental
rest and set in the device. Since HRV is the time
difference between successive R peaks, the interval
between successive R peaks is of much important for
further calculation than the amplitude.

The normal values of R peak to peak interval also
depends on various criteria like age and gender, but this
does not influence the abnormality in HRV the heart
shows during stress.

**Change in HRV due to flight/fight response:**
Habitual stress is a response to daily pressure. During
such circumstances also the heart may skip a beat and
alert may be generated in a vibrator but it can be rejected
by the user. Stress due to fear (fight/flight stress) is the
process during which a person becomes scares awaiting
what lays ahead and the changes in HRV due to this
kind of circumstances entails help from another person.
Exercise is another physical condition which also alters
the heart functioning. When a person is under physical
training the parameters like heart rate, respiratory rate
and blood pressure varies whereas HRV remains nearly
unchanged, thus featuring HRV as the stress identifying
parameter which could acutely differentiate the anxiety
and agony from the other physical trainings and exercises.

The proposed system works as follows: The time
difference between consecutive R-R peaks is calculated.
Variation in the successive time differences means an
abnormality. Prolonged abnormality will increment a
counter. If the abnormal count crosses a particular value
(say n) the alert is given to the person through a vibrator.
A person wearing the watch can feel the vibration and
can respond to the alert. If the threat is a prank or due to
any work stress (habitual stress), the person can reject
the alarm and the entire process will be reset, instigating
the calculations again. If there is no response from the
user, in case of a real threat, for some elapsed time period
(say n), GPS coordinates of the person is automatically
sent using GSM along with the alert message to the pre-
saved numbers, so that the person could receive timely
help. The following flow chart explains the working of
the proposed system.

**Results and Discussion**

**Observed HRV during physical activity:** The
PQRST waveform is recorded for various persons
under various conditions to study the variations in R
peak amplitude and HRV. Fig. 2 (a) and 2 (c) show
the waveforms recorded using pulse sensor for persons
under complete rest. We can observe the different peak
amplitude for both persons which are due to change in
color tone and muscle density. The pulse waveforms
are recorded for the same persons after mild exercise
as shown in fig. 2 (b) and 2 (d), (the subjects (21-25
age group) were made to go up and down a series of
20 staircases continuously for 5 minutes). From fig 2
we can infer that, the heart rate (number of R peaks per
second) increases for a person under exercise, but the
HRV (consecutive R peak to peak time interval) remains
almost constant as that of normal body condition which
means the HRV is normal. When the person is under
rest the HRV is ‘x’ (say) seconds and after exercise
it has decreased to ‘y’ (say) seconds, but the HRV in
consecutive interval remains nearly same. This robustly
proves the fact that HRV does not vary during physical
activity.
Observed HRV for persons by inducing anxiety: As real-time stress measurements cannot be demonstrated, various readings are recorded for different person by inducing stress. To prove that HRV varies when a person is under stress, the pulse waveform is recorded when a person is watching a horror movie. Sample waveforms are taken for persons who undergo extreme fear while watching a horror movie. The samples at the start of the movie and the samples taken as movie proceeds are compared as shown in fig. 3. Fig. 3 (a) and 3 (b) shows the setup for recording the PPG waveform and sending alert message.

As shown in fig. 3 (c) and 3 (e), at the start of the movie both persons were normal. But when the movie proceeds, as they undergo fretfulness, the waveform varies abnormally, as shown in fig. 3 (d) and 3 (f), in contrast to physical activities and some of the peaks are skipped thus making adjacent HRV to vary. Depending on the tolerable anxiety level of the persons the abnormality in HRV differs for both persons. However, as the change in HRV increments counter, the prolonged abnormality automatically will trigger GPS and GSM modules and will send the alert.

A code is developed to calculate the abnormality in HRV. When the threshold for peak detection is set, the time where the first peak occurs is noted. Then the time of occurrence of second peak is detected and the time difference between successive peaks (HRV) is calculated. This time difference is compared with the consecutive HRV values to identify the variation in HRV and if it is varying an abnormal count is initiated.
When the abnormal count is under acceptable range, no alert is triggered and when it is increasing continuously alert message is sent. For demonstration purpose the maximum abnormal count range is set as 6 and when the count crosses the value 6, an SMS is sent as shown in Fig. 4.

When a person suffers from heart ailments (like mitral valve replacement, AV block etc.) electrical activity of the heart varies and the heart may produce irregular beats. In some cases, the heart may skip a beat or may produce faint beats due to the blocks resulting in abnormal HRV changes. Hence the proposed design can also be used to know the abnormal conditions of heart patients in order to take immediate measures.

**Fig. 3 (d) Waveform recorded when the person 1 undergoes fretfulness**

**Fig. 3 (e) Waveform recorded at the start of the movie for person 2**

**Fig. 3 (f) Waveform recorded when the person 2 undergoes fretfulness**

![Arduino serial monitor output](image)

**Fig. 4 Arduino serial monitor output**

**Conclusion**

The prime concern of this paper is the safety for women. From the results, it is inferred that anxiety in emergency situations can be differentiated from physical activities as the later produces heart rate variation but not HRV. The interesting feature of this design is that the offender cannot know that information was sent from the victim. Also, it is easy to handle and suitable for people of all age as it is like an enhanced smart watch. If petite components could make the smart watches compact, the equivalent and superior miniature progression can be employed for the Guard Watch to be time-honored as the paramount security aid in the near future. Physical
protection cannot be the finest solution all the times but this kind of technological advancements can turn out to be the paramount choice for women safety.

Conflict of Interest: Nil

Source of Funding: Students project Scheme (SPS), Mepco Schlenk Engineering College, Sivakasi, Tamilnadu

Ethical Clearance: The waveforms were observed for the authors themselves.

References


Mobile Phone Usage and Willingness to Receive Health Care Tips among Patients Attending NCD Clinic in a Tertiary Carecentre, Pondicherry

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Abstract

Background: To implement mHealth interventions for control of non-communicable diseases, it is essential to know the readiness among the target population. Among diabetes and hypertension patients attending NCD clinic, tertiary care centre, Puducherry, to describe mobile phone availability and knowledge regarding operation of mobile phones and to study the willingness to receive health related information

Methodology: A facility based cross-sectional study was conducted among diabetes and hypertension patients attending NCD clinic at a tertiary care centre, Puducherry during July and August 2018. The patients were interviewed using a semi structured, pre-tested questionnaire after obtaining informed consent. Information on demography, mobile phone availability, knowledge on mobile phone usage and willingness to receive health related information was collected. Data were entered in Epi Data 3.1 and analysed using SPSS 17

Results: Of total 300 participants, mean (SD) age was 53 ± (7.6) years. Nearly 60% were females. Almost more than half of the patients had diabetes. Personal mobile phone was with 253 (84.3%) patients. Of total 300 patients, all knew to receive a call, 95% knew to make a call. Regarding SMS, 30.8% and 28% know to read SMS and text SMS respectively. Willingness to receive health information was reported by 269 (89.6) patients; 81% preferring voice calls.

Conclusion: Four out of five NCD patients attending tertiary care have personal mobile phone. Willingness to receive health information was also very high. Hence the effective use of mobile phone technology in health care delivery may play a vital role in the management of non-communicable disease.

Keywords: Mobile phone, willingness, health tip, Non-communicable disease, tertiary care.

Introduction

Access to mobile phone has increased which includes nearly two third of the adult population worldwide.¹ The usage of mobile phone has found a rapid increase, which corresponds to the faster diffusion in the field of communication technology than any other communication tool.¹² Among the world nations India stands to be the second largest nation with wireless communication subscriber base and on comparing with urban and rural area, the urban area takes four fold increase contribution in wireless tele density.³ Mobile phone has led to various improvements among people of various sectors and one such important application of this lies in the field of self–care and health care delivery system among patients, a field which has found its way on and is termed as mobile health (mHealth).⁴

mHealth comprises of various modalities which include sending messages through text or video,
The usage of mobile phone in health care has found its attention and is found to be more attractive because of its functional modalities which helps to save people on time in situations which are found difficult for hospital care and management which includes identifying the risk population for developing acute health problems, providing health education among people, and in assisting patients on various administrative works such as assessment of health care records and scheduling appointments. As management of non-communicable disease is a major challenge in the present world, due to the limited capacity of health system in self-management due to changes in lifestyle of people.

Mobile health services can provide various information to patient whenever and wherever they require it and thereby provides an extended form of health care. The use of mobile phones and health services provided by it especially in resource poor setting play a major role in addressing the burden of NCDs. Globally the potential of mHealth is found to be more important in low and middle income countries than developed ones. NCDs are a leading contributor to morbidity and mortality worldwide. The increase in usage of mobile phone across world has provided an opportunity in transforming health care delivery for improving the management of non-communicable diseases (NCDs). The willingness of the target population and knowing their capacity before planning on mHealth is of much importance. Hence this study is planned to assess the mobile phone usage and willingness to receive health related information among patients attending NCD clinic in a tertiary care setup.

**Aims and Objectives:** Among patients attending NCD clinic in tertiary care Pondicherry.

1. To assess mobile phone availability and knowledge regarding operation of mobile phones (Smart phone/Ordinary)
2. To assess their willingness to receive health-related information through mobile phone.
3. To study the factors associated with willingness to receive health related information

**Material and Methodology**

**Study setting & Study population:** It was a facility based cross-sectional study conducted during July to August 2018. Approval from Institute research committee and Institute ethics committee were obtained. The study was conducted in Non-communicable disease clinic under control of department of General medicine, Aarupadai Veedu Medical College, Pondicherry. NCD clinic is regularly conducted by department of General Medicine twice weekly. On average 30-40 patients are attending the NCD clinic on each day. All new and previously diagnosed cases of hypertension, diabetes patients attending NCD clinic were included in the study.

**Inclusion criteria:** New and old cases of hypertension, diabetes attending NCD clinic in Aarupadai Veedu Medical college, Pondicherry.

**Exclusion criteria:** NCD patients other than diabetes and hypertension, patients who were extremely ill & not willing to give informed consent.

**Procedure:** After obtaining informed consent, a pretested semistructured questionnaire was administered to all study participants who will satisfy the inclusion criteria. Details regarding socio-demographic details, access to mobile phone, knowledge on mobile usage (both smartphone and ordinary) and willingness to receive health related information were obtained. Data was entered in EpiData version 3.1 and analysed using SPSS 20.

**Operational Definitions:** Following operational definitions were followed in this study:

**Personal mobile phone:** a mobile phone (Smart phone/ordinary) owned by the individual. It does not include access to a mobile phone through a family member.

**Smart phone:** a mobile phone which have 3G/4G internet connectivity with touch screen with whatsapp application

**Ordinary phone:** a mobile phone which does not have 3G/4G internet connectivity with touch screen with whatsapp application

**Receive and answer a call:** knowledge on attending an incoming phone call irrespective of ownership or present access to a mobile phone.

**Make a call:** knowledge on making an outgoing call irrespective of ownership or present access to a mobile phone.

**Read SMS:** knowledge on opening and ability
to read an incoming whatsapp message or SMS text irrespective of ownership or present access to a mobile phone.

**Send SMS:** knowledge on typing and sending whatsapp message or SMS irrespective of ownership or present access to a mobile phone.

**Health tip:** Any information concerning the specific disease of the patient is suffering from aimed at improving the outcomes of disease management.

**Results**

Table 1: Socio-demographic characteristics of patients attending non-communicable disease clinic in a tertiary care centre in Puducherry, south India, 2018.

<table>
<thead>
<tr>
<th>Socio demographic factors</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Age (in years)</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>12 (4.0)</td>
</tr>
<tr>
<td>40-49</td>
<td>83 (27.7)</td>
</tr>
<tr>
<td>50-59</td>
<td>146 (48.7)</td>
</tr>
<tr>
<td>60 and above</td>
<td>59 (19.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Male</td>
<td>126 (42)</td>
</tr>
<tr>
<td>Female</td>
<td>174 (58)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education status</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>No formal education</td>
<td>131 (43.7)</td>
</tr>
<tr>
<td>Primary</td>
<td>99 (33)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>14 (4.7)</td>
</tr>
<tr>
<td>High School and above</td>
<td>56 (18.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Unemployed</td>
<td>83 (27.7)</td>
</tr>
<tr>
<td>Employed</td>
<td>217 (72.3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Socio-economic Status</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Class 1</td>
<td>2 (0.7)</td>
</tr>
<tr>
<td>Class 2</td>
<td>10 (3.3)</td>
</tr>
<tr>
<td>Class 3</td>
<td>18 (6.0)</td>
</tr>
<tr>
<td>Class 4</td>
<td>249 (83)</td>
</tr>
<tr>
<td>Class 5</td>
<td>21 (7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>Number of individuals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Diabetes</td>
<td>154 (51.4)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>112 (37.3)</td>
</tr>
<tr>
<td>Diabetes with Hypertension</td>
<td>34 (11.3)</td>
</tr>
</tbody>
</table>

Table 2: Mobile phone usage and willingness to receive health tip and use of helpline among the patients attending NCD clinic at tertiary care centre, Puducherry, India, 2018 (N=300).

<table>
<thead>
<tr>
<th></th>
<th>Personal mobile phone N (%)</th>
<th>No access to mobile phone N (%)</th>
<th>Total 300 (100)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ordinary phone 187 (74%)</td>
<td>Smart phone 66 (26%)</td>
<td>Total 253</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23 (48.9)</td>
</tr>
<tr>
<td>Knowledge of mobile phone usage</td>
<td></td>
<td></td>
<td>241 (95)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29 (61.7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>28 (59.6)</td>
</tr>
<tr>
<td>Willingness to</td>
<td></td>
<td></td>
<td>20 (42.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>32 (68.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>66 (100)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>63 (95.5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78 (30.8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>71 (28)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>175 (93.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>66 (100)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>66 (100)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>66 (100)</td>
</tr>
</tbody>
</table>

Of total 300 participants, 174 (58%) were females and mean (SD) age was 53 ± (7.6) years. Majority (43.7%) of participants had no formal education, and 83(27.7%) participants were unemployed. In all, 154(51.4%) patients had diabetes alone, 147 (51.6%) patients had hypertension alone, and 34(11.3%) had both diabetes and hypertension.

Access to mobile phone and knowledge about its use are described in Table2. Personal mobile phone was with 253 (84.3%) patients, among them 26% were smartphone users. Off the 300 study participants 276 (92%) knew to receive & answering calls, 241 (80.3%) knew to make a call, 107(35.6%) knew to open & read SMS and 99(33%) knew to type & send SMS.
Almost 68% of mobile phone owners currently using Tamil (local) language. Willingness to receive health information was reported by 269 (89.6%) patients (Table 2), 81% preferring voice calls. Almost 98% of the mobile phone users prefer to receive health tips in Tamil. Off the 269 willing participants, 116(43%) prefer evening time for receiving health tips followed by 62(23%) prefer morning time. Almost half of the participants who shows willingness to receive health tip prefer once a week followed by 102(37.9%) prefer daily health information.

Date of next visit (29.7%), medication usage (27.1%) and diet (7%) were the 3 most common bits of information that participants were willing to receive.

In bivariate regression analysis, higher age group (OR=4.8[1.4-16.3]), having no formal education (OR=10.7 [3.6-31.4]), unemployment (OR=2.5 [0.5-13.0]), were associated with willingness. In multivariate analysis, having no formal education (OR = 9.6 [2.7-34.0]) independently associated with willingness to receive health tip.

Discussion

mHealth is emerging field in health care delivery system, especially in control of chronic non-communicable disease. To address irregular drug intake, physical activity, wide gap in follow up visits, mobile phones are valuable tool to access the patients at regular intervals and make them touch with health care delivery system. Personal mobile phone is easy to access either through voice call or text messages for health care information. Hence the present study was planned to assess the proportion of mobile phone usage and willingness to receive health related information among non-communicable disease patients attending tertiary care institute.

In this present study, it was found that 84.3% of the study participants had personal mobile phone, among them 26% were smartphone users. Nearly 90% of the study participants willing to receive health tips to control their disease irrespective of having personal mobile phone. More than 80% preferring voice calls. A Similar study was conducted by Niranjan et al in rural Pondicherry and reported that only 38% had personal mobile phones and 60 % of the patients willing to receive health tips and more than half of them preferred voice calls. Okoro EO et al conducted a study in 2009 about Mobile phone ownership among Nigerians with diabetes reported that Eighty nine 68.5% patients had active Mobile phone. These results are very much lower when compared to the present study. The difference could be due to rural and urban difference in study setting. Another community based cross-sectional study from rural area of Bangalore reported that 99% were willing to receive health-related information on mobile phone, and 89% prefer voice calls which is little higher than the present study.

About knowledge of operating mobile phone, 100% of study participants knew to answer the calls, 95% knew to make a call, 30.8% knew to read SMS and 28% knew to text SMS whereas study from rural area of Puducherry reported only half of the patients knew to receive & answering calls, 40.7% knew to make a call, 15.4% knew to open & read SMS but only 8.8% knew to type & send SMS. These results make the difference between urban and rural setting.

In the present study more than half of patients had diabetes alone the remaining half patients had hypertension alone, and 11.3% had both diabetes and hypertension whereas study from rural area of Puducherry reported that 12.3% patients had diabetes alone, 51.6% patients had hypertension alone, and 64 22.5% had both diabetes and hypertension.

In the present study, Date of next visit (29.7%), medication usage (27.1%) and diet (7%) were the 3 most common bits of information that participants were willing to receive whereas study from rural area of Puducherry showed Diet (38.6%), medication usage, (21.6%), and lifestyle modification (25.2%) were the 3 most common bits of information that participants were willing to receive.

In the present study, higher age group, having no formal education, unemployment, were associated with willingness whereas study from rural area of Puducherry showed lower age group, male gender, having formal education, employment, and access to mobile phone were associated with willingness.

This is one of the few studies assessing the knowledge and willingness related to mHealth interventions among patients with non-communicable diseases. This study has a few implications. This comprehensive assessment on receiver level

Knowledge and willingness will help in effective planning of mHealth interventions for chronic non-communicable disease patients. mHealth interventions
have shown favorable results in blood glucose control in diabetic patients, an increased rate of HbA1c testing among previously nonadherent patients, and improved outpatient attendance.\textsuperscript{10,17-20}

The study was conducted among patients attending a tertiary care centre, which caters mixing of urban and rural population. This study findings can be generalised to all tertiary care centres in Puducherry

**Conclusion**

Non-communicable diseases become one of the leading cause for morbidity & mortality. Regular physical activity, follow up visits & regular adherence to medication are at most priority in management of Diabetes & Hypertension. Four out of five chronic disease patients in this tertiary care setting have personal mobile phone. Willingness to receive health information was also very high. Hence the effective use of mobile phone technology in health care delivery may play a vital role in the management of non-communicable disease.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Obtained from institute ethical committee.

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Management of External Resorption: A Case Report

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Abstract

Resorption of the root can be either internal or external and may manifest in the form of perforations on the middle third of the root surface. These resorptions may have undesirable sequelae such as gingival inflammation, periodontal destruction and bone resorption. Numerous materials have been tested to treat such lesions in the past. The present case makes use of mineral trioxide aggregate (MTA) and a periodontal flap for the management of external root resorption. With the success of treatment and desirable outcomes at follow-up appointments, MTA proved to be an effective and viable material of choice.

Keywords: Root resorption, periodontal flap, mineral trioxide aggregate.

Introduction

Resorption is a condition associated with either a physiologic or pathologic process resulting in the loss of dentin, cementum or bone, as defined by the Glossary of American Association of Endodontists.¹ Primary teeth undergo physiologic resorption, allowing the permanent dentition to take their place. Pathologic resorption may follow trauma, orthodontic forces or pulpal or periodontal infections.²

Resorption may also be of the internal or the external type. External resorption is further classified into external surface resorption, external inflammatory resorption, external replacement resorption, external cervical resorption and transient apical breakdown. If permitted to progress, external root resorption may lead to rapid tooth loss.³,⁴

A recently emerged material being increasingly used for management of cases of external root resorption is mineral trioxide aggregate (MTA). MTA is a reliable material owing to its advantage of being biocompatible, with good sealing properties. It also encourages the regeneration of peri-radicular tissues including the periodontal ligament, cementum and bone. MTA finds a wide application as an ideal material for root-end filling, perforation repair and pulp capping.⁵

The following case report demonstrated the use of MTA in the treatment of external root resorption.

Case Report: A 53-year-old female patient reported to the Department of Periodontology and Oral Implantology, with the chief complaint of food lodgement in the upper and lower back tooth region. Her medical history was non-contributory. On clinical examination, grade 2 mobility with 21, and a grade 1 mobility with 22 was detected. Generalized gingival recession along with generalized deep periodontal pockets was noted. Radiographic examination revealed round-shaped regions of radiolucency in the maxillary left central and lateral incisor, indicative of areas of external resorption (Figure 1). Palpation and percussion tests on the tooth revealed no pain, tenderness or discomfort. A combination of the clinical and radiographic examination led to the diagnosis of chronic generalized periodontitis, with external root resorption in 21,22. A complete scaling and root planing were carried out. After 15 days, the patient returned, having fractured her upper left central incisor (21) while brushing.

The two teeth (22, 23) were isolated, an access cavity was made, following which the working length was determined (Figure 2). Copious irrigation of the canal was done using sodium hypochlorite followed by...
normal saline. Calcium hydroxide dressing was placed as an intracanal medicament followed by a temporary restoration.

To deal with the sites of external resorption, probing depth to the lesion was determined using a calibrated probe (Figure 3). Once the depth was determined both clinically and radiographically, a conventional flap elevation was made on the site of interest. A periosteal elevator was used to elevate the flap and clinically expose the site of external root resorption (Figure 4). Once adequate access was gained to the site, the granulation tissue was removed (Figure 5). MTA was mixed on a glass slab as per the manufacturer’s instructions and then placed on the site of external resorption with a plastic instrument. It was allowed to set for 10 minutes. Placement of MTA was coupled along with the obturation of the prepared canals (Figure 6,7). Flap was repositioned and sutured in place, achieving a total coverage of the MTA and the root surface (Figure 8).

A follow up was done after a period of 3 months. No signs or symptoms were noted. The radiograph showed that external resorption had been arrested. Adequate healing was noted (Figure 9).

Figure 1. Radiograph showing areas of root resorption
Figure 2. Working length determination
Figure 3. Probing depth to the lesion
Figure 4: Elevation of periodontal flap
Figure 5: Removal of granulation tissue
Discussion

External root resorption is not an uncommon phenomenon. It is found on isolated teeth rather than in the generalized form. External resorptions can be external surface resorption, external inflammatory root resorption, ankylosis and replacement resorption, with inflammatory resorption being the most common type.

External root resorption remains to be one of the most difficult to treat conditions. Thus, the solution lies in something beyond endodontic therapy, as a communication pathway opens between the root canal and the periodontium. It is ideal to make use of a material that is biocompatible and preserves bacterial leakage.

In the present case, MTA was the choice of material for sealing the subgingival area denuded by external resorption. To date, resin-modified glass ionomer cements have been demonstrated to have histologic and clinical biocompatibility to both epithelial and connective tissue adhesion, when placed subgingivally. MTA, by virtue of being a bioactive material, has the ability to form an apatite-like layer on its surface on coming in contact with physiologic fluids in the oral cavity. MTA is composed of tricalcium and silicate. Studies have demonstrated that MTA can conduct and induct hard tissue formation, in addition to the fact that several ions are released from MTA in a sustained manner, when placed in the oral cavity.

The use of MTA in combination with flap surgery have had favourable outcomes in recent studies. This
procedure has demonstrated an increase in clinical attachment level, reduction in probing depth, and MTA can be maintained adequately over teeth with resorptive lesions for over a period of 6 years, despite the subgingival location.\textsuperscript{11}

The use of MTA in such a case of external resorption leads to avoidance of surgical treatment with similar prognostic outcome. Further long-term clinical studies using MTA in different scenarios should be encouraged.\textsuperscript{12}

\textbf{Conclusion}

The present case supports the use of MTA as an effective material to treat external root resorption. When combined with a surgical flap, it can be an ideal replacement to other materials to treat subgingival lesions successfully.

\textbf{Ethical Clearance:} Obtained from the Institutional Ethics Committee, Sharavathi Dental College & Hospital

\textbf{Source of Funding:} Self

\textbf{Conflict of Interest:} Nil

\textbf{References}

A Comparative Study of Photo-Neutron Production from Flattened and Unflattened Beams in a Medical Linear Accelerator

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Abstract

High energy x-rays from a medical linear accelerator (LINAC) is used to treat cancer patients in radiotherapy department. The medical linac can produce bremsstrahlung x-rays from 4MV to 18MV and the commonly used linac produces 6MV, 10 MV and 15MV photons for treating major parts of the cancer patients. The photo neutron production during the radiation treatment is one of the major issues which have to be addressed with high impact because of the high LET nature associated with it. Photo neutrons are produced from several high atomic number (Z) elements present in the linac head mostly by the (γ,n) reaction. The flattening filter used in medical linac to produce uniform intensity distribution (made up of either tungsten, steel, lead, uranium, aluminum or a combination) is one of the photo neutron sources in the linac head. Advanced radiotherapy treatments like Intensity Modulated Radiotherapy (IMRT) and Volumetric Arc Therapy (VMAT) doesn’t require a flat radiation field, and hence the flattening filter could be removed. This is called flattening filter free beam (FFF beam) 1,2. The removal of the filter will result in a forward peaked photon beam, which is very advantageous for these kinds of treatments 3,4. The purpose of this work was to find out the difference in the percentage of photo neutron production in a flattening filter free (FFF) and flattening filter (FF) mode of operation than the FF mode. The neutron fluence was measured at different positions with FFF and FF mode and the results were tabulated. The neutron fluence was lower for the FFF mode of operation than the FF mode. The reduction ranges from 2.27% to 44.22%.

Keywords: CR 39 SSNTD, Medical Linac, flattening filter.

Introduction

The high energy x-ray from a Medical linear accelerator is used to treat cancer patients with modern treatment techniques in order to get maximum therapeutic ratio. The high energy electrons accelerated by microwaves when collide with a heavy metal target x-rays (photons) are produced. These high energy photons will be directed to the patient by shaping the beam to confirm the shape of the tumor. The treatment head contains different components designed to shape and monitor the treatment beam.

The beam flattening filter is a conical shaped metal absorber which absorbs more photons in the central part than the ones in the periphery. It makes the intensity almost uniform. A flattened beam is essential to create uniform dose distribution during the treatment 5. It is usually made of either tungsten, steel, lead, uranium, aluminum or a combination. In dual energy photon linacs, separate flattening filters are used for the low and the high energy photon modes. Removal of the flattening filter 6 results in increasing dose rate (2-4 times higher) reduces head scatter, non-uniform beam profile etc 7.

The photo neutron production is one of the major problems associated with high energy bremsstrahlung x-rays 8. The various components in the treatment head (shielding blocks, collimators, flattening filters, scattering foil, vacuum windows, water cooling etc)
are continuously exposed during radiation treatment and become sources for photo neutrons by the (gamma, n) reaction. Also high energy photons interacting with treatment volume and surrounding tissues produces photo-neutrons. So the patient itself becomes source of photo neutrons. The total reaction yield dependent upon the isotopes present, photon flux as well as energy and resonances in cross section. Nuclei with loosely bounded neutrons contribute significantly to this process even at relatively low energies.

The photo neutrons have a continuous energy spectrum with respect to the incident bremsstrahlung photon energy and the threshold energy required for the particular target element. The high LET associated with photo neutrons makes it radio biologically more hazard than the photons. The neutron induced activity is another problem due to the (n, gamma) reaction. The out of field dose and induction of cancer in late period are the outcome of these problems.

Previously neutron fluence and dose measurements were done with different method like foil activation method, CR39 etched track method and using TLD600-TLD700 combination etc. Kry SFet al measured and compared neutron fluence around an accelerator operating at 18MV withFFF and FF mode using gold foil activation in neutron moderators. The result was that, neutron fluence per monitor unit was approximately 20% lower in the FFF mode than in the FF mode. Total neutron fluence during the entire course of prostate IMRT case was 69% lower with the FFF mode.

Hassen Ali Nedaiein their work measured the photo-neutron contamination arising from the 18MV varian clinac 2100CD and Elekta Precise machine using TLD600 and TLD700 pairs and the MCNPX code. They concluded that the larger photo-neutron production in Varian linac compared to Elekta due to differences in the linac head configuration as well as accelerating potential of the incident electron impinging the target.

V et al examined the chemical etching parameters of CR39 as a neutron dosimeter. The CR 39 film placed in polyethylene radiator were exposed to neutron source for different time intervals and the neutron fluence were varied from 4.68x to 2.7x/n. Etched tracks were analyzed and counted at 40X with microscope and neutron recoil track density was calculated after every hour of etching. This study shows that there was a correlation between the total number of tracks per unit area with dose and neutron fluence, and it shows a linear relation. Their experimental results suggested that the potentiality of CR39 as neutron dosimeters in future for high energy linear accelerators and radioactive ion beam facilities.

The present work was carried out with CR39 SSNTD. Different neutron detectors have different characteristics, and they have to be chosen based on the situation. CR39 SSNTD is an ideal detector for neutron dosimetry since it is insensitive to photons of all energies and unlike active detector, no power is required for CR 39 SSNTD operation and the analysis can be done off site. It is also not bulky and can be placed easily anywhere to measure the neutron dose.

The present work focuses on the change in neutron spectrum due to FF and FFF beams. We have recorded photo neutron spectrum due to 10MV X rays from a medical linac (Elekta Versa HD) in FF and FFF modes. The neutrons so produced are detected in a CR39 SSNTD and analyzed using image processing software. The spectral behavior in both FF and FFF mode are analyzed accordingly.

### Materials and Method

The CR39 SSNTD used in this work is a 250 µm thick film and density 1.3 g/cc. The film was cut into eight pieces each of having a dimension of 1cm*1cm using a diamond cutter. Each of eight films was given an identification tag for future reference.

The measurements were done in Elekta Versa HD Linear Accelerator. 10 MV X-rays with FF and FFF mode were used. 1000 MU was delivered to each mode with collimators fully closed. Four positions were selected for measurements, first position is close to the MLC, second position is at isocentre, third position is 30 cm left to isocentre and fourth position is 30 cm right to isocentre (Figure(1)).

In the FF mode, four CR 39 SSNTDs were placed at positions 1 to 4 and irradiated with 10MV X-rays with 1000 MU and jaws fully closed. Then another set of four CR39 SSNTDs were placed at positions 1 to 4 and irradiated with 10 MV X-rays in the FFF mode with 1000 MU with jaws fully closed. The CR 39 SSNTDs were taken out and properly tagged for future reference.

The measurements were done in Elekta Versa HD Linear Accelerator. 10 MV X-rays with FF and FFF mode were used. 1000 MU was delivered to each mode with collimators fully closed. Four positions were selected for measurements, first position is close to the MLC, second position is at isocentre, third position is 30 cm left to isocentre and fourth position is 30 cm right to isocentre (Figure(1)).

In the FF mode, four CR 39 SSNTDs were placed at positions 1 to 4 and irradiated with 10MV X-rays with 1000 MU and jaws fully closed. Then another set of four CR39 SSNTDs were placed at positions 1 to 4 and irradiated with 10 MV X-rays in the FFF mode with 1000 MU with jaws fully closed. The CR 39 SSNTDs were taken out and properly tagged for future reference.

The irradiated CR39 SSNTDs were chemically etched in an in house chemical etching setup made at University of Calicut. Two CR 39 SSNTDs can etch
simultaneously. The chemical etching was done at standard etching conditions such as 6N NaOH at 60°C for 6 hours with 30 rotations per minute.

The chemically etched CR 39 SSNTDs were then imaged with an optical microscope with 40X Magnification. The images of the tracks obtained at different positions are as shown in figure(2) for both FF and FFF modes.

Each CR39 SSNTD was read out using Triac II automatic track counting software\textsuperscript{18, 19}. The Triac II is a programming software written in matlab and is based on Hough transform method. This software is used to measure the length of Major axis, minor axis, Orientation and brightness of the elliptical tracks formed in the detector. During analysis of the CR39 detectors, the Triac II programme fits ellipses to the openings of the nuclear tracks in the image. Once an image is analyzed and all tracks within the image were measured and the programme gives the output in excel format.

The recoil proton energy can be calculated from the track diameter by using a calibration graph\textsuperscript{20,21}. The calibration graph is obtained by plotting track diameter and known proton energy (See figure (3)). The equation to best fit the data is calculated and is given by

\[ E_p = (0.0295956 \times d^2) + (-1.16821 \times d) + 12.674 \]  

where \( d \) is the track diameter.

Then the corresponding neutron energy is calculated using the equation

\[ E_n = E_p \cos^2 \Theta \]  

Where \( E_p \) is the energy of proton, evaluated in the previous step, \( E_n \) is the neutron energy and \( \Theta \) will be the recoil angle.

Thus the neutron energy corresponding to each track can be calculated.

The neutron energy is binned with 200 KeV and the average energy for each bin is calculated. The number of photo-neutrons for each average energy was counted. This is then corrected with the efficiency as

\[ Y = n \sigma \phi \]

Here \( n \) is the number of hydrogen atoms present in 1cm\(^2\) unit of CR39 film, \( \sigma \) is the cross section for \((\gamma,n)\) reaction obtained from EXFOR ENDS, \( \phi \) is the efficiency corrected number of photo-neutrons and \( Y \) is the number of tracks formed in the CR39 film in 1 cm\(^2\) area. The spectrum is then plotted with energy along X axis and corrected counts along Y axis (See Figure (4)).

### Results and Discussion

The photo neutron fluence was measured at the four specified positions using CR 39 SSNTD with the accelerator operated in both FF and FFF mode. For all measurements the gantry was kept at zero degree and collimator fully closed. 1000 MU was delivered for each mode. The images of the tracks obtained for FF and FFF mode using CR 39 SSNTD is as shown in figure(2). The result shows a considerable reduction in neutron fluence for the FFF mode when compared to the FF mode. This reduction ranges from 2.27\% to 44.22\%. On average the reduction in neutron fluence was 19.87\% for the FFF mode of operation.

In the first position, the number of neutron production was 2.27\% more in the FF mode. Similarly which is 44.22\% more at isocenter, 26.06\% more at 30 cm right of the isocenter and 6.94\% more at 30 cm left of the isocenter. It shows there was no discernable trend in the reduction of neutron production as a function of position. On average neutron production was 19.87\% lower in the FFF mode of operation compared to the FF mode. Total number of tracks and percentage of difference is as shown in the table (1).

The plot between number of counts and neutron fluence is presented in figure (4). It provides information about the Q value of the materials involved in the \((\gamma,n)\) reaction. The highest peaks in the spectrum is near to the Q value of lead (Pb) which shows that the majority of the photo neutron production from the linac head is due to Pb which is present in flattening filter, shielding materials, collimators etc. The presence of flattening filter increases the photo neutron production in FF mode compared to the FFF mode.
Figure (1): Irradiation Set Up

Figure (2): Photo-neutron tracks in CR-39 nuclear track detector for accelerator operated in flattening filter (FF) and flattening filter free (FFF) modes in Elekta versa HD linear accelerator with closed fields. Measurement made at isocenter.

Figure (3): The calibration graph
Table 1: The photo-neutron counts and percentage difference in FF and FFF beams.

<table>
<thead>
<tr>
<th>Position</th>
<th>Total count</th>
<th>% of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1 (Near to MLC)</td>
<td>FF 132</td>
<td>2.27%</td>
</tr>
<tr>
<td></td>
<td>FFF 129</td>
<td></td>
</tr>
<tr>
<td>Position 2 (Isocenter)</td>
<td>FF 147</td>
<td>44.22%</td>
</tr>
<tr>
<td></td>
<td>FFF 82</td>
<td></td>
</tr>
<tr>
<td>Position 3 (30 cm right of isocenter)</td>
<td>FF 188</td>
<td>26.06%</td>
</tr>
<tr>
<td></td>
<td>FFF 139</td>
<td></td>
</tr>
<tr>
<td>Position 4 (30 cm left of isocenter)</td>
<td>FF 144</td>
<td>6.94%</td>
</tr>
<tr>
<td></td>
<td>FFF 134</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion**

In the present work the photo neutronfluence was measured for FF and FFF mode in an Elekta Versa HD medical linear accelerator. The neutron fluence was measured at four preselected positions around the gantry with FF and FFF mode. The result shows that the removal of the flattening filter led to a reduction in the number of photo neutrons produced during treatment session. This reduction ranges from 2.27% to 44.22% with an average of 19.87%. No discernable trend was found in the measurement as a function of measurement position.

The result of this study reveals that the photo neutron production associated with high energy radiotherapy can be reduced by a considerable amount by operating the medical linac in the FFF mode. FFF mode removes one of the components responsible for the photo-neutron production. Also the machine requires only less beam on time in the FFF mode to deliver the treatment which reduces the photo neutron production associated with other components in the linac head such as shielding blocks, collimators etc. This considerable reduction in the photo neutron production reduces the severe biological effects caused by the high LET nature. It also reduces the induced activity due to the interaction of neutrons with various components in the linac head. The out of field neutron dose also decreases which may induce fatal secondary malignancies in the patient. The risk of fatal secondary malignancy from 18 MV IMRT to the prostate cancer has been previously studied by Kry SF et al for an accelerator equipped with flattening filter. The present day treatment planning systems doesn’t include the neutron dose associated with the high energy radiotherapy treatment. The algorithm should include the photo neutrons produced from the treatment head, air and from the patient itself. The montecarlo simulation studies can be used for the complex neutron transport and hence the dose. The present study gives an insight in to the photo neutron production percentage in FF and FFF modes and it gives an added advantage for the FFF mode treatment in addition to the less beam on time.

**Conflict of Interest:** Nil
Source of Funding: Self

Ethical Clearance: Not needed

References


Effectiveness of Mobilization to Sitting in Improving Arousal at Various Durations in Traumatic Brain Injury Patients

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¹Postgraduate Student, ²Associate Professor, ³Professor, Faculty of Physiotherapy, Srinagar-116

Abstract

Background: Rehabilitation of motor function in Traumatic brain injury patients in the acute phase depends on their state of consciousness and arousal level. Upright positioning stimulates the ascending reticular activating system and is proved to have improvement in arousal level. Verticalization in the acute phase is not well tolerated due to orthostatic intolerance. Mobilization to sitting in the acute phase could reduce the negative effects and improve arousal but the effective duration of mobilization is not well studied which demands the need of the study.

Methodology: This interventional study was conducted in the Neurosurgery ICU with 24 patients in each group. Brain abnormalities were classified using Marshalls CT TBI classification and patients with Coma Recovery scale (CRS-R) of ≤ 7 were included and allocated to either ½ hour or 1 hour mobilization for 15 days. Changes in the arousal level were assessed with CRS-R after 15 days to measure their improvement.

Results: Both the groups showed statistically significant improvement in arousal with p value ≤0.01 in paired test and unpaired t test showed increased arousal in group 2 than group 1 with p value ≤ 0.01. Negative correlation was observed between onset of mobilisation and improvement in CRS-R in both the groups with Pearson correlation (p ≤ 0.01)

Conclusion: The study concludes that arousal in TBI patients is significantly improved by early onset of mobilization to sitting both for ½ and 1 hour duration without much orthostatic intolerance in the acute period which could be included into the standard care of rehabilitation of TBI patients.

Keywords: Arousal, Traumatic Brain injury, Verticalization, Mobilisation to sitting.

Introduction

Traumatic brain injury (TBI) is a non degenerative, non congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness.¹,² 1.5 to 2 million persons are injured and 1 million die in India with Road traffic accident (RTA) accounting for 60%, falls around 20-25% and violence of 10% with alcohol involvement in 20% of TBI patients at the time of injury.³

The mortality rate of severe brain injury was around 33%, and for moderate brain injury was 2.5% as per Traumatic Coma Bank.⁴ TBI results in chronic disability and long term complications of TBI include physical disability, cognitive, psychological, behavioural and emotional deficits leading to psychosocial and economic burden.⁵ Open TBI results when the scalp or skull is fractured and closed TBI results when an outside force impacts the head without any external injury.⁶ Primary damage that occurs at the time of actual impact includes skull fracture, contusion, hematoma, laceration, nerve damage. Secondary damage occurs over time after the actual injury which is aggravated by obliteration.
of microvasculature, release of proinflammatory cytokines leading to reduced tissue perfusion and oedema\(^6\).

Diffuse bilateral hemisphere damage and failure of the ascending reticular activating system (RAS) cause coma or vegetative state. Coma is defined as an unarousable state without eye opening, verbalization, or the ability to follow commands\(^7\). Vegetative state is a condition characterized by complete unawareness of the self and the environment but accompanied by sleep–wake cycles which continues for at least six months\(^8\). Arousal is the physiological readiness of the human system for activity. RAS plays an important role in arousal\(^9\). Neurotransmitters of RAS include serotonin, acetylcholine, noradrenaline, adrenaline, dopamine and GABA which are activated by collaterals from somatic sensory pathway, olfactory, visual, auditory, visceral, descending motor pathway and circulating catecholamines. All stressful activities activate ascending RAS which in turn activates hypothalamus\(^10\). Physiological arousal can be increased by stressors which affects the physical or psychological health that stimulates the nervous and cardiovascular systems\(^11\). A change within the autonomic system affects the cardiac muscle, smooth muscle and endocrine glands and in response to arousal there is an increase in blood pressure\(^12\).

Rehabilitation of a TBI patient in the acute phase depends on the level of arousal of a patient. Various strategies like Tactile, Auditory, Visual stimulation as well as multisensory stimulation have been used to improve arousal in TBI patients. Electrical stimulation of peripheral nerves activates the Neuro-endocrine system and it is proposed to stimulate ascending RAS which enhances arousal following TBI\(^13\).

Changes in body position play an important role in arousal, improvement of alertness. Positional changes like sitting upright or lying down in a relaxing chair, standing in tilt table with and without stepping and Locomotion therapy in robotic tilt table improves arousal in vegetative or minimally conscious patients\(^14\). Many studies have showed positive effects of verticalization on tilt table but upright positioning in early phases of TBI is not completed as it results in the occurrence of postural hypotension, syncopal or pre syncopal symptoms due to central sympathetic dysfunction, absence of venous pump and effects of gravity which leads to increased blood pressure and heart rate\(^15\). Randomized crossover pilot trial,” “type”: “article-journal”, “volume”: “22” }, “uri”: [ “http://www.mendeley.com/documents/?uuid=5f8ee86f-4595-4a46-876f-3e618401ac5b” ] }, { “id”: “ITEM-2”, “item Data”: { “ISBN”: “0269-9052”, “ISSN”: “02699052 (ISSN These effects would be reduced in sitting which could be advantageous to start in the acute period earlier than standing but not many studies have been done in analyzing the effect and the ideal duration for sitting which could improve arousal is also not well studied which demands the need of this study.\(^16\)

**Materials and Method**

This intervention study was approved by the Ethics Committee (CSP/16/AUG/50/230) Sri Ramachandra Institute of Higher Education and Research. Subjects were recruited from Neurosurgery Intensive care unit and wards. 48 patients in the age group of 20-75 years diagnosed as TBI with both open and closed head injuries who were haemodynamically stable and out of sedation with a CRS-R score of <7 were included in the study. Subjects who were associated with severe cardiac arrhythmias, uncontrolled seizures and pelvic bone fractures were excluded from the study.

**Procedure:** Operational definition for Mobilization to sitting is bringing the patient to an upright sitting position from supine lying passively on to the chair. Subjects were screened for their inclusion criteria after receiving the referral from Neurosurgeon and informed consent was obtained from their Caretakers. Study subjects were allocated to enter into Group1 or Group 2 based on sequential sampling technique. Marshalls CT classification was used to classify brain abnormalities of TBI patients. Their arousal level was assessed by CRS-R. After receiving routine Physiotherapy, subjects were mobilized passively to sitting in a chair with safety precautions by positioning with pillows and straps in comfortable position.

Group 1 subjects were made to sit for 30 minutes and Group 2 were made to sit for one hour for seven days a week and continued for 15 days. Blood pressure and heart rate were monitored in supine lying and in sitting after 15 minutes of mobilization. Patients were reshifted back to bed safely when they showed syncope or presyncope symptoms such as tachypnoea, tachycardia, pallor or increase in sweating. After 15 days of intervention subjects were again assessed with CRS-R to assess the improvement in arousal level.
Mobilization to Sitting

Results

Data was analysed with SPSS version 17.0. Table 1 shows the mean and standard deviation of improvement in CRS–R between day 1 and day 15 within and between the Groups. Both showed statistically significant improvement in arousal with p value of < 0.01 in paired t test and p value < 0.01 in group 2 in unpaired t test. Correlation between onset of mobilisation with improvement in CRS-R was found with Pearson correlation which showed a negative correlation with statistically significant p value of < 0.01 in both Groups (Table 2). Table 3 shows the changes in CRS-R scores in different grades of Marshall CT scan classification and Table 4 shows the mean blood pressure of lying and sitting in Group 1 and Group 2 at day 1 and day 15.

Table 1: Improvement in CRS-R between Day-1 and Day-15 within and between Groups

<table>
<thead>
<tr>
<th></th>
<th>CRS-R</th>
<th>Day 1 Mean (SD)</th>
<th>Day 15 Mean (SD)</th>
<th>Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paired t test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>6.08(1.55)</td>
<td>14.38(3.73)</td>
<td>8.32(2.22)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>5.00(2.06)</td>
<td>17.33(2.59)</td>
<td>12.33(0.53)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Unpaired t test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>6.08(1.55)</td>
<td>14.38(3.73)</td>
<td>8.32(2.22)</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>5.00(2.06)</td>
<td>17.33(2.59)</td>
<td>12.33(0.53)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Correlations between onset of Mobilisation with Improvement in CRS-R

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (SD)</th>
<th>r</th>
<th>p–value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-1</td>
<td>Onset of Mobilization</td>
<td>6.08 (2.46)</td>
<td>-0.71</td>
</tr>
<tr>
<td>Group-1</td>
<td>Difference in CRS-R</td>
<td>8.32(2.22)</td>
<td></td>
</tr>
<tr>
<td>Group-2</td>
<td>Onset of Mobilization</td>
<td>6 (2.35)</td>
<td>-0.78</td>
</tr>
<tr>
<td>Group-2</td>
<td>Difference in CRS-R</td>
<td>12.33(0.53)</td>
<td></td>
</tr>
</tbody>
</table>

Pearson correlation coefficient

Table 3: Difference in CRS-R scores of Day 1 and Day 15 in various Grades of Marshall CT

<table>
<thead>
<tr>
<th>Marshall CT</th>
<th>N</th>
<th>CRS-R Day 1</th>
<th>CRS-R Day 15</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grp 1</td>
<td>Grp 2</td>
<td>Grp 1</td>
<td>Grp 2</td>
</tr>
<tr>
<td>Stage–I</td>
<td>3</td>
<td>1</td>
<td>6.3</td>
<td>6</td>
</tr>
<tr>
<td>Stage–II</td>
<td>15</td>
<td>14</td>
<td>6</td>
<td>6.3</td>
</tr>
<tr>
<td>Stage–IV</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>5.8</td>
</tr>
<tr>
<td>Stage–V</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>6.5</td>
</tr>
<tr>
<td>Stage–VI</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>5.3</td>
</tr>
</tbody>
</table>
Table 4: Mean Blood Pressures of Day 1 and Day 15 in Lying and Sitting in Both Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Position</th>
<th>DAY 1 (mean) mmHg</th>
<th>DAY 15 (mean) mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lying</td>
<td>Sitting</td>
</tr>
<tr>
<td>Group 1 Sys/Dias</td>
<td></td>
<td>128.83/86.17</td>
<td>125.04/83.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>123.96/83.13</td>
<td>124.46/83.0</td>
</tr>
<tr>
<td>Group 2 Sys/Dias</td>
<td></td>
<td>127.83/87.29</td>
<td>125.54/84.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>123.54/84.17</td>
<td>124.13/83.38</td>
</tr>
</tbody>
</table>

Discussion

Arousal impairment is the major problem following TBI which plays an important role in recovery of motor function. Coma indicates dysfunction of the ascending RAS resulting in environmental deprivation which can retard recovery and further depress impaired brain functioning. Enhancing the recovery from coma is important in setting realistic goals and attaining...
maximum functional outcome. Strategies to stimulate ascending RAS to improve arousal are required to perceive the incoming stimuli which could lead to meaningful activity.

Four patients who underwent mobilisation were not able to continue sitting due to orthostatic intolerance which was minimal in number compared to studies on tilt table verticalization to upright standing. Riberholt et al (2013)\(^{22}\) investigated mobilization in tilt tables to improve arousal but fifteen of sixteen patients did not complete 20 minute session of tilt table training which conveys that mobilization to passive sitting is well tolerated than standing.

Patients who were mobilized to one hour sitting showed better improvement in CRS-R score compared to half an hour mobilization which is evident from the higher mean difference score in Group 2. Comparison of CRS-R scores between day 1 and day 15 showed significant improvement in both the groups conveying that mobilization to sitting from lying as well as both duration had a strong influence in improving arousal (Table 1). This finding is consistent with the study done by Megha M et al\(^{23}\) where multimodal coma stimulation was given for 3 groups of TBI patients and the two interventional groups received 20 minutes and 50 minutes of stimulation and third group received conventional therapy. Results convey that short duration of high frequency stimulation at regular intervals will adequately stimulate ascending RAS thereby improving arousal.

Many studies on verticalization in TBI patients are done after 3-4 weeks post injury but mobilization in this study has been initiated at an early period after the patients were out of the drugs inducing sedation in the acute period in the Intensive Care Unit. The mean day of onset of mobilization was 6.08 in Group 1 and 6 in Group 2 respectively. Table 2 shows the correlation between onset of mobilization post injury to the improvement in CRS-R which had a significant negative correlation conveying that early mobilization will result in significant improvement of arousal from coma. A very Early Rehabilitation Trial for Stroke patients (AVERT) done by Bernhardt et al\(^{24}\) showed that very early mobilization was safe, feasible and patients were able to tolerate longer period of upright positioning. This conveys that higher centres could be stimulated without ill effects when mobilized at an early period which could have an additional benefit of improving arousal.

Oedema is the cause of death in large number of TBI patients where ICP persistently remains high leading to widespread damage and deterioration of higher functions. Medical management with Diuretics in the acute period extract water from intracellular compartments and thereby causing a reduction in oedema and intra cranial pressure\(^{25}\). As this study is done in the acute period, reduction in oedema could also have enhanced the improvement of arousal.

Comparison of Grades of Marshall CT scan with improvement changes of CRS-R score (Table 3) shows that subjects having Grade II in Group 1 and Grade VI in Group 2 showed good recovery but result cannot be taken up as there were unequal numbers of subjects in all grades. Maximum number of subjects were in Grade II which conveys that majority of patients with TBI following RTA have similar intensity of injury with the midline shift of 0–5 mm in this study group. The mean decrease in blood pressure from lying to sitting in day 1 was 4.87/3.04 mmHg in Group 1 and 4.29/3.12 mmHg in Group 2 which was within physiological limits as the subjects did not show any orthostatic intolerance(Table 4). The mean Blood pressure in day 15 in both groups did not show much difference in lying to sitting which could be attributed to the fact that subjects would have got accommodated to the sitting position on the 15th day. Intra cranial pressure monitoring could have been done as this study was done in the acute period which is considered as limitation of the study.

**Conclusion**

The study concludes that both mobilizations to sitting at both ½ and 1 hour duration has a beneficial effect in improving arousal in the acute period without much orthostatic intolerance which could be included into the standard care of rehabilitation of TBI patients.

**Conflict of Interest:** None

**Ethical Clearance:** Ethical clearance was obtained from Ethics Committee of Sri Ramachandra Institute of Higher Education and Research (CSP/16/AUG/50/230).

**Source of Funding:** Self

**References**


Vegetation and Pollution in Delhi-Frequency, Abundance and Density of Plants and Pollutant Levels: An Analysis

Rudraksh Gupta¹, Manju Rawat Ranjan², Usha Mina³, Rajul Kumar Gupta⁴

¹Post Graduate, Amity Institute of Environmental Sciences, Amity University, Noida, ²Associate Professor, Amity Institute of Environmental Sciences, Amity University, Noida, ³Associate Professor, School of Environmental Sciences, Jawaharlal Nehru University, New Mehrauli Road, Delhi, ⁴Professor, Army College of Medical Sciences, New Delhi

Abstract

The present study endeavours to explore the role of vegetation in air quality improvement at selected sites of Delhi. The study was conducted at four sites of Delhi-Pusa in Central Delhi, ITO in East Delhi, Dwarka in South West Delhi and Rohini in North West Delhi. To monitor and quantify the abundance, frequency and density of vegetation of the sites, belt transect method (with 500m transect and 30 quadrats of 0.5 x 0.5m) was used. Results of the study indicate that Pusa had highest abundance (6.7), frequency (86%) and density (6.2) of vegetation as compared to Dwarka, Rohini and ITO. ITO site has minimum abundance (2.0), frequency (50%) and density (1.9) of vegetation. There was a statistically negative correlation between the abundance, frequency and density of vegetation and ambient levels of chemical air pollutants. Physical pollutant (PM₂.₅), doesn’t seem to get affected by vegetation. The study indicates that the contribution of vegetation is significant in improving air quality of urban areas.

Keywords: Air quality, Vegetation, Pollution reduction, Abundance, Frequency, Density, Belt transect method, Delhi.

Introduction

Being the capital of India and a metropolitan city with ahuge population of 1.25 crore, Delhi has experienced a phenomenal growth in recent years. Delhi is adversely affected by problems of urbanization. There is rapid growth of vehicles, construction, and energy consumption resulting in serious environmental concerns.

Delhi has a relatively rich tree and forest cover which facilitates pollution control. But the tree cover varies from location to location. It is therefore important to assess the vegetation cover and to correlate it with pollutant levels at specific places. So far as the role of vegetation is concerned, pollution reduction is a function of the quantity and quality of vegetation. While the quantity of plants (number, frequency and density) present at a location would determine the level of pollution reduced by them, it is also the type of vegetation (shrubs/tress and species) which is important. In the present study, the vegetation cover and pollution level at various regions was assessed to ascertain the relationship between vegetation and pollution levels.

Methodology

This analytical study was undertaken at New Delhi, with an area of 1484 sq km. The study was undertaken over five months and pollution levels measured during January to March 2018, at four selected sites catering to all directions-North, East, Central and South-West, located far away from each other:

1. Dwarka (DAV School)-South West Delhi
2. ITO (Near Metro Station)-East Delhi
3. DTEA Senior Secondary School, Pusa Road-Central Delhi

4. Rohini (Delhi Technical University)-North West Delhi

Data of PM$_{2.5}$, NO$_2$ and NO levels, on daily basis was downloaded from Central Pollution Control Board (CPCB) nearbymonitoring sites displayed on website (https://app.cpcbccr.com/ccr/#/caaqm-dashboard-all/caaqm-landing/data) for the entire study period.¹

**Studying Vegetation:** Belt transect methodology was used to monitor and quantify vegetation.² The belt transects were marked between two points of 500 m area. The length of the belt transect was taken as 500 m at each selected site, where 30 quadrats were laid down, each of size 0.5m x 0.5m. The vegetation in each quadrat was identified, counted and tabulated. The abundance, frequency, density of vegetation was quantified using following formulas³

- **Abundance** = Total no of individuals
- No of quadrats of occurrence

- **Frequency (%)** = No of quadrats in which species occurred x100
- Total no of quadrats studied

- **Density** = Total no of individuals
- Total no of quadrats studied

**Equipment Used for Monitoring Vegetation:**
0.5 X0.5 m Quadrat, 30m measuring tape, nails, thread, camera

**Results**

**Average Pollutant Concentration:** Average Pollutant concentration for PM$_{2.5}$, NO$_2$ and NO was ascertained from 3 January to 9 March 2018 which is summarized in **Table 1**.

<table>
<thead>
<tr>
<th>Site</th>
<th>Level of pollutant</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PM$_{2.5}$ (µg/m$^3$)</td>
<td>NO$_2$ (µg/m$^3$)</td>
<td>NO (µg/m$^3$)</td>
</tr>
<tr>
<td>Pusa</td>
<td>91.5</td>
<td>24.5</td>
<td>29.0</td>
</tr>
<tr>
<td>Dwarka</td>
<td>157.4</td>
<td>40.0</td>
<td>27.0</td>
</tr>
<tr>
<td>Rohini</td>
<td>205.4</td>
<td>26.8</td>
<td>41.2</td>
</tr>
<tr>
<td>ITO</td>
<td>146.2</td>
<td>73.5</td>
<td>129.6</td>
</tr>
<tr>
<td>Standard</td>
<td>60</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Abundance, Density and Frequency of Vegetation: Quadrat analysis was carried out for counting plants and to determine their abundance, density and frequency at the four selected sites. A typical site is shown in **Figure 1**.

**Figure 1:** A typical Site of Quadrat analysis [ITO]

A total of 10 species were recorded at the four sites. Details are elaborated in **Table 2**.
Table 2: Diverse plant species at various study sites

<table>
<thead>
<tr>
<th>S.No</th>
<th>Pusa</th>
<th>Dwarka</th>
<th>Rohini</th>
<th>ITO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E.hirta</td>
<td>Parthenium</td>
<td>Cynodon</td>
<td>E.hirta</td>
</tr>
<tr>
<td>2</td>
<td>Peepal</td>
<td>Baloon Vine</td>
<td>E.hirta</td>
<td>Parthenium</td>
</tr>
<tr>
<td>3</td>
<td>Cynodon</td>
<td>Amaranthus</td>
<td>Amaranthus</td>
<td>Cynodon</td>
</tr>
<tr>
<td>4</td>
<td>Calotropis</td>
<td>Cynodon</td>
<td>S.alfreda</td>
<td>Calotropis</td>
</tr>
<tr>
<td>5</td>
<td>Amaranthus</td>
<td>E.hirta</td>
<td>Oxalis</td>
<td>Amaranthus</td>
</tr>
<tr>
<td>6</td>
<td>Horseweed</td>
<td>Poa</td>
<td>Horseweed</td>
<td></td>
</tr>
</tbody>
</table>

Three species were common at each site namely *Euphorbia hirta, Cynodon sp, Amaranthus* and *Euphorbia hirta*.

Figure 2: Common plants at three sites: *Euphorbia hirta* (top left), *Cynodon sp* (top right), *Amaranthus* (bottom)

The abundance, density and frequency of these three common species was estimated and recorded in Table 3. Vegetation was highest in Pusa and lowest in ITO.

Table 3: Abundance, density and frequency of three common plants

<table>
<thead>
<tr>
<th>S.No</th>
<th>Site</th>
<th>Species</th>
<th>Abundance</th>
<th>Frequency</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pusa</td>
<td>E.hirta</td>
<td>2.46</td>
<td>86</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cynodon</td>
<td>14.9</td>
<td>96</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amaranthus</td>
<td>2.95</td>
<td>77</td>
<td>2.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>6.77</td>
<td>86</td>
<td>6.15</td>
</tr>
<tr>
<td>2</td>
<td>Rohini</td>
<td>E.hirta</td>
<td>1.85</td>
<td>90</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cynodon</td>
<td>6.1</td>
<td>93</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amaranthus</td>
<td>2.13</td>
<td>76</td>
<td>1.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>3.36</td>
<td>86</td>
<td>1.65</td>
</tr>
<tr>
<td>3</td>
<td>Dwarka</td>
<td>E.hirta</td>
<td>2.15</td>
<td>86</td>
<td>1.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cynodon</td>
<td>12</td>
<td>90</td>
<td>10.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amaranthus</td>
<td>2.56</td>
<td>83</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>5.57</td>
<td>86</td>
<td>4.9</td>
</tr>
<tr>
<td>4</td>
<td>ITO</td>
<td>E.hirta</td>
<td>1.92</td>
<td>46</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cynodon</td>
<td>2.41</td>
<td>40</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amaranthus</td>
<td>1.78</td>
<td>63</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>2.03</td>
<td>50</td>
<td>1.97</td>
</tr>
</tbody>
</table>

As abundance, frequency and density of plants increases pollutant level decrease. ITO is one of the most polluted areas in Delhi. Pollution is caused by high vehicular density; Pusa on the other hand has lots of green areas, and less vehicular pollution resulting in lower levels of PM$_{2.5}$, NO$_2$ and NO.
Correlation of Pollutants Versus Abundance, Density and Frequency of Plants: Correlation of pollutants (PM$_{2.5}$, NO$_2$ and NO levels) versus the abundance, density and frequency of the three plant species (*E. hirta*, *Cynodon*, *Amaranthus*) were calculated. (Table 4). An inverse correlation was seen between frequency of various plant species and levels of NO and NO$_2$. (statistically significant for frequency of *Euphorbia* and *Cynodon* with NO$_2$ and NO) and *Amaranthus* with only NO.

Table 4: Correlation of frequency, abundance and density of three plant species with pollutants

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Correlation coefficient (r) with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency Euphorbia</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.13</td>
</tr>
<tr>
<td>p</td>
<td>0.86</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>-0.96</td>
</tr>
<tr>
<td>p</td>
<td>0.04</td>
</tr>
<tr>
<td>NO</td>
<td>-0.98</td>
</tr>
<tr>
<td>p</td>
<td>0.02</td>
</tr>
<tr>
<td>Abundance</td>
<td>Euphorbia</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>-0.87</td>
</tr>
<tr>
<td>p</td>
<td>0.12</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>-0.44</td>
</tr>
<tr>
<td>p</td>
<td>0.55</td>
</tr>
<tr>
<td>NO</td>
<td>-0.51</td>
</tr>
<tr>
<td>p</td>
<td>0.48</td>
</tr>
<tr>
<td>Density</td>
<td>Euphorbia</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>-0.31</td>
</tr>
<tr>
<td>p</td>
<td>0.68</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>-0.91</td>
</tr>
<tr>
<td>p</td>
<td>0.086</td>
</tr>
<tr>
<td>NO</td>
<td>-0.96</td>
</tr>
<tr>
<td>p</td>
<td>0.044</td>
</tr>
</tbody>
</table>

Figure 3: Correlation between frequency of Euphorbia with NO (R=-0.98, p=0.02) & NO2 (R= 0.96, p =0.04)
An inverse statistically significant correlation was also seen between abundance of two plant species (Amaranthus and Cynodon) and levels of NO. Abundance of Amaranthus also exhibited a statistically significant inverse correlation with NO level.

An inverse correlation was seen between abundance of Euphorbia and Amaranthus and levels of NO and NO\textsubscript{2}. It is seen that there was a statistically significant inverse correlation between density of Amaranthus with NO Levels and Euphorbia with NO and NO\textsubscript{2} levels. Density of Amaranthus also exhibited a statistically significant inverse correlation with NO level.

However there was no correlation between frequency, abundance and density of all three plant species and PM\textsubscript{2.5}.

**Discussion**

PM\textsubscript{2.5}, NO\textsubscript{2} and NO are dangerous pollutants which adversely affect human health and environment. The present study was undertaken to correlate levels of these pollutants with abundance, frequency and density of plants at various urban sites in Delhi.

**Health Effects:** Particles in the PM\textsubscript{2.5} size range travel deeply into respiratory tract, reaching the lungs. Exposure to fine particles causes short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose and shortness of breath. Exposure to fine particles also affects lung function and worsens medical conditions such as asthma, chronic bronchitis, reduced lung function and increased mortality from lung cancer and heart disease.

When nitrogen is released during fuel combustion, it combines with oxygen atoms to form nitric oxide (NO). This further combines with oxygen to create nitrogen dioxide (NO\textsubscript{2}). Oxides are together referred to as (NOx). NOx gases react to form smog and acid rain besides being central to the formation of fine particles (PM) and ground level ozone, both of which compromise health.
High NOx levels have a negative effect on vegetation, including leaf damage, reduced growth, making vegetation more susceptible to disease and frost damage. A study of the effect of nitrogen dioxide and ammonia on the habitat of Epping Forest revealed that pollution is likely to significantly influence forest-ecosystems.4,5

**Pollution Levels:** The site at ITO had the highest level of pollutants followed by Rohini, Dwarka and Pusa. In January 2017, the pollution levels at ITO were maximum. According to Times of India, PM$_{2.5}$ average at ITO between December 18, 2016 to January 2, 2017 was 309 µg/m$^3$, more than five times the 24 hour standard and more than 12 times the WHO guidelines.6

Levels are highest at ITO being a traffic intersection and most of the land is concretized. According to a study by IIT, it was found that Pusa was one of the least polluted areas in Delhi followed by Dwarka and Rohini7. Present study also depicts similar results. Pusa and Dwarka have lower pollution levels due to high abundance of trees, lesser construction activities and lower traffic. Rohini is an industrial area with lots of construction work and smoke being emitted from industries.

**The Role of Plants in Reducing Pollution:** The present study shows that with rising vegetation (i.e. increasing abundance, density, frequency of plants) there is an increased reduction in pollution at that particular site. From the present study it was also clear that Pusa had the highest quantity of the three common plant species followed by Dwarka and Rohini. ITO had the lowest abundance, frequency and density of the three plant species, which reflected on its high pollution levels.

However, there was no correlation between plants and PM$_{2.5}$. It is owing to the fact that being a physical particulate matter PM$_{2.5}$ is seen to be unaffected by the level of vegetation.8 From these results, it can be inferred that the plants exhibited a statistically significant inverse correlation with chemical pollutants.

**Conclusion**

According to a Times of India, Delhi is one of the most polluted cities in India and ITO the most polluted site.6

To take a case in point, ITO also has lowest abundance, frequency and density of plants resulting in highest pollution levels. Plants are most effective in reducing the levels of chemical pollutants like NO$_3$ and NO. The physical pollutant, i.e. PM$_{2.5}$ is not seen to be affected by the plants.

The study re-emphasises the importance of acute and urgent requirement of planting more tress, besides taking other pollution control measures. These are needed most at ‘high-pollution/low-vegetation’ sites, like the ITO. The plantation drives by the Delhi Government are commendable. There is a requirement of indulging in similar plantation drives by schools, NGOs, other government organizations, industries, corporate houses, and the general public. As brought out by the study, if intensive plantation drives are implemented, the pollution level in Delhi will reduce significantly, contributing to health for the community and the environment.

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**Ethical Clearance:** Taken from institutional ethical committee

**Conflict of Interest:** Nil

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**References**


Prevalence and Factors Influencing Chronic Kidney Disease in Urban Slum Area of Mysuru City

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Abstract

Introduction: Chronic Kidney Disease (CKD) leads to high morbidity and mortality in both developing and developed countries. CKD as a complication of non-communicable diseases and as itself leads to huge economic burden to the individual and nation. Screening is the only measure to prevent or delay in progress of early CKD. Hence this study was undertaken in urban slum area of Mysuru with the objectives to estimate the prevalence of Chronic Kidney Disease (CKD) using estimated-Glomerular filtration rate and Urinary abnormalities in people residing in urban slum area of Mysuru and to find out the factors influencing Chronic Kidney Disease

Method: This cross-sectional study was conducted in the urban slum, Mysuru. A total of 828 adults above 18yrs, consenting to participate were included in the study. A semi-structured proforma was used to collect data by interview technique. Serum creatinine was used to calculate eGFR. Urine analysis was done using dipsticks.

Results: The prevalence of CKD of Stage 3 and above (using CKDEPI equation) was found to be 6.8% and proteinuria of 3.5%. Risk factors identified were age, gender, obesity, hypertension, smoking, alcohol and indigenous medicine usage.

Conclusion: Screening for CKD at PHC level with tests like S. Creatinine estimation (hence eGFR calculation) and urine dipstick analysis along with information on age, gender, blood pressure, smoking status and presence or absence of diabetes mellitus can help in implementing preventive measures at grass-root level.

Keywords: Adults, Chronic Kidney Disease, Urinary abnormalities, Risk factors, urban slum, Mysuru.
the Indian CKD Registry of 52,273 adult CKD patients who registered till 2010, 35.5%, 27.9%, 25.6% and 11% patients were from South, North, West and East zones respectively. Important risk factors for kidney disease recognized globally include diarrheal diseases, HIV infection, low birth weight, malaria and preterm birth, all of which are also leading global causes of DALYs. Modifiable risk factors like tobacco use, physical inactivity, harmful use of alcohol and unhealthy diets all are known to increase risk of developing CKD. In India, aetiology of CKD varies considerably with Diabetic nephropathy being the commonest cause (31%), followed by CKD of undetermined aetiology (16%), chronic glomerulonephritis (14%) and hypertensive nephrosclerosis (13%). Few parts in the states of Andhra Pradesh, Odisha, and Goa have high levels of CKD of unknown aetiology (CKDu), which is a chronic interstitial nephropathy with insidious onset and slow progression.

People with CKD may not feel ill or notice any symptoms. Only way to find out for sure is screening through specific blood and urine tests which includes measurement of both creatinine level in blood and protein in urine and decreased renal function (below thresholds of GFR estimated from serum creatinine concentration). There are very few data available about prevalence of CKD in Urban areas of Karnataka and in Mysuru. Hence this study was done to know the prevalence of CKD and risk factors influencing CKD in adults residing in urban slum area of Mysuru.

Method

This community based cross-sectional study was done in Urban field practice area (Urban health centre-UHC) of JSS Medical College, Mysuru for a period of 18 months (January 2017 to June 2018). Sample size of 828 was derived from prevalence of 17.2% from the SEEK study. This was divided among 6 blocks of UHC area using Population Proportion to size. After taking informed consent, data was collected by house-to-house survey by interview technique, random blood sample for serum creatinine estimation and random midstream urine sample for dipstick analysis were collected. Serum creatinine thus estimated was used to calculate estimated glomerular filtration rate by CKD-EPI equation and stages of CKD was categorized according to KDOQI guidelines. Data thus collected was coded and entered in Microsoft excel spreadsheet and analyzed in SPSS version 22. Descriptive statistics like percentages, mean and standard deviation were calculated and inferential statistics like Chi-square test was applied and p-value less than 0.05 was taken as statistically significant.

Inclusion criteria: Individuals aged 18 yrs and above residing in study area.

Exclusion criteria:
- Severely ill and bed ridden patients
- Pregnant women and women who had just delivered (up to 40 days after delivery) were excluded.

Results

Among the study participants, 378(45.7%) belong to age groups 30-39 and 40-49 years with nearly equal representation from both groups. 223(27%) of study participants were males and 605(73%) were females. Most of them, 260(31.4%) were non-literates, majority were unemployed 409(49.4%) and majority 364(44%) belonged to Lower Middle Class and Middle class according to Modified B.G. Prasad’s Socio Economic Status Classification.

With S. Creatinine, eGFR was calculated according to CKD-EPI equation and stages of CKD were categorised according to KDOQI guidelines based on eGFR value and presence of either proteinuria or hematuria. Mean eGFR was noted to be 90.37 ml/kg/m² and 391(47%) had CKD (Figure 1). Among them 7(0.84%) belonged to Stage 1, 328 (39.6%) were in Stage 2, 44 (5.31%) were in Stage 3A, 8 (0.96%) were in Stage 3B of CKD classification. 3 (0.36%) had Stage 4 and 1 (0.12%) had Stage 5 which are severe to very severe CKD among study participants (Figure 2). 37(3.5%) had hematuria of 37(3.5%) and 9(1%) had proteinuria.

Obesity was noted in 413(50%), 348 (42.1%) were found to be hypertensive with 258 (31.2%) having Stage 1 Hypertension and 90 (10.9%) having Stage 2 Hypertension and 216(26.1%) had pre-existing Diabetes Mellitus. Smoking was noted in 190 (22.9%), 190(23%) were consuming alcohol and 86 (23%) were using smokeless tobacco. Indigenous medicine use was noted in 327(39.5%), analgesics (NSAIDs) use without prescription was noted in 436(42.7%) of the individuals.

Among socio-demographic variables tested for association with CKD, a statistically significant association was found with age (p<0.001), gender...
(p=0.01), education (p<0.001), occupation (p<0.001) and socioeconomic status (p=0.002).

Among modifiable risk factors tested for association with moderate to severe CKD, a statistically significant association was found with BMI (p=0.048), hypertension (p<0.01), smoking (p=0.003), alcohol (p=0.001) and use of indigenous medicine (p=0.014). (Table-1).

Table 1: Association between modifiable risk factors and CKD

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>CKD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No CKD</td>
<td>Mild CKD</td>
</tr>
<tr>
<td>BMI</td>
<td>Underweight</td>
<td>44(62%)</td>
<td>24(33.8%)</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>98(52.7%)</td>
<td>81(43.5%)</td>
</tr>
<tr>
<td></td>
<td>At risk Obese</td>
<td>86(54.4%)</td>
<td>56(35.4%)</td>
</tr>
<tr>
<td></td>
<td>Obese 1</td>
<td>155(53.8%)</td>
<td>116(40.3%)</td>
</tr>
<tr>
<td></td>
<td>Obese 2</td>
<td>54(43.2%)</td>
<td>58(46.4%)</td>
</tr>
<tr>
<td>Hypertension*</td>
<td>No Hypertension</td>
<td>194(67.60%)</td>
<td>85(29.60%)</td>
</tr>
<tr>
<td></td>
<td>Pre-Hypertension</td>
<td>113(58.5%)</td>
<td>70(36.3%)</td>
</tr>
<tr>
<td></td>
<td>Stage 1 Hypertension</td>
<td>95(36.8%)</td>
<td>138(53.5%)</td>
</tr>
<tr>
<td></td>
<td>Stage 2 Hypertension</td>
<td>35(38.90%)</td>
<td>42(46.70%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>Smoker</td>
<td>116(61.1%)</td>
<td>58(30.5%)</td>
</tr>
<tr>
<td></td>
<td>Non Smoker</td>
<td>321(50.3%)</td>
<td>277(43.4%)</td>
</tr>
<tr>
<td>Alcoholic</td>
<td>Alcoholic</td>
<td>120(63.2%)</td>
<td>55(28.9%)</td>
</tr>
<tr>
<td></td>
<td>Non-Alcoholic</td>
<td>317(49.7%)</td>
<td>280(43.9%)</td>
</tr>
<tr>
<td>Indigenous medicine Use</td>
<td>Present</td>
<td>193(59%)</td>
<td>116(35.5%)</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>244(48.7%)</td>
<td>219(43.7%)</td>
</tr>
</tbody>
</table>

*Note: Numbers within brackets indicate row percentages for individual observations; *Significant, *No Hypertension=(<120 and <80 mmHg), Pre-Hypertension (120 to 139 and 80 to 89 mmHg), Stage 1 Hypertension (140 to 159 and 90 to 99 mmHg) and Stage 2 Hypertension (≥ 160 or ≥ 100 mmHg)

Figure 1: Distribution of CKD among the study participants based on CKD-EPI equation
Discussion

In the present study comprising of 828 study participants, majority (45.7%) belonged to age group 30-39 and 40-49 years, 73.1% were females, 31.4% were non-literate and 49.4% were unemployed. This can be explained by the study being conducted in urban slum area and majority were females. Majority (44%) belong to lower middle socio-economic status according to modified BG Prasad Scale of Socio-economic status.
Present study documented prevalence of CKD based on CKD-EPI equation (according to KDOQI classification) to be 47% and moderate to severe CKD (Stage 3A and above) was found to be 6.8%. This is more than that in SEEK multi-centric study, where overall prevalence of CKD in India was 17.2% and that in Mysuru was 4.2% (CKD-EPI equation). In a study done in South rural Karnataka by Anupama et al., noted prevalence of CKD to be 6.3% (MDRD equation). In present study, association between age and CKD was found to be statistically significant at p value of 0.01. Studies have already proved age to be an independent risk factor for CKD and advancing age is the most powerful independent risk factor for CKD. In our study, with respect to gender, CKD stage 3A and above was noted to be 7.2% of males and 6.6% of females. The association between gender and CKD was found to be statistically significant at p-value of 0.01. In SEEK multi-centric study, prevalence of CKD was more in males than females and in a study conducted in South Karnataka, CKD prevalence was noted to be high among males than females. Our study is in concordance with both the studies with CKD seen more in males than females. In our study, there was statistically significant association between educational status and CKD with p-value of <0.001. In the SEEK study, it was noted that individuals with education level more than the High School had higher prevalence of CKD and association was noted to be statistically significant. This was in contrast to our study where CKD prevalence was noted more in non-literate individuals. This can be explained by composition of study participants which had more of non-literate. Our study result was in concordance with that in the KIDS project in South interior Karnataka, where prevalence of CKD was more among those who had education level lesser than High school.

Prevalence of hypertension in Urban India was noted to be 33.8% and in South India was 31.8% from a meta-analysis study done in 2014. Our study had higher prevalence than this with 42.1% were hypertensive and was associated with statistical significant at p value of <0.001 with CKD. Our study finding was similar to that of KIDS project where there was statistical significant association between hypertension and CKD. Prevalence of pre-existing diabetes mellitus in the present study was 26.1% which is more than prevalence of DM in India which was 8.5% in 2016. Even though diabetic nephropathy is the most common cause of CKD, there was no statistically significant association between DM and CKD and this may be due to inclusion of only individuals with history of DM and no screening was done for the same. Present study documented tobacco consumption in 33.3% of study population. Tobacco use as smoke tobacco was 22.9% and smokeless tobacco was 10.4% in contrary with the Global Adult Tobacco Survey (GATS-2) done in India in 2016-17 which reported 28.6% of tobacco use in any form with 10.7% using smoke tobacco and 21.4% using smokeless tobacco and tobacco use in any form in Karnataka was noted to be 22.8%, which is lesser than our study. Prevalence of alcohol consumption was found to be 23% in the present study similar to National Household Survey of Drug Use in India in 2015 which recorded alcohol use in India was 21.4%. In the present study, indigenous medicine usage was noted in 39.5% which is more than the WHO-Sage study in 2016 in which 11.9% were using traditional medicine. In the present study, analgesics (NSAIDs) usage without prescription was noted in nearly 52.7% was more than that in a study done in Bangalore, which was noted as 35.8%. Generalised obesity was noted in 49.9%, similar to a study conducted in urban north India, in which the prevalence of generalized obesity was 50.1% and the Chennai Urban Rural Epidemiology Study (CURES) conducted in Chennai city in Tamil Nadu which reported age standardized prevalence of generalized obesity to be 45.9 per cent and association was found to be statistically significant with p value of 0.023. Our study result was similar to that of results in SEEK study where there was statistically significant association between BMI and CKD.

Conclusion

CKD and risk factors for CKD are prevalent in urban slum population. Among study population, majority had normal eGFR, but 7 individuals were noted to have urinary abnormality as proteinuria/hematuria with normal eGFR. Nearly 6.8% had eGFR suggestive of CKD (stage 3A and above). This proportion of CKD calls for preventive measures. Risk factors are gradually increasing in Indian population and represent a public health concern which indicates that there is need of intervention to reduce these are necessary. Use of simple tests like S. Creatinine estimation (hence eGFR calculation) and urine dipstick analysis can be recommended in PHC level and preventive measures can be implemented in individuals who are at risk of CKD (stage 2) can be identified and can be made aware of measures to be taken to prevent or delay progression into further stages of CKD.
Ethical Clearance: Taken from Institutional Ethical Committee, JSS Medical College.

Conflict of Interest: None

Source of Funding: JSS University Research and Development Fund.

References

An Epidemiological Study on Barriers of Utilization of Contraception among Married Women of Reproductive Age Group in Rural Population of Meerut

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Abstract

Background: Family planning promotion has the potential to reduce poverty, maternal and child mortality, high risk pregnancy, and abortion.

Objectives: To assess the barriers in acceptance of contraception among the women of reproductive age group in the rural population.

Materials and Method: A community based cross-sectional study was conducted in the rural setting of Parikshitgarh block of Meerut in Uttar Pradesh. 285 women of reproductive age group (15-49 years) were selected by multistage random sampling. Information regarding the various barriers was obtained from the participants by interview by door to door survey.

Results: Out of the 285 women, contraceptive use was seen in 150(52.6%) whereas 135(47.4%) women were not using any contraceptives. The reasons of non use of contraceptives seen in this study were wanted child/pregnant 74(54.8%), don’t feel necessary/not interested 33(24.4%), Menorrhagia/abnormal or excessive bleeding 8(5.9%), husband not ready/not allowed 3(2.2%), diminution of vision 2(1.5%), menopause started early 1(0.7%), uncomfortable/don’t like 1(0.7%), weight loss 1(0.7%).

Conclusions: This study found that desire for child was the main reason for non utilization of contraception followed by not understanding the necessity of contraception. Side effects and opposition from husband were also important reasons but were reported by considerably less women compared to the two major reasons.

Keywords: Contraceptive, Barriers, Non utilization.

Introduction

The family welfare programme has travelled a long way, but still total fertility rate has not reached the desired target of 2.1%. In spite of availability of a wide range of contraceptives, mass media campaign and Information Education and Communication programme, the population control seems a distant dream to achieve.[¹]

The factors responsible operate at the individual, family and community level with their roots in the socio-economic and cultural base of society. Most of the married women want to use the contraceptive method but are unable to use because of illiteracy, lack of knowledge, economical problem, fear of side effects, social customs, religious cause, superstitions, insufficiency of family planning worker, uncooperative husband and limited supply and high cost.[²]

Cultural barriers inhibit from postponing childbearing, parents, in-laws and relatives influence
couples to give births soon after marriage. Moreover, persistent misconceptions about modern contraceptive method act as barrier to use. Reasons for not using oral contraceptive pills were reported as perceived or experienced side effects/health concern, dizziness, loss of appetite, weight gain, nausea/vomiting, breast tenderness, mild headache, fatigue, and depression or mood change. With regard to use of condom, inconvenience or lack of privacy was reported as barrier to use. Lack of correct knowledge about contraceptive method was also found as barrier to use contraception.\(^3\)

**Objective:** To assess the barriers in contraception acceptance among married women of reproductive age group in rural population of Meerut.

**Materials and Method**

A community based cross-sectional study was conducted in the rural setting of Parikshitgarh block of Meerut, Uttar Pradesh in India, from March 2017 to February 2018. The present study was conducted in the area of rural health & training centre Khajoori in Kila Parikshitgarh block which is rural field practice area of Department of Community Medicine, Subharti Medical College, Meerut. There are 12 blocks in Meerut district and Kila Parikshitgarh is one of them. From the List of Villages in the block, 3 villages (Khajoori, Alipur and Badhla) were selected by Simple Random Sampling. Using the Simple Random Sampling first village to start was chosen (Khajoori).

For selecting the first house for the study the researcher with one female health worker reached the centre of the village and rotated the pencil and the house towards which the tip of the pencil pointed was chosen as our house no. 1 and then every 5th house by Systematic Random Sampling was covered by using left hand rule. After first village Khajoori next village Alipur was chosen by left hand rule and then the last village selected was Badhla till we got the desired sample size \((285)\) calculated by taking the prevalence of unmet need of contraception (rural) 23.1% on the basis of National Family Health Survey 2005-06 (NFHS-3).\(^4\)

If there were no eligible woman in the house according to sampling technique then we moved on to the next house.

Informed consent was taken from the woman prior to the interview. The purpose and objectives of the study was explained to the married females prior to data collection and they were assured about the confidentiality.

Only one eligible woman in one house was included in study. The data was collected by using prestructured, pretested, pre validated schedule. Interview method used was using validated Hindi translation of the schedule.

A pilot study was done on 30 married females for validating the schedule and necessary modifications and rectifications were done. After the necessary modifications survey was started in compliance with basic ethical issues. These 30 families were not included in the final sample of 285 households used for analyzing.

Data was analysed using SPSS version 19.0. Frequency tables were made for proportion and Pearson’s Chi square test was applied to find out significant association between independent and dependent variables. A p-value of less than 0.05 was considered significant.

**Results**

In the present study a total of 285 married women of reproductive age group (15-19 years) were interviewed, out of which 59.4% women in our study group belonged to nuclear families while 40.6% women were living in joint families. Majority of women 162(56.8%) belonged to Muslim religion, whereas 120(42.1%) women belonged to Hindu population and only 3(1.1%) were from Sikh community. Among all the families 85(29.8%) were of lower middle class, followed by 72(25.3%) middle class, 71(24.9%) upper middle class, 38(13.3%) upper class and only 19(6.7%) belonged to lower socio-economic class.

In our study group 80(28.1%) women belonged to age group of 25-29 years, followed by 72(25.3%) in 30-34 years age group, 54(18.9%) in 35-39 years age group, 46(16.1%) in 20-24 years age group, 27(9.5%) in 40-44 years age group. Only 5(1.8%) women were in 45-49 years age group and 1(0.4%) women was in 15-19 years age group(as also depicted in figure 2).

Majority women (61.1%) in our study were literate (as also shown in figure 3).In the present study majority women were housewives 255(89.5%).

Table No.1 shows that the current level of contraceptive use as reported in this study was 52.6%. The method of contraception being used are depicted in figure 1 in which condom usage was by 57% followed by female sterilization by 20%.
Table No.2 depicts that the reasons of non use of contraceptives seen in this study were wanted child/pregnant 74(54.8%), don’t feel necessary/not interested 33(24.4%), Menorrhagia/abnormal or excessive bleeding 8(5.9%), husband not ready/not allowed 3(2.2%), diminution of vision 2(1.5%), menopause started early 1(0.7%), uncomfortable/don’t like 1(0.7%), weight loss 1(0.7%).

Table 1: Distribution of study population according to current use of any method of family planning

<table>
<thead>
<tr>
<th>Currently using</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>135 (47.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>150 (52.6)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>235 (100)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of women according to reasons for not using any contraceptive method currently

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanted Child/Pregnant</td>
<td>74(54.8)</td>
</tr>
<tr>
<td>Don’t feel necessary/Not interested</td>
<td>33(24.4)</td>
</tr>
<tr>
<td>No Response</td>
<td>12(8.9)</td>
</tr>
<tr>
<td>Menorrhagia/Abnormal or Excessive Bleeding</td>
<td>8(5.9)</td>
</tr>
<tr>
<td>Husband not ready/not allowed</td>
<td>3(2.2)</td>
</tr>
<tr>
<td>Diminution of vision</td>
<td>2(1.5)</td>
</tr>
<tr>
<td>Menopause started early</td>
<td>1(0.7)</td>
</tr>
<tr>
<td>Uncomfortable/Don’t Like</td>
<td>1(0.7)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>1(0.7)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>135(100)</td>
</tr>
</tbody>
</table>

Discussion

In the present study, out of 285 women, nearly half (46.3%) of the women were in 35-49 years age group, followed by 28.5% in 15-29 years age group, and 25.3% women in 30-34 years age group, while in Shukla et.al (2015) [4] in Lucknow slums majority of the women(63%) were in 15-29 years age group, followed by 21.1% women in 30-34 years age group and 15.9% women in 35-49 years age group.

In the present study, majority of the women(57.9%) were Non-Hindu (162 Muslim, 3 Sikhs), followed by 42.1% women of Hindu religion, whereas in Setu Y et.al (2018) [5] study in urban slums of Allahabad, most of women (94.4%) were of Hindu religion.
In the present study, 59.4% women were living in nuclear families and 40.6% women were living in joint families, whereas according to Vohra et al. (2014) [6] in their study done in rural and urban area of Jaipur, 93.2% women lived in nuclear families and only 6.8% women lived in joint families.

Majority of the women (89.5%) in our study were housewives; similar findings were reported by Rizvi A et al. (2013) [7] in their study in urban Lucknow (94%) were.

In our study 38.9% women were illiterate, similar findings were reported by Choudhary S et al. (2011) [8] in their study in rural area of Hisar, Haryana in which 43.3% were illiterate.

In the present study we found that majority women belonged to lower middle class (29.8%), followed by middle class (25.3%), and upper middle class (24.9%) according to BG Prasad socio-economic Classification (2017) [9], whereas Chakraborty et al. (2016) [10] in their study in rural area of North 24 Parganas of West Bengal reported slightly lower number of women in lower class (19.5%), middle class (20.7%), but slightly higher number of women in upper middle class (28.9%).

Table no.1 shows that in the present study out of 285 women current users of family planning in our study were 52.6% which was much higher than the prevalence of contraception in rural UP as reported in the NFHS 3 (2005-06) [4] (39.7%) and NFHS 4 (2015-16) [11] (42.1%). Similar findings were reported by Afzal Hakim et al. (2017) [12] in their study done in Jodhpur (57.2%) and Jesha MM et al. (2016) [13] in their study in North Kerala, in which current users were 49% whereas Rizvi A et al. (2013) [7] in their study in urban Lucknow reported almost half (26.2%) current users in comparison to our study.

Table no.2 depicts that in the present study out of 135 women who were not using any family planning method currently the most common reason given was pregnancy/desire for pregnancy (54.8%), followed by who did not feel necessary/were not interested in using any method (24.4%), reason of abnormal or excessive bleeding during previous use (5.9%), opposition from their husband (2.2%), non use due to dimunition of vision due to prior use of any method (1.5%), menopause started early/uncomfortable with any method/weight loss (0.7%). Similar to our result the most common reason for not using any method of contraception in Hajira Saba et al. (2014) [14] study in urban areas of Bangalore, Hemavarneshwari et al. (2015) [11] study in rural areas of Bangalore and Murarkar et al. (2011) [15] study in rural area of Ambajogai, Maharashtra was desire for pregnancy (56%, 46.3% and 39.8% respectively), the second reason was need not felt in 20.1% in Hajira Saba et al., whereas in Hemavarneshwari et al. and Murarkar et al. the second reason were fear of side effects in 14% and 16.3% respectively. Opposition of partner/relative was given as reason by 12% in Hemavarneshwari et al. and 14% in Murarkar et al which was higher than our study whereas it was only 0.8% in Hajira Saba et al. which was less compared to our study. Other reasons in these studies different from our studies were misconception and against religion in 10.5% each in Hajira Saba et al; fear of surgery in 10.6%, religious reason in 5.1% and lack of knowledge in 2.6% in Hemavarneshwari et al.; early menopause by 14%, breastfeeding by 8%, reason of no knowledge of source of obtaining any method by 5.7%, ignorance about use and anti religion by 4.5% each, infrequent sex by 3.8% and undergone hysterectomy by 3% in Murarkar et al. In contrast to our findings Lakkarwar et al. (2014) [16] in their study done in sub-urban Pondicherry reported that the most common reason for not using contraception was lack of knowledge (54.3%), followed by against the religion (49.3%), worry of side effects (48.9%), opposition to family planning (44.3%), cost factor and health does not permit (24%), afraid of sterilization (15.8%) and do not like any method (6.3%).

**Conclusion**

The present study also conclude that the barriers identified in the study were, desire for child, fear of side effects, opposition from husband/family members, need not felt, no proper explanation by health worker regarding family planning, contraception causes weight loss, diminution of vision and uncomfortable to use in previous episode.

**Limitations of the Study:** It was a cross sectional study. No follow-up was done. Data was collected by interview method so there may be recall bias, response bias although our questionnaire was pretested and validated.

**Acknowledgement:** NA

**Ethical Clearance:** Permission obtained.

**Any Conflict of Interest:** None

**Source of funding agency:** Self Funded
References


Transcranial Direct Current Stimulation in Combination with TENS: Effectiveness on Pain and Functional Outcomes in Knee OA Patients: A Study Protocol

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Abstract

The goal of the study is to investigate the effectiveness of combination of Transcranial direct current stimulation (tDCS) and TENS on pain and functional outcomes in patients with knee osteoarthritis. Patients following ACR criteria for knee osteoarthritis, aged more than 45 years will be selected for the study. 80 patients will be selected and will be randomized into following four groups: Active tDCS/active TENS (group 1), Sham tDCS/active TENS(group 2), Active tDCS/sham TENS(group 3), Sham tDCS/sham TENS(group 4). The study will be participant blinded randomized controlled trial. The outcome variables are pain and functional assessment using six minute walk test and self-reported questionnaire KOOS. Trial Registration: CTRI/2018/02/012027.

Keywords: Combination, Transcranial direct current stimulation, TENS, Pain, Osteoarthritis, Knee.

Introduction

Knee osteoarthritis (OA) is one of the common cause of musculoskeletal pain and disability. It is estimated that 20% of people aged over 30 years experience knee symptoms in India1, resulting in substantial pain and physical dysfunction2. Various therapeutic exercises are recommended for patients of knee osteoarthritis with the prime aim of improving muscular strength, as weakness is common in knee OA. Strength training can conquer the muscle weakness in such patients by improving the muscle mass. However, pain becomes a hurdle in exercising that causes individuals to under perform the exercises. Therefore, strengthening the musculature of lower limb can overcome this problem. Many pharmacologic treatments are available however; there is growing interest in non-pharmacologic intervention targeting the central nervous pain processing system.

Transcranial direct current stimulation (tDCS) is used in chronic pain conditions because of its neuromodulatory effect3-6. The application of TENS in knee OA has been demonstrated to be effective in managing arthritic pain7-12. Thus, by combining the two interventions can generate both the neuromodulatory effect (cortical effect) as well as segmental inhibition in the pain gate13 and descending pain suppression via δ-opioid mechanisms (spinal and peripheral effect). Various studies have suggested tDCS combined with TENS resulted in greater pain reduction than their isolated application in low-back pain (LBP) by the priming effect14,15. Therefore, taking in account of these encouraging results, we hypothesize that the combined application of tDCS, TENS and exercise will reduce pain to greater extent and may enhance mechanistic and clinical outcomes in knee OA. Moreover, RCTs from Asian countries, particularly India where knee pain is common1, is still lacking and our protocol is aimed to reduce this knowledge gap.

Objectives: The primary objective of the study is to find out the effectiveness of combined tDCS and TENS on pain. The secondary objective of the study is to find out the effectiveness this combination on quality of life in patients with knee osteoarthritis.

Hypothesis: Transcranial stimulation (tDCS) in combination with TENS will reduce pain and bolster the
effect of exercise by priming effect thereby improving function in knee osteoarthritis patients and may regulate pain by the “top down and bottom up” mechanism.

Method

Target population and sample: The subjects will be recruited from public announcements, flyers and referral cases of knee OA from various hospitals. The study will be conducted at 3 centers in XXX. The participants fulfilling the American college of Rheumatology (ACR) criteria for clinical classification for idiopathic knee OA will be recruited for the study.

The sample size was calculated by pilot study on 8 subjects with 80% power at 95% confidence interval of effect size 0.54. Sample size of 16 subjects in each group was calculated. The sample size was increased to 20 subjects expecting 20% dropout rate.

Inclusion criteria: The subjects will be selected on the basis of criteria defined by the ACR Criteria: Presence of knee pain and any three of following: age over 45 years; morning stiffness lasting less than 30 min; crepitus; bony tenderness; bony enlargement; no palpable warmth.

Exclusion criteria: The subjects will be excluded if they have the following: Any knee surgery in the past 6 months; Knee joint replacement or high tibial osteotomy on the affected side; other muscular, joint or neurological conditions affecting the functions of lower limb;unable to walk unaided; currently undertaking any exercise programme for knee OA; contraindications to tDCS (eg, epilepsy).

Discontinuity criteria: The subjects will be discontinued if: They miss 3 consecutive session of exercise even after repeated reminders made through phone call; any moderate to severe adverse events are presented by the subjects that are related to application of therapeutic intervention or exercises; subjects who involves in other medical treatment for knee OA that may interfere with the results;any other health program like weight reduction or aerobic exercises or Pilates or any other fitness training program.

Research group and study design:

Study design: Present study is 4-arm parallel group, participant blinded; sham (placebo) controlled randomized trial. After taking the informed consent at the baseline visit the subjects will be assessed by the researcher thoroughly at the baseline visit and will be randomly allocated to one of the four groups by corresponding author through lottery method done by independent person not participating in the study. All the subjects will receive hot packs followed by the interventions and exercise protocol thrice weekly. All the participants will be assessed four times a) at the baseline visit b) week 1 (after 5 days of intervention) c) end of 2nd week d) end of 6th week. All the subjects will undergo weekly thrice supervised exercise training for 5 weeks and advised to do exercises taught at home on the days not coming for the treatment. Home exercises and supervised exercise will be taught by experienced physiotherapist (First author). The study participants were allowed to continue their medications if any, throughout their participation in the trial. At the baseline visit, type of medication, dosage and frequency of medication will be recorded. Total duration of study is 6-weeks including 1st week 5 treatment sessions followed by weekly thrice supervised exercise for 5 weeks.

Research group: The study participants selected following the inclusion and exclusion criteria for the study will be randomly assigned to one of the four groups.

Group 1: Active tDCS/Active TENS (n=20)
Group 2: Active tDCS/Sham TENS (n=20)
Group 3: Sham tDCS/Active TENS (n=20)
Group 4: Sham tDCS/Sham TENS (n=20)

Intervention description:

Transcranial direct current stimulation (tDCS): A constant current of 2 mA for 20 min once a day for 5 consecutive days will be by a pair of circular sponge electrode saturated with normal saline. The anode will be placed on primary motor cortex (M1, C3 or C4) as per 10/20 International electroencephalogram EEG system) contralateral to the most painful knee and the cathode will be placed on opposite supraorbital region ipsilateral to the affected knee. For sham stimulation same electrode placement will be used. The equipment will be turned on for 30 sec, and then turned off. A Customized model, Medicaid, Chandigarh (Mohali), India will be used for transcranial stimulation.

Transcutaneous electrical nerve stimulation (TENS): A pair of surface electrodes 5cm × 5 cm, placed on the skin at medial and lateral side of the knee joint
fastened by velcro will be used. High frequency TENS at 100 Hz for 20 min duration will be given to the patient for five consecutive days. Only the most painful side will be stimulated. For sham stimulation the same placement of electrode will be used, with stimulator turned on for 30 sec and then turned off. TENS Enraf Nonius, USA will be used for stimulation. Both the stimulators (tDCS and TENS) will be turned on and off simultaneously during each session of treatment.

**Exercises:** The subjects will perform a supervised exercise protocol following the interventions. Each exercise will be done for 3 sets of 10 repetitions with a break of 30 sec in between the sets. The exercise program will progress as mentioned in the prescribed protocol. The study physiotherapist will decide the initial level of exercise depending upon the ability of the subject and the time when to progress the exercise based on the participant’s performance and therapist’s clinical judgment. The subjects will undergo initial 5 sessions of exercise on 5 consecutive days post intervention (1st week). Subjects will undergo thrice a week supervised exercise sessions for next 5 weeks (2nd-6th week) by study therapist. The participants will also be taught home exercises to be performed on days not coming for treatment. The subjects must undergo at least 12 sessions (including 1st week 5 sessions) of supervised exercise session for estimating the desired benefits of the exercise regime.

**Outcomes:** The outcome variables of all the participants will be assessed four times: at the baseline visit, week 1 (post intervention), 2 week and at week 6.

- **Pain:** The intensity of pain will be measured by VAS (0-10 cm) by asking pain on walking during previous day, self-assessed pain describing ‘no pain’ (score 0) and ‘extreme pain’ (score 10) will be reported.

- **Function:** Six minute walk test is reliable tool in Indian population will be used for functional assessment. Subject was asked to walk on a 20-m corridor for six continuous minutes as per Ateef et al 2016. The distance covered in meter by the participant will be recorded in the assessment form.

- **Quality of Life:** It will be assessed through self-reported Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire containing 42 questions in five subscales namely pain, symptoms, activities of daily living (ADL), sports/recreation and quality of life. Score ranges from 0 to 100 where 100 means maximum problem. KOOS is a reliable assessment tool in Indian knee OA patients.

**Safety:** For ensuring safety of the participants questions like any symptoms of itching or burning sensation, tingling, any kind of pain at the stimulation site, headache, mood changes, anxiety, nervousness, or any kind of changes in visual perception during or after the treatment or any other potential risk described by Rossi et al 2009 will be asked.

**Ethical aspects:** The trial will be conducted according to the ICMR (Indian council of medical research) 2017 guidelines which are in accordance with Helsinki declaration 2013 (7th revision). All the participants will sign the informed consent prior to participation in the study.

The trial has been prospectively registered with the Clinical Trail Registry of India number CTRI/2018/02/012027 registered on 21/02/2018. Ethical approval was obtained from Institutional ethical committee vide letter no. PTY/2017/484 dated 9th October 2017. The findings of the study will be shared with the participants in simple language. Confidentiality of the participants will not be breached at any point of the study. The raw original data will be archived for 5 years by the investigator of the study. Consolidated data without participant’s personal details will be permanently archived in Mendeley data repository.

**Consent to publish:** A written permission from the participant will be obtained for the data and images to be published.

**Data analysis:** The data will be analyzed as per principle of intention to treat. To find out the effectiveness of interventions, analysis of pain and functional outcomes per protocol analysis of variance (ANOVA) will be used. Repeated measure ANOVA will be used to estimate the effectiveness of interventions within the group for all the four groups. Effect size will be calculated.

**Discussion**

The paper is in accordance with the recommendations of SPIRIT guidelines (Standard Protocol: Recommendations for Interventional Testing) in evolution and recording of protocol for the study. Considering OA as a debilitating health problem, requires better management of pain and function thus making the population less disabled. Supervised exercise
program shows better results as the treatment is given on one to one basis. In a study on knee osteoarthritis, the application of tDCS demonstrates substantial pain reduction and improved mobility performance and the effect of stimulation lasts for 3 weeks. In another study, tDCS combined with TENS demonstrates promising results in chronic LBP patients. Present protocol is similar to Luz-Santos et al. and marginally different from it by outcome measures. We believe 6-minute walk test is more functional hence meaningful to patients; would help the therapists to monitor rehabilitation outcome. Considering the results obtained from these studies, the effectiveness of tDCS used alone as well as in combination with TENS must be explored for treating musculoskeletal conditions like knee OA. tDCS, either alone or combination, may be a potential intervention for better management of pain and functional activities in knee OA.

Benefits: The subjects will be asked to continue the exercises even after the completion of trial at home to sustain the benefits of exercises. The results of the study if comes out to be effective, the leading treatment will be offered to the people not received the treatment.

Trial status: The study is enrolling participants from April 2018 onwards and estimated to be completed by March 2020.

Compliance with Ethical Standards: This article does not contain any studies with human participants performed by any of the authors.

Funding: There is no external funding to write this paper.

Conflict of Interest: The author of the study declares no conflict of interest.

References


Are Teachers/Motivators in Schools Aware of MR Vaccination?: A Study in a City of South India

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Abstract

Introduction: Measles is a major killer disease and Rubella leads to lifelong birth defects. In India, every year nearly 2.7 million children get measles and over 4000 children are born in India with such birth defects (Congenital Rubella Syndrome). The mortality and morbidity of measles and rubella is not declining a significant level in recent years. To bring it down, government of India has planned a massive vaccination campaign on measles and rubella among children (9 months to 15 years). School based immunization was a part of the strategy.

Method: This study aimed at assessing the awareness of MR vaccination among principals and teachers in 90 schools in Trichy, using a self-administered questionnaire and the results were compiled and analyzed.

Result: The results showed that 94.4% of the study group was aware of the disease with the main source of awareness being media and social workers which accounted for 38.9%. The results showed that 78.9% people were convinced that measles and rubella is a big burden to our country. Respondents strongly felt that health education regarding MR vaccine was necessary in order to eradicate measles and rubella. IEC activities, Training Programs can be aimed at improving the knowledge about MR Vaccination to the school teachers. Teachers can be trained to conduct Counseling sessions to increase the acceptance rate

Keywords: Measles, Rubella, MR Vaccine.

Introduction

Measles is a deadly disease and one of the main causes of children mortality in the country. It is highly contagious and spreads through coughing and sneezing. Rubella is generally a mild infection, but has serious consequences, if infection occurs in pregnant women, causing congenital rubella syndrome, which is a cause of public health concern. (¹) High level of herd immunity is required for its elimination. (²) Sero-prevalence studies suggest that coverage in the range of 90–95 % is needed. (³) India along with ten other WHO South East Asian region member countries, have resolved to eliminate measles and control rubella and congenital rubella syndrome by 2020. (⁴) With an aim to eradicate rubella and measles from India, the union health ministry launched the measles-rubella campaign, targeting 41 crore children from 9 months to 15 years across the country. The first phase of MR vaccination campaign was held in February 2017. The campaign was first launched in Karnataka, Tamil Nadu, Puducherry, Goa and Lakshadweep covering nearly 3.6 crore target children. However, it will later be extended to cover the entire country. According to the ministry, after the campaign, MR vaccine will be introduced in routine immunization, replacing the two doses of measles vaccine given to children at 9 to 12 months and 16 to 24 months of age. The government is committed to eradicate Measles and Rubella from the country and have taken this as an achievable target. This shall be taken up in a mission mode and rolled out in a partnership with state government and NGO’S.

All children aged between nine months and less than 15 years was be given a single shot of MR vaccination irrespective of their previous measles/rubella vaccination
status or measles/rubella disease status. MR vaccine was provided free of cost across the states from session sites at schools as well as health facilities and outreach session sites. All eligible children were vaccinated in schools for first 1-2 weeks of campaign. Next 2 weeks, health sub-centres, antidepressants, fixed outreach sessions and mobile/special posts in villages and urban area conducted vaccination for the missed and school absentees. Government health facilities vaccinated on all days of campaign.

This study had teachers and principals as respondents, considering them as point of contact in the society who can establish contact and extend their knowledge to others in the population. The study aimed at assessing the knowledge about the vaccine and henceforth reinforcing the importance, awareness and acceptance of the vaccine which will aid in elimination in the near future.

**Objectives:** To assess the level of awareness about MR vaccination campaign among the teachers/motivators in schools in Trichy city.

**Materials and Method**

Cross sectional study was done in Feb-March 2017 among 90 schools in Trichy district. From each School a single participant was selected either a principal or a teacher. A self-administered questionnaire was used to collect relevant information from the teachers and other staffs considering them as the point of first contact for this campaign. The study was done with their informed consent and after proper explanation. The Questionnaire included basic details about the school, awareness about the measles and rubella disease, vaccines and source of information. The data was entered in MICROSOFT EXCEL and analyzed using EPI INFO software. Descriptive statistics were done using frequency and percentage.

**Results**

**A. Awareness about MR Vaccination:** Out of 90 participants in this study, Most of the respondents, 47 (53%) were Principals and remaining 43 (47%) were teachers. In this study, 85(94%) were aware of the vaccination program and the remaining 5(6%) were unaware of the vaccination campaign as represented in Figure 1.

**Figure 1: Awareness about vaccination campaign (n=90)**

Among the study population, 72(80%) of respondents answered correctly as MR vaccine, 13(14%) answered as rubella and 5(6%) answered as MMR. This is represented in the following Figure 2.

**Name the vaccine correctly**

**B. Information related to MR Vaccination:** Out of the study participants, 71 (79%) of participants considered measles and rubella as a burden to our country hindering our country’s growth and 50(56%) have answered the exact age group for MR vaccination as 9 months to 15 years. Also 76(84%) have answered that health education regarding MR vaccination was adequate and 85(94%) feel that MR vaccine is necessary for eradication of the two diseases which aids nation’s growth. This is represented in the following Figure 3.

**Figure 2: Awareness about name of the vaccine given during campaigns (n=90)**

**Figure 3: Awareness about age group for MR vaccination (n=90)**
C. Source of Information: Media and social workers contribute to source of awareness of equal percentage 35(39%). The other sources include Pamphlets, Posters and Demonstrations. This is represented in the following Figure 4.

Nearly 50 to 75 respondents are aware about the importance and need for the vaccine and the exact age group for the vaccine. As media can have a huge impact on the general population as it can reach people easily in an effective manner and can break all the myths regarding the vaccine and their adverse effects. Advertisements may be provided in newspapers and other radio channels so that it can enhance the acceptability and the need for the vaccine. Training programs can be organized for the teachers and other social workers who can improve the knowledge about the vaccination campaign thereby increasing the success rate of the vaccination.

In our study 85(94%) were aware of the vaccination program where as in a study done among parents about rota virus and pneumococcal vaccine 120(34.2%) of mothers were aware about Rota virus and 148(39%) about Pneumococcal vaccine. Awareness of these vaccines was seen among the middle and upper socio economic group with the major source of awareness being doctors and health workers. Similarly another study done among parents about knowledge and attitude about immunization calendar showed 80% of unawareness. This increase knowledge among the study population in the current study may be due to the recentness in the campaign and training programmes for the school authorities about these particular campaigns.

Studies done about similar campaigns in Tehran showed that one day before the beginning of the
campaign, over 80% of the people under study were aware of it. This increased and at the end of the 2nd week the coverage reached more than 96%. By the end of the program, all of the people sampled were aware of it.(7) Our Study results shows good knowledge level among the teachers compared to the general population of other studies. However, a teacher is expected to fit in to the role of motivator, counselor for promoting the vaccination campaign. For that role the knowledge related to MR vaccination is not complete.

Regarding the source of information, Media contributes equal to source of information spread by social workers (39% each). The effective use of spread of information through both media and social workers is needed.

**Conclusion**

Mass vaccination campaigns are considered an important strategy to increase vaccine coverage. Teachers in this case, act as bridge between health care providers and the community. They are not completely aware of the MR Vaccination and its related information. IEC activities, Training Programs can be aimed at improving the knowledge about MR Vaccination among the school teachers. Teachers can be trained to conduct Counseling sessions to increase the acceptance rate.

**Recommendation:** Health care providers and other social workers being persons with good understanding about vaccines can be used to create awareness. Training programs can be conducted to the teachers to create awareness about the disease and vaccination as they can motivate students and their parents. Small advertisements in mass media regarding vaccine and its usefulness may be done to reach people in all levels.

**Ethical Clearance:** Obtained ethical clearance from our Institutional ethical committee, Chennai Medical College Hospital and Research Centre, Trichy, Irungalur-621105

**Funding:** Self

**Conflict of Interest:** None

**References**

Causes of Occupational Stress among Women Healthcare Professionals (Nurses) in Private Hospitals

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Abstract

Occupational stress has become an issue of great concern over the last decade. It represents an important concern among healthcare workers due to its crucial contribution in attaining maximum job output and optimal quality of working life. The study aims at identify the factor causing occupational stress among women health care professionals and to compare the occupational stress among women health care professionals based on category of employees. Both primary and secondary data were collected for the study. Primary data were collected using questionnaire method and secondary data were collected from reports, books, magazines and websites. The research study was based on primary data. The sample respondents were selected using purposive random sampling i.e. purposively nurses working in private hospitals of Palayamkottai in Tirunelveli city. The data collected were analysed using various statistical tools like percentage analysis, ANOVA, t-Test, Weighted Average Score and Ranking. The major findings of the study are selected sample respondents are under the age group of 20-30 years. Majority of the respondents have completed diploma in nursing. The nurses working in private hospitals are satisfied about their job but not satisfied about the shift working time. The researcher found that there is significant difference among marital status and causes of occupational stress also there is no significant association between age and occupational stress and there is a significant association between working hours and occupational stress. The researchers conclude that women health care professionals are more stressful.

Keywords: Occupational Stress, Health Care, Causes, Nurses, Women, Work Stress.

Introduction

Occupational stress is a stress related to one’s job. Occupational stress often stems from unexpected responsibilities and pressures that do not align with a person’s knowledge, skills, or expectations, inhibiting one’s ability to cope.¹ Occupational stress can increase when workers do not feel supported by supervisors or colleagues, or feel as if they have little control over work processes. Occupational stress focuses on important aspects of job characteristics, such as skill variety, task identity, task significance, autonomy, and feedback.² These characteristics are proposed to lead to ‘critical psychological states’ of experienced meaningfulness, and experienced responsibility and knowledge of outcomes. It is proposed that positive or negative work characteristics give rise to mental states which lead to corresponding cognitive and behavioural outcomes, e.g. motivation, satisfaction, absenteeism, etc.³ In conjunction with the model, Hackman and Oldham (1980) developed the Job Diagnostic Survey, a questionnaire for job analysis, which implies key types of job-redesign including combining tasks, creating feedback method, job enrichment, etc⁴.

Stress in nurses is an endemic problem. It contributes to health problems in nurses and decreases their efficiency. The nursing profession is known to be stressful throughout the world and has detrimental effects on the physical and psychological well-being of an individual’s health.⁵ Occupational stress is of key interest to employers because of the known adverse effects on employee performance, productivity, job satisfaction and health as a whole. Stress basically involves the relationships between individuals and their environment that are considered as challenging or exceeding their resources and jeopardizing their well-being.⁶ Stressors are objects and events; stress reactions
are responses in the form of physiological (such as rapid heart rate, increased blood pressure) and psychological (e.g. anger, fear), that occur when confronted with a stressor. World Health Organization has observed that stress is a worldwide epidemic because stress has recently been noted to be associated with 90% of visits to physicians.

Statement of the Problem: Stress makes one depressed and makes them to fail in their life. Women are a backbone of a family. At present, along with family pressure, women are forced to go for job. Then only it is easy and manageable to the family economically. So, women are going for job. Now-a-days women preferred to go for hospital service jobs like doctors, nurses and administrative support staff. Even trying to manage family, women are facing problems in their work place too i.e gender inequality between co-worker, sexual harassment and so on. So it creates job stress to the workers. As a nurse, woman faces many situations like personal life and the career. Women balance both responsibilities equally and sincerely.

Objectives of the Study: The following are the objectives focused in this study:

1. To study about the concept of occupational stress among nurses.
2. To find out the causes of occupational stress among nurses working in select private hospital of Palayamkottai city.
3. To give suggestions to cope up with occupational stress among nurses.

Methodology

The researcher select Palayamkottai city for conducting the research. Palayamkottai is the heart of Tirunelveli district. There are so many hospitals in and around Palayamkottai city with ample facilities and various speciality hospitals. So, the researcher select palayamkottai city as the study area. The period of the study is six month s from November-2017 to April-2018. The study was confined with both primary and secondary data. The primary data were collected using questionnaire. The questionnaire was issued to the nurses working in private hospitals and the data were collected for analysing. The secondary data were collected from websites, magazines, articles and so on.

Four hospitals were selected for the study. The nurses working in the select hospital were selected as sample respondents. The nurses working in private hospital were selected for the study using purposive stratified random sampling. The respondents were selected for the study randomly based on the availability and willingness of the respondents to fill the questionnaire. The sample of seventy respondents was selected for the study. The study was analysed using percentage analysis, ANOVA, t-Test, weighted mean score and rank.

Analysis and Interpretation: The followings are the findings observed based on the objectives of the study.

- Most of the respondents (70 per cent) are belong to the age group between 20-30 years.
- Majority (74 per cent) of the respondents have completed diploma in nursing.
- Majority (69 per cent) of the respondents are unmarried.
- Majority (87 per cent) of the respondents are staff nurse.
- Majority (59 per cent) of the respondents are earning Rs.5000–8000 per month.
- Majority (67 per cent) of the respondents not have enough salary.
- Most (26 per cent) of the respondents are in paediatric department.
- Majority (56 per cent) of the respondents are satisfied with their job.
- Majority (56 per cent) of the respondents are having heavy stress due to Shift working hours.
- Majority (33 per cent) of the respondents are having break time for 30 minutes to one hour.
- Majority (61 percent) of the respondents are working for 11-12 hours in a day.
- Majority (54 per cent) of the respondents can avail casual leave up to above 12 days in a year.
Table 1: Association between Age and Causes of Occupational Stress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age (in years)</th>
<th>F-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes of Occupational Stress</td>
<td>20-30</td>
<td>34.22</td>
<td>3.238</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>29.33</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>56.57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 50</td>
<td>29.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S.D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Computed Data

The above table shows that there is no significant association between age and causes of occupational stress. The null hypothesis was accepted at 5 per cent significant level. It describes that age does not associate with the causes of occupational stress. All type of age group of the healthcare professionals especially nurses is having similar stress over their job.

Table 2: Significant Difference between Marital Status and Causes of Occupational Stress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Marital Status</th>
<th>t-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes of Occupational Stress</td>
<td>Married</td>
<td>38.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.869</td>
<td>0.005**</td>
</tr>
</tbody>
</table>

Source: Computed Data

The above table shows that there is a significant difference between marital status and causes of occupational stress. The null hypothesis was rejected at 5 per cent significant level. It describes that marital status also paves a way for stress on job. Because married family women are having more responsibilities to balance their work and family. It creates a conflict which is first family or job that leads to a server stress over their job.

Table 3: Association between Working Hours and Causes of Occupational Stress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Working Hours</th>
<th>F-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes of Occupational Stress</td>
<td>Upto 8</td>
<td>32.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-10</td>
<td>25.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-12</td>
<td>5289</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 12</td>
<td>26.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>4.348</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td></td>
<td>S.D</td>
<td>3.18</td>
<td>5.09</td>
</tr>
</tbody>
</table>

Source: Computed Data

The above table shows that there is a significant association between working hours and causes of occupational stress. The null hypothesis was rejected at 1 per cent significant level. It describes that working hours plays a significant association with the causes of occupational stress. Increase in working hours leads to have depression and which leads to get stress over job.

Suggestions:

- There are many ways to overcome stress, by doing some exercise and meditation can give some peace to our mind and help us to get relief from stress.
- Due to overcrowding the stress level increases can be controlled by division of the work load equally to all nurses.
- Lack of concentration and Forgetfulness create stress can be overcome by doing meditation.
- Each organization should appoint one person as a counsellor/mentor who will look after worries, tensions, and stress of employees.
• Work should be properly delegated to the employees to avoid overload of work, which could cause stress.
• Good relationship should be maintained within the employees to feel better environment.
• Employees can be motivated by giving rewards for their excellent performance.
• Proper grievance handling system can be practiced to help the employees to overcome their problems.
• Work life balance and stress relief techniques should be demonstrated to the employees to avoid stress over their job.

Conclusion

The level of occupational stress among a group of staff nurses was measured using a questionnaire survey. In addition, factors contributing to occupational stress were examined. Stress will leads to decreases in attention, concentration, productivity and decision making, and judgment skills. Occupational stress is also negatively related to quality of care due to loss of compassion for patients and increased incidences of mistakes and practice errors. Thus, hospital managers should initiate strategies to reduce the amount of occupational stress among the nurses. They should provide more support to the nurses to cope up with the stress.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: The Data were collected from outside of the working premises. The hospital names were not mentioned anywhere in the research work for ethical conduct.

References


Work_Performance_of_Systems_Employees_of_Pantawid_Pamilyang_Pilipino_Program

Financial Performance of Gold Jewellery Merchants of Cuddalore District, Tamilnadu

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Abstract

The present research paper envisaged the financial performance persisted in the small jewellery merchants in the Cuddalore district has been identified in certain factors. Such as present net worth asset and liabilities present worth of the asset fixed cost per annum variable cost per annum financial assistant in the business start financial bank loan and relative problems by purchase, cost of production, and competition, fashion problems by changing fashion and traditional way of grafting, labour problems by lack of training facilities to unsatisfied working conditions, financial problem, and pricing problem. The primary data have been collected from the identified SJM and analyzed. The results and findings of the study will implicate the SJM and the general public.

Keywords: Jewellery Merchants, Ornamental Usage, Retail Merchants.

Introduction

In today socio-economic empowerment of the people is processing precious metals like platinum, gold and silver. Among the metals, gold has first place as an Ornamental usage. It has possessed by lower class people to upper class of people. As per the religious concepts wearing ornament is parable and Vedic conceptually accepted. The execution of fashion and style of human expression by means of wearing Jewellers is habitually or socially attributed for goodness. In India people are accustom with doing their saving and investment on „Gold”. In south India “Atchayathiruthiyai” is a good sign for investing money on gold. Particularly in Tamilnadu, the people are practicing Gift for others at memorable occasions they prefer only gold coin or ornamental object. Basically the Hindu and the Islamic religious people are practicing the „marriage gift” of offering gift and initial life sources, they are giving Gold ornament. In this juncture, the role of small Jewellery merchants is inevitable.¹ In Tamilnadu, past Ten years back, there is no much of corporate Jewelers, but now (2014) most of the cities in Tamilnadu, the corporate business people having their branch show rooms. They are selling the Gold and other precious metals with a lesser of wastage rates, making cost and VATT (Value Added Tax and Tariff). Thus, this study aims to study the problem of small Jewellery merchants.²

Present Worth of the Assets/Liabilities: To know their financial problems and business growth present worth of the assets and liabilities is to be analyzed. Due to that the researcher has collected the worth of Assets/Liabilities as Up to 20 Lakhs, 20 Lakhs to 50 Lakhs and Above 50 Lakhs.³

Table No. 1: Present Worth of the Assets/Liabilities (Amount in Lakhs)

<table>
<thead>
<tr>
<th>Present worth of the Assets/Liabilities (Amount in Lakhs)</th>
<th>Small Jewellery Shop located in the talks of Cuddalore district</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CUD</td>
<td>CDM</td>
</tr>
<tr>
<td>Up to 20 Lakhs</td>
<td>14 (18.4)</td>
<td>33 (35.9)</td>
</tr>
<tr>
<td>20 Lakhs to 50 Lakhs</td>
<td>43 (56.6)</td>
<td>17 (18.5)</td>
</tr>
<tr>
<td>Above 50 Lakhs</td>
<td>19 (25.0)</td>
<td>42 (45.7)</td>
</tr>
<tr>
<td>Total</td>
<td>76 (100)</td>
<td>92 (100)</td>
</tr>
</tbody>
</table>

Source: Primary Data
From the above table the researcher has inferred that most of them (40.8%) developed their business worthiness above 50 lakhs. 33.9 per cent of them are developed 20 lakhs to 50 lakhs. Only 25.3 per cent of the SJM are developed their business worthiness up to 20 lakhs. Thus, the researcher inferred that 74.1 per cent of the SJMs are developed their business above 20 lakhs due to various factors such as rupee net present value, building and land value appreciation, further establishment, extension and increase of stakeholders, interior decoration, capitalization, and utilization of other resources.

**Present Worth of the Net Assets:** Continuations of the above table, researcher has extended that the present worth of net asset value to determine the real growth of their business.

**Table No. 2: Present Worth of the Net Assets (Amount in Lakhs)**

<table>
<thead>
<tr>
<th>Present worth of the Net Assets (Amount in Lakhs)</th>
<th>CUD</th>
<th>CDM</th>
<th>Panruti</th>
<th>K.Kudi</th>
<th>VDM/Veppur</th>
<th>T.Kudi</th>
<th>K.Padi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10 Lakhs</td>
<td>24</td>
<td>18</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>67</td>
</tr>
<tr>
<td>10 Lakhs to 20 Lakhs</td>
<td>19</td>
<td>47</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td>97</td>
</tr>
<tr>
<td>Above 20 Lakhs</td>
<td>33</td>
<td>27</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>92</td>
<td>12</td>
<td>22</td>
<td>22</td>
<td>13</td>
<td>8</td>
<td>245</td>
</tr>
</tbody>
</table>

Source: Primary Data

From the above table the researcher has inferred that most of them (39.6%) are held with their business about 10 to 20 lakhs of net asset. 33.1 per cent of them are held above 20 lakhs of net asset value. Only 27.3 per cent of the SJM are developed with their net asset up to 10 lakhs. Thus, the researcher inferred that 72.7 per cent of the SJMs are developed their business with the net asset value about 10 lakhs and above.

**Fixed Cost Per Annum:** To know the financial problems and other features of cost overheads, researcher has collected the details of costs occurred in the Small Jewellery Shop located in the taluks of Cuddalore district.

**Table No. 3: Fixed Cost Per Annum (Approximate) (Amount in Lakhs)**

<table>
<thead>
<tr>
<th>Fixed Cost per annum (Approximate) (Amount in Lakhs)</th>
<th>CUD</th>
<th>CDM</th>
<th>Panruti</th>
<th>K.Kudi</th>
<th>VDM/Veppur</th>
<th>T.Kudi</th>
<th>K.Padi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 2 Lakhs</td>
<td>36</td>
<td>27</td>
<td>5</td>
<td>11</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>98</td>
</tr>
<tr>
<td>2 Lakhs to 5 Lakhs</td>
<td>27</td>
<td>35</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>87</td>
</tr>
<tr>
<td>Above 5 Lakhs</td>
<td>13</td>
<td>30</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>92</td>
<td>12</td>
<td>22</td>
<td>22</td>
<td>13</td>
<td>8</td>
<td>245</td>
</tr>
</tbody>
</table>

Source: Primary Data

From the above table the researcher has inferred that most of them (40%) are spending fixed costs around up to 2 lakhs per annum. 35.5 per cent of them are spend fixed cost 2 to 5 lakhs. Only 24.5 per cent of the SJM are spending above 5 lakhs. Thus, the researcher inferred that 60 per cent of the SJMs are spend 2 lakhs and above per annum.
**Variable Cost Per Annum:** Continuations of the above table, researcher has extended that the variable costs spent by the SJMs in Cuddalore district.

<table>
<thead>
<tr>
<th>Variable Cost per annum (Approximate) (Amount in Lakhs)</th>
<th>Small Jewellery Shop located in the talks of Cuddalore district</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CUD</td>
<td>CDM</td>
</tr>
<tr>
<td>Up to .5 Lakhs</td>
<td>21 (27.6)</td>
<td>28 (30.4)</td>
</tr>
<tr>
<td>1 Lakh to 2 Lakhs</td>
<td>24 (31.6)</td>
<td>38 (41.3)</td>
</tr>
<tr>
<td>Above 2 Lakhs</td>
<td>31 (40.8)</td>
<td>26 (28.3)</td>
</tr>
<tr>
<td>Total</td>
<td>76 (100)</td>
<td>92 (100)</td>
</tr>
</tbody>
</table>

Source: Primary Data

From the above table the researcher has inferred that most of the respondents (39.6%) are spending variable costs around 1 lakhs to 2 lakhs per annum. 34.7 per cent of them are spend variable cost above 2 lakhs. Only 25.7 per cent of the SJM are spending up to 0.5 lakhs. Thus, the researcher inferred that 74.3 per cent of the SJMs are spend variable costs 1 lakhs and above per annum.

**Sources of Financial Assistance:** During the business operation, the SJMs are availed financial assistances from different sources such as family support, relatives, friends, commercial banks and financial institutions.

<table>
<thead>
<tr>
<th>Sources of Financial Assistance</th>
<th>Small Jewellery Shop located in the talks of Cuddalore district</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CUD</td>
<td>CDM</td>
</tr>
<tr>
<td>Family supports</td>
<td>7 (9.2)</td>
<td>15 (16.3)</td>
</tr>
<tr>
<td>Relatives</td>
<td>22 (28.9)</td>
<td>11 (12.0)</td>
</tr>
<tr>
<td>Friends</td>
<td>17 (22.4)</td>
<td>20 (21.7)</td>
</tr>
<tr>
<td>Commercial banks</td>
<td>18 (23.7)</td>
<td>21 (22.8)</td>
</tr>
<tr>
<td>Financial institutions</td>
<td>12 (15.8)</td>
<td>25 (27.2)</td>
</tr>
<tr>
<td>Total</td>
<td>76 (100)</td>
<td>92 (100)</td>
</tr>
</tbody>
</table>

Source: Primary Data

From the above table, the researcher infers that most (24.5%) of the respondents are availed the financial assistances from the commercial banks; 20.4 percent of them got financial assistances from financial institutions; 20 per cent of them assisted by their friends; 18.8 per cent of them are got from their relatives and only 16.3 per cent of the SJMs are having the family support for the financial assistances during the business.

**Suggestions**

1. Most of them (34.7%) have taken the investment decision by their relatives
2. Most of them (40%) are spending fixed costs around up to 2 lakhs per annum.
3. Most of them (39.6%) are spending variable costs around 1 lakhs to 2 lakhs per annum.
4. Most (24.5%) of the respondents are availed the financial assistances from the commercial banks.
5. Most of them (39.6%) are held with their business about 10 to 20 lakhs of net asset worthiness.

**Conclusion**

From the above findings and suggestions the researcher has concluded as per the respondents’ opinion that the SJMs are affected at the financial performance of net asset and financial assistant time of purchasing the raw materials for the production of gold and silver ornaments. SJMs are exaggerated on cost of production of gold and silver ornaments. SJMs are embellished by competition on gold and silver ornaments sales. Changing fashion is a hectic problem and it will increase the cost of production and wastages. Traditional way
of grafting will create the replacement of the modern technology in to the old one but it is highly impossible once installed the machines and electrified technology in ornamentation of gold and silver will not revoke into the traditional. The labour oriented gold industry needs the appropriate training facilities. It can be rectified through conducting workshops for fresher’s and the new entrepreneurs. The unsatisfied working conditions have been existed much in the gold jewellery industry and it cannot be rectified by the small jewellery merchants. The financial problems have not stay alive in the small jewels merchants and the financial supports and commercial banks financial assistances are not satisfied. The pricing problems have been continued and it is inherent in nature of small jewellery merchants in Tamilnadu and the price fluctuations and variations are depended with the economy of the nation and the bargaining activities of the customer are everywhere in the competitive marketing environment.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


A Study on Changing Family Structure in Tamilnadu

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Abstract

The traditional values were losing importance and new thinking new values were adding in society. Men and women will be treating equal in modern era. The new health treatment and facilities were opened to serve village people’s health sector. All individuals were given equal opportunity in society. The village people’s way of life, structure of the family has been changed because of impact of liberalization privatization and globalization in our country. The family has also been influenced by the effects of Globalization. Though it is the fact that processes like-Industrialization and Modernization have influences the traditional structure of family in the early years, but the changes have been rapid in the recent years on the Indian rural society, which has also passed through Globalization and Information. The data for this paper is obtained from the Household questionnaire, which contains information, related to age, sex, marital status, education, occupation and relationship to the head of the household for all usual residents as well as for the visitors who slept last night in the house. The family has been and continues to be one of the most important elements in the fabric of Indian society. The bond that ties the individual to his family, the range of the influence and authority that the family exercises make the family in India not merely an institutional structure of our society, but accord give it a deep value. The Indian family is subjected to the effects of changes that have been taking place in the economic, political, social and cultural spheres of the society.

Keywords: Family Structure, Change in Culture, Impact of Society.

Introduction

The term family is derived from the Latin word ‘familia’ denoting a household establishment and refers to a “group of individuals living together during important phases of their lifetime and bound to each other by biological and/or social and psychological relationship”. The Indian society is “collectivistic” in that it promotes interdependence and co-operation, with the family forming the focal point of this social structure. In a situation where the mental health resource is a scarcity, families form a valuable support system, which could be helpful in management of various stressful situations. Ever since the growth of human civilization, change has remained a consistent part of every society though there have been variations in its state and directions. At different phases of growth the processes of change have affected the various aspects of society. The processes of social change like: Modernization, Westernization, Urbanization and Sanskritization have contributed a lot in changing the Society. In the decade of 90’s, the policy of Liberalization in the economic field, has resulted in frequent exchanges and a huge increase in the import-export between nations, and the development of various modes of communication has made the social exchanges between nations possible and easy.¹ These social contacts have been defined in the form of globalization have also influenced the different aspects of Indian society. The primary unit of society and also primary source of socialization is family. The family has also been influenced by the effects of Globalization. Though it is the fact that processes like-Industrialization and Modernization have influences the traditional structure of family in the early years, but the changes have been rapid in the recent years on the Indian rural society, which has also passed through Globalization and Information. The revolution along with other social changes. Globalization is a concept of the emergence of a society that is based on the global outlook. Globalization is outcome of various social and cultural interactions between the masses.²

Objectives of the Study:

1. To understand the change in family structure of the study area.
2. To study the differentials in family structure by different socio-economic characteristics of the head of the family at the state level.

**Sources of Data:** The data for this paper is obtained from National Family Health Survey. The primary objective of the survey is to provide national and state-level data on different demographic and socio-economic determinants in respect of family planning, maternal and child health indicators. The survey also collected the information at three levels-Village, Household and Individual levels. The data for this paper is obtained from the Household questionnaire, which contains information, related to age, sex, marital status, education, occupation and relationship to the head of the household for all usual residents as well as for the visitors who slept last night in the house. In addition, the household questionnaire also included information on housing conditions, such as the source of water supply, type of toilet facility, land owning, type of house and various consumer durable goods and characteristics of the head of the household such as religion, caste and place of residence. This paper the above mentioned particulars are analyzed only for the usual residents in the family.³

**Family Orientation:** The family is the basic unit of society. Families exist in all sizes and configurations and are essential to the health and survival of the individual members and to society as a whole. As the primary group for the individual, the family serves as a buffer between the needs of the individual and the demands and expectations of society. The family is a unity of interacting persons related by ties of marriage, birth or adoption, whose central purpose is to create and maintain a common culture which promotes the physical, mental, emotional and social development of each of its members.⁴

**Extended Family:** A Hindu Joint Family or Joint Family is an extended family arrangement prevalent among Hindus of the Indian subcontinent, consisting of many generations living under the same roof. The joint family status being the result of birth, possession of joint cord that knits the members of the family together is not property but the relationship. The family is headed by a patriarch, usually the oldest male called “Karta”, who makes decisions on economic and social matters on behalf of the entire family. The patriarch’s wife generally exerts control over the kitchen, child rearing and minor religious practices.⁵

**Results Discussion**

To know the distribution of family structure in India, following classifications are considered:

**Table 1. Nature And Size of Family in the Village Community**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Nature of Family</th>
<th>Size of Family</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nuclear</td>
<td>Small (01-07 Members)</td>
<td>73</td>
</tr>
<tr>
<td>2</td>
<td>Joint</td>
<td>Large (Above 7 Members)</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>


Table 1 shows that the above mentioned table deals with the about 73 percent families belong to small family’s below7 member’s that is nuclear family and 27 percent families belongs to large-size and come under the category of joint family systems. The tendency of respondents in regard to family authority and decision-making in the changing scenario is demonstrates in the table given below:

**Table 2. The Tendency in Regards to Family-Authority and Decision-Making in the Changing Scenario**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Nature of Decision</th>
<th>Only Husband</th>
<th>Only Wife</th>
<th>Husband</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education related decision of children</td>
<td>(27)</td>
<td>(11)</td>
<td>(62)</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Family expenditure related decisions</td>
<td>(26)</td>
<td>(17)</td>
<td>(57)</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Decision about Professional future of young members of the family</td>
<td>(33)</td>
<td>(09)</td>
<td>(58)</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Decision regarding agricultural–work</td>
<td>(31)</td>
<td>(14)</td>
<td>(55)</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Decision regarding marriage</td>
<td>(29)</td>
<td>(21)</td>
<td>(50)</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Decision regarding the arrival of Guests</td>
<td>(34)</td>
<td>(15)</td>
<td>(51)</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>Decision regarding property–buying/house building etc.</td>
<td>(36)</td>
<td>(14)</td>
<td>(50)</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 2 reveals that the tendency of in regards to family decision making education related decision of children. The 27 percent only husbands will be taking decisions, 11 percent only wives will be taking decisions and 62 percent husband and wife both will be taking decisions. The family expenditure related decisions 26 percent only husbands, 17 percent only wives and 57 percent both husband and wife will be taking decisions. The decision about professional future of young members of the family respondents. The 33 percent only husbands, 09 percent only wives and 58 percent both husband and wife’s are taking the decisions. The Decision regarding agricultural work 31 percent only husbands 14 percent only wives and 55 percent both husband and wife’s will be taking decisions. The Decision regarding marriage the 29 percent only husbands, 21 percent only wives and 55 percent both husbands wives will be taking decisions. The Decision regarding the arrival of Guests 34 percent husbands, 15 percent wives and 51 percent both husband and wives will be taking decisions. The Decision regarding property buying/ house building etc 36 percent only husbands, 14 percent only wives and 50 percent husband and wife both will be taking decisions.

Table 3. The Tendency in Regard to Decrease in the Mutual Relations among of Family

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Nature of Relations</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>More Intimate</td>
<td>21</td>
<td>07</td>
</tr>
<tr>
<td>2</td>
<td>Close</td>
<td>132</td>
<td>44</td>
</tr>
<tr>
<td>3</td>
<td>Formal</td>
<td>120</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>Sour Relations</td>
<td>27</td>
<td>09</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>


Table 4. The Tendency in Regards to Means of Treatment

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Various means and their use</th>
<th>No of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New means of treatment</td>
<td>177</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>Traditional means of treatment</td>
<td>123</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>


Table 3 and 4 shows that about 07 percent respondents have more intimate relations, 44 percent respondents have close relationships, 40 percent respondents have formal relations,09 respondents have sour relations. The Tendency in Regards to Means of Treatment above table reveals that 59 percent respondents agree to the practice of modern means of treatment. They have viewed that because of the process of change and modernization, new means of treatment have come in use and they have replaced traditional means of treatments. Most of the respondents who approve of these modern means are educated and have modern ideas while the other 41 percent respondents accept that they prefer and approve of the traditional means of treatment these respondents feel that the traditional means do not give any adverse effect on health. The respondents who have expressed these views are traditional, illiterate and also have conventional attitude.

Family: Family, a basic unit of social structure, the exact definition of which can vary greatly from time to time and from culture to culture. How a society defines family as a primary group, and the functions it asks families to perform, are by no means constant. There has been much recent discussion of the nuclear family, which consists only of parents and children, but the nuclear family is by no means universal. In the United States, the percentage of households consisting of a nuclear family declined from 45% in 1960 to 23.5% in 2000.19 In preindustrial societies, the ties of kinship bind the individual both to the family of orientation, into which one is born, and to the family of procreation, which one founds at marriage and which often includes one’s spouse’s relatives. The nuclear family also may be extended through the acquisition of more than one spouse, or through the common residence of two or more married couples and their children or of several generations connected in the male or female line. This is called the extended family; it is widespread in many parts of the world, by no means exclusively in pastoral and agricultural economies. The primary functions of the family are reproductive, economic, social, and educational; it is through kin itself variously defined that the child first absorbs the culture of his group.6

Problems of Changing Family: The family has been and continues to be one of the most important elements in the fabric of Indian society. The bond that ties the individual to his family, the range of the influence and authority that the family exercises make the family in India not merely an institutional structure of our society, but accord give it a deep value. The family has indeed contributed to the stability to Indian society and culture today, the Indian family is subjected to the effects of
changes that have been taking place in the economic, political, social and cultural spheres of the society. In the economic sphere, the patterns of production, distribution and consumption have changed greatly. The process of industrialisation and the consequent urbanisation and commercialisation have had drastic impacts on the family. Migration to urban areas, growth of slums, change from caste oriented and hereditary occupations to new patterns of employment offered by a technological revolution, the cut-throat competition for economic survival and many other economic changes have left their impact on the family.7

Social Processes Affecting Family Structure: A host of inter-related factors, viz., economic, educational, legal and demographic like population growth, migration and urbanization, etc., have been affecting the structure of the family in India. We shall take care of these factors while discussing the changes, in the following sections. Here, let us discuss the broad processes of industrialization, urbanization and modernization as factors affecting the family structure. The changing structure of the family due to industrialization, it is not yet possible to establish any one-to-one relationship. Various accounts demonstrate how both nuclear and joint structures have evolved innumerable varieties due to the influence of urbanization.8

Conclusion

The present paper concludes that there have been many changes found in the village community and this has been because of the impact of globalization. But this change mainly happens in the form of limited changes that have been occurred in their family structure. This change is related mainly to the both aspects of family structure but the functional aspect of change has been demonstrated in a limited way. This community has it neither altogether given up its traditional practices nor has it totally accepted modernization in regard to family structure. The social functioning is operational in between the background of globalization and family values. Due to the continuous and growing impact of urbanization and westernization, nuclear family has now become the characteristic feature of the Indian society.9 The phenomenon of male-headed households has now been transforming into female-headed ones. Another noticeable change in the Indian family system is dissolution of marriages and the number of divorce cases is slowly mounting day by day.

Ethical Clearance: Completed
Source of Funding: Self
Conflict of Interest: Nil

References
Meat Merchandising in Single Look Produce the Chance of Foodborne Illness: Shoppers Alert!

R. Bhuvaneswari¹, S. Senith², A. Alfred Kirubaraj², S.R. Jino Ramson³

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Abstract

Purpose: The aim of the study is to produce information of food safety relates to meat consumption to guage the knowledge and angle of shoppers to make the notice publically to avoid the chance of foodborne ill health. Here the investigation belongs to however the shoppers square measure influenced by getting at totally different levels of meat below the chance perception.

Design/methodology/approach-Structural equation modeling (SEM) was engineered to grasp the chance perception of urban and rural shoppers in Coimbatore, Erode and Nilgris by scale back with the perceived risk of their probability of goat meat, chicken, fish, beef and pork.

Findings–The intentions of shoppers in these 3 districts is to facilitate with the acquisition behavior, attitude, knowledge, food safety awareness square measure involved with the microbiological risk of food contamination.

Social implications-The retail search oversubscribed their meat and poultry in single buy their convenience of shopper to avoid wasting time period and cash by mistreatment constant knife and board. It’ll produce the microbiological risk and facilitate to grasp the food handling behavior conjointly to guage the effectiveness of food safety to avoid the chance.

Practical implication-The merchant and shopper prefers these quite consumption for saving the time and cash to urge all meat in one place however they’re not knowing the chance of pathogens they use same knife and cutting all meat and poultry this produce the chance of food borne sickness and also the snacks search, tea shop, fruit stall square measure closely around the meat search and also the meat search marketing in Associate in Nursing open show there’s a necessity of closed glass box that stop mud, and bug will unfold the sickness.

Research implications–The result offer with the data of food safety steerage from producer to shopper to avoid the chance of foodborne ill health and create safe consumption to the buyer with clean and clear setting.

Originality worth–The risks are unknown by the retailers and shoppers it provides the data of meat consumption that relates to food safety with detail understanding of risk perception.

Keywords: Food safety, shopper risk, Hazards, interference of cross-contamination, correct cleanup and sanitizing, shopper education.

Introduction

The preference and selection square measure take issue from person to person one provide preference for style, the opposite one like for texture and somebody like for nutrition diet likewise each person’s shopping for thoughts and angle and emotions square measure totally different it’s necessary to grasp the data and angle of the buyer, it’ll facilitate North American country to avoid the perception of risk relates to meat consumption the essential of food safety square measure involved with the perception of risk in 3 varieties like microbiological
risk, physical risk and chemical risk here the scientist concentrates with the challenges of microbiological risk (Ruth yeung, 2010). Risk might cause at any time the causes of contamination might happen at stage from producer to shopper it’ll happen throughout the assembly stage (or) throughout the process stage square measure within the stage if transformation of product from one place to a different place the HACCP hazard analysis important management purpose explains the hygiene attempt to avoid the chance of food contamination (E. Hoornstra, 2001). General dimension of risk square measure mentioned in four ways that the primary one is risk perception the other is communication of risk third one is lay handling risk and also the fourth one is trust in establishments and specialists. because of the rise of increase the necessity and need demand of product conjointly increase with risk these days the worldwide trade modified the ingestion habits of shoppers with their promoting food stuff IOM (institute of medicine) known the chance into six teams with the emergence of influencing parasitic zoonoses they’re “changes in demographic, changes in technology and business, the increasing international travel and commerce, environmental changes and land use” (Broglia A, 2011).

This study examine the food safety relates to meat consumption with perception of hazards by creating choices of buying time with the priority to create interference of cross contamination with clean condition of healthful setting and insight with the highlight to boost the data of shopper education in future.

**Research Methodology**

**Measurements:** The form was created to access the food handling behavior of the shopper’s angle, data the perception of shopper risk in meat and poultry retail search the form were tested with pilot study and also the correction square measure done and SEM Model won’t to reduce the chance of foodborne sickness. Structural equation modeling may be a applied math technique that mixes parts of ancient variable models, like multivariate analysis, correlational analysis and synchronous equation modeling. The Structural equation modeling approach is usually conjointly referred to as caused modeling as a result of competitive models may be assumed regarding the info and tested against one another several applications of Structural equation modeling may be found within the social sciences, wherever mensuration error and unsure casual conditions square measure ordinarily encountered.

**Data assortment and analysis:** The scientist collect information within the 3 districts kind Tamil Nadu from Bharat specifically Coimbatore, Erode and Nilgiris from 1105 respondents these space the retailers oversubscribed their meat mix for the convenience of shopper for saving their cash and time however the chance is unknown by the retailers. The model explains with food handling behavior to avoid the chance of foodborne sickness.

**Results**

**Table:1 Milton Friedman Test-Influencing Factors regarding Perception of Risk associated with shopping for Chicken, Mutton Meat, Fish, Beef and Pork.**

<table>
<thead>
<tr>
<th>Particulars of Factors</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Rank</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks related to Foodborne Illness</td>
<td>2.40</td>
<td>1.29</td>
<td>2.11</td>
<td>0.629</td>
</tr>
<tr>
<td>Risk related to Bird Flu</td>
<td>3.18</td>
<td>1.43</td>
<td>2.98</td>
<td></td>
</tr>
<tr>
<td>Risk related to Hormone Growth</td>
<td>3.91</td>
<td>1.14</td>
<td>3.94</td>
<td></td>
</tr>
<tr>
<td>Risk related to Cholesterol</td>
<td>4.24</td>
<td>0.80</td>
<td>4.32</td>
<td></td>
</tr>
<tr>
<td>Risk related to Obesity</td>
<td>4.19</td>
<td>0.86</td>
<td>4.26</td>
<td></td>
</tr>
<tr>
<td>Risk related to Food Allergy</td>
<td>3.59</td>
<td>1.01</td>
<td>3.39</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary Data

**Interpretation:** Table:1. It may be noted from the on top of table that among the seven factors “Risk associated with cholesterol” was hierarchic 1st. it’s followed by the “Risk associated with obesity” was hierarchic second. “Risk associated with internal secretion growth” was hierarchic third.

**Model Testing:** To test the abstract model, we have a tendency to use the structural equation modeling (SEM) technique mistreatment AMOS version 20:00
Figure 1: Pair of Structural Equation Model on shopper exploitation in organized merchandising and its remedial measures

<table>
<thead>
<tr>
<th>Variables</th>
<th>Un standardized Co-efficient</th>
<th>S.E.</th>
<th>Standardized Co-efficient</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer food handling behavior</td>
<td>Knowledge of the consumer relates to food safety</td>
<td>0.193</td>
<td>0.021</td>
<td>0.205</td>
<td>9.029</td>
</tr>
<tr>
<td>Consumer food handling behavior</td>
<td>Perception of risk relates to buying chicken, mutton, fish, beef, and pork</td>
<td>0.15</td>
<td>0.016</td>
<td>0.165</td>
<td>9.475</td>
</tr>
<tr>
<td>Consumer food handling behavior</td>
<td>General nutrition knowledge of consumption</td>
<td>0.045</td>
<td>0.022</td>
<td>0.037</td>
<td>2.042</td>
</tr>
<tr>
<td>Consumer food handling behavior</td>
<td>Consumer awareness of food safety</td>
<td>0.041</td>
<td>0.017</td>
<td>0.048</td>
<td>2.361</td>
</tr>
<tr>
<td>Consumer food handling behavior</td>
<td>Awareness on Standards and regulation of food safety</td>
<td>0.086</td>
<td>0.025</td>
<td>0.054</td>
<td>3.401</td>
</tr>
<tr>
<td>Consumer food handling behavior</td>
<td>Awareness on Food contamination</td>
<td>0.14</td>
<td>0.016</td>
<td>0.143</td>
<td>8.819</td>
</tr>
<tr>
<td>Attitude influence the consumer to purchase Chicken, Mutton, Fish, Beef and Pork</td>
<td>Consumer food handling behavior</td>
<td>1.813</td>
<td>0.152</td>
<td>1.451</td>
<td>11.922</td>
</tr>
</tbody>
</table>
Here the co-efficient of information of the buyer relates to food safety is zero. 193 represents the partial result of information of the buyer relates to food safety on shopper food handling behavior holding alternative factors ‘Perception of risk relates to purchasing chicken, lamp meat, fish, beef, and pork, General nutrition data of consumption, shopper awareness of food safety, Awareness on Standards and regulation of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.193 for each unit increase in data of the buyer relates to food safety and this co-efficient worth is critical at Chronicles level.

The co-efficient of Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork is zero.15 represents the partial result of Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork on shopper food handling behavior holding alternative factors ‘Knowledge of the buyer relates to food safety, General nutrition data of consumption, shopper awareness of food safety, Awareness on Standards and regulation of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.15 for each unit increase in Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork and this co-efficient worth is critical at I Chronicles level.

The co-efficient of General nutrition data of consumption is zero.045 represents the partial result of General nutrition data of consumption on shopper food handling behavior holding alternative factors ‘Knowledge of the buyer relates to food safety, Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork, shopper awareness of food safety, Awareness on Standards and regulation of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.045 for each unit increase in General nutrition data of consumption and this constant worth is square measure important at five-hitter level.

The co-efficient of shopper awareness of food safety is zero.041 represents the partial result of shopper awareness of food safety of shopper food handling behavior holding alternative factors ‘Knowledge of the buyer relates to food safety, Perception of risk relates to purchasing chicken, lamp meat, fish, beef, and pork, General nutrition data of consumption, Awareness on Standards and regulation of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.041 for each unit increase in shopper awareness of food safety and this co-efficient worth is critical at the five hundred levels.

The constant of Awareness on Standards and regulation of food safety is zero. 086 represents the partial result of Awareness on Standards and regulation of food safety in shopper food handling behavior holding alternative factors ‘Knowledge of the buyer relates to food safety, Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork, General nutrition data of consumption, shopper awareness of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.086 for each unit increase in Awareness on Standards and regulation of food safety and this constant worth is critical at the half of level.

The co-efficient of Awareness of Food contamination in zero.14 represents the partial result of Awareness of Food contamination on shopper food handling behavior holding alternative factors ‘Knowledge of the buyer relates to food safety, Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork, General nutrition data of consumption, shopper awareness of food safety, Awareness on Standards and regulation of food safety’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by zero.14 for each unit increase in Awareness of Food contamination and this co-efficient worth is critical at the half of level.

more the co-efficient of shopper food handling behavior is one.813 represents the partial result of shopper food handling behavior on angle influence the buyer to buy Chicken, lam meat, Fish, Beef and Pork is holding alternative factors 'Knowledge of the buyer relates to food safety, Perception of risk relates to purchasing chicken, mutton, fish, beef, and pork, General nutrition data of consumption, shopper awareness of food safety, Awareness on Standards and regulation of food safety, Awareness on Food contamination’ as constant. The calculable positive sign implies that such result is positive that shopper food handling behavior would increase by one.813 for each unit increase in shopper
food handling behavior and this constant worth is critical at the half of level.

**Table No. 3: Model fit summary**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN</td>
<td>9.316</td>
</tr>
<tr>
<td>P value</td>
<td>0.097</td>
</tr>
<tr>
<td>GFI</td>
<td>0.939</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.921</td>
</tr>
<tr>
<td>CFI</td>
<td>0.973</td>
</tr>
<tr>
<td>RMR</td>
<td>0.069</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.043</td>
</tr>
</tbody>
</table>

From the on top of model work outline table it’s found that the calculated p worth is zero.062 that is larger than zero. 05 that indicates absolutely work. Here GFI (goodness of work index) worth and AGFI (Adjusted goodness of work index) worth is larger than zero.9 that represents it’s a decent work. The calculated CFI (Comparative work index) worth is zero.937 which it’s found that RMR (Root mean sq. residuals) is zero.064 and RMSEA (Root mean sq. error of approximation) worth is zero.055 that is a smaller amount than zero.10 that indicated it’s absolutely work.

**Discussion and Conclusion**

The study is vital to grasp the quantity and speed of trade increase the chance of foodborne ill health, it conjointly will increase the world level downside within the facet of the buyer to guard their health and conjointly make sure they want of trade follow in global level resolution. within the facet of Scio-demographic info supported the interviews across with the 3 elite districts of Tamil Nadu is chosen in their aspects of angle, behavior, data and with their food handling behavior with their perception of food risk within the meat and poultry with fourteen dimensions. these days it’s terribly essential to grasp the data, angle with the demographic info regarding food safety relates meat and poultry consumption the folks from this space should take into account realizing the chance of combined marketing of meat and poultry in one place it’s necessary to contemplate the hazards that happened within the contamination of microorganism, viruses and parasite because of the poor food handling behavior {of retailers of searches|of outlets} in meat and poultry shop.

The place of distribution for food ought to be clean and clear it’ll shield the market setting for safe consumption to the shoppers it’ll helps to avoid the chance of food borne ill health and conjointly it becomes the responsibilities of every and each individual it makes a secure consumption with smart quality of product to {the customers the purchasers these archers} within the retail shop of meat and poultry the employees ought to recognize the foundations and regulation and policy and procedures thus there’s a necessity of coaching to coach them regarding the hygiene and expanse of operating place clean and clear.

“To any work there’s a necessity for safety, particularly within the food business hygiene and safety is important to guard the buyer for safe consumption” Food is an important part of our life for all to measure thus producer ought to take into account it to offer the merchandise safe with quality.

**Direction for future analysis implications:** The angle and data of meat consumption relates to food safety target 5 things meat, chicken, fish, beef and pork these food things purchased for the daily use of shoppers. It might be preferred for the separate study of pork and meat. Pork includes poultry and food. Meat includes goat, pork, and beef. Current study centered on (raw) recent meat solely more study advocate in processed Meat. As a result of the state of Tamil Nadu folks get solely recent meat. The study concentrates on the microbiological risk of food safety future analysis might consider physical risk, chemical risk, technology risk and mode of the folks.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Approved by SRC Committee.

**References**

A Study to Find Barriers for Physical Activity among Chronic Kidney Disease Patients

Anupama Das¹, S. Sridevi², N. Venkatesh³, T. Senthil Kumar⁴

¹Postgraduate, ²Assistant Professor, ³Course Chairman & Professor, ⁴Assistant Professor, Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research (Deemed to be University)

Abstract

Introduction: Physical inactivity has various harmful effects but in case of chronic diseases patients perceive various barriers for physical activity. This study aims to find such barriers in Chronic Kidney Disease patients.

Methodology: This is an observational study conducted in dialysis unit of a tertiary care hospital with 104 both female & male patients of age group 40–60 years undergoing hemodialysis (HD) at least for past 6 months. Patients with recent MI, stroke & with physical impairment were excluded. Consented patients participated. Human Activity Profile Questionnaire (HAP) was used to assess the patient’s physical activity level and patient related perceived barriers for physical activity.

Result: Among 104 patients, male-female ratio was 62:42, mean age was 54.56 years, mean dialysis vintage was 27.85 months (range 6-120 months). Hypertension (91.3%), Diabetes (53.8%) were most frequent chronic co-morbidities. According to MAS and AAS of HAP, 55.8%, 43.3%, 1% patients were impaired, moderately active & active.

The most frequently reported barriers were fatigue or tiredness (54.8%), shortness of breath (51.9%) (p 0.03), fear of getting hurt (22.1%), body pain (21.2%). Other reported barriers are joint pain, family protection, lower limb swelling, foot ulcer, chest pain, less self confidence, anxiety, overstressed, depression. Shortness of breath is the most influential barrier and statistically significant (p0.04).

Conclusion: There were a number of patient related perceived barriers for physical activity were identified and among that fatigue & SOB were found to be influential factors.

Keywords: Chronic Kidney Disease, End Stage Renal Disease, Physical Activity, Barriers, Fatigue, Shortness of breath, Hemodialysis.

Introduction

Worldwide Chronic Kidney Disease (CKD) has become a serious health issue and has drawn much attention due to its increasing prevalence. End Stage Renal Disease (ESRD) is one of the chronic diseases resulting a high level of disability in different domains of the patients’ lives regardless of age. A cross-sectional cohort study has stated that prevalence of CKD is 17.2% in India & as per stages 1, 2, 3, 4 and 5 was 7%, 4.3%, 4.3%, 0.8% and 0.8%, respectively.¹ Hypertension, anemia, diabetes were seems to be the most common risk factors associated with CKD.¹ The most common cause for kidney disease is diabetic nephropathy. Nearly 48% cases presented in Stage V; they were younger than those in Stages III-IV. Patients belongs from lower income groups had more advanced CKD at presentation.²

Patients with advanced CKD and ESRD experience profound greater fatigue, increased risk of Cardio

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Vascular Disease (CVD), muscle weakness, wasting of muscle, depressive symptoms, restless leg syndrome, excessive daytime sleepiness, and decrease physical and sexual functioning.\(^3\)

Physical inactivity is a strong predictor of mortality in patients with end-stage renal disease. The younger patient who are undergoing hemodialysis, physical activity level was within the 50th percentile for healthy individuals >70 years of age, where female are lesser active than male.\(^4\) The dialysis patients has impaired exercise capacity, but 90 minutes of sub-maximal exercise twice a week for 12 months, may improve physical function, aerobic capacity and quality of life. As the important aspect of the care of selected dialysis patients mild & regular physical activity should be recommended and encouraged.\(^5\)

Few data are currently available for factors contributing inactive on CKD patients in Western population. It is likely that Co-morbid conditions (CVD; hypertension, respiratory disease; diabetes mellitus; musculoskeletal and mental health illnesses) and symptom burden (fatigue, pain in joints and back, shortness of breath, lack of motivation).\(^6\) Other associated factors were expressed as injury concerns and aggravation of the physical condition through exercise perception, too many medical problems, sadness, lack of time on dialysis days.\(^7\) Other barriers were lack of time, lack of company, lack of money, fear of injury, disliking exercise, feel too old & having an injury/disease, but only the disliking exercise is statistically significant.\(^8\)

The purpose of the study is to carefully identify patient’s perceived barriers to physical activity among HD population according to their physical activity level and find out more influential barrier for physical activity in Indian population as there is dearth of knowledge in this area.

### Materials and Method

This is an observational study which was conducted in dialysis unit of tertiary care hospital. The sample size were estimated from the previous study where Expected proposal: 48%, Relative precision: 20%, Confident level: 95%, Sample size: 104. After obtaining the study approval by The Institutional Ethics Committee of Sri Ramachandra Medical College and Research Institute (REF: CSP/17/AUG/60/244), the subject has been recruited. To meet the criteria, both male & female patients were included within the age group of 40–60 years who were undergoing hemodialysis at least for past 6 months. Patients with recent MI, stroke & with physical impairment were excluded. After screening and consented the patient’s physical activity level was assessed by using Human Activity Profile Questionnaire (HAP) and is administered during hemodialysis session and then the patient related perceived barriers for physical activity was enquired through a mixed type interview session.

The physical activity level is assessed by using Human Activity Profile Questionnaire (HAP).

**Statistical Analysis and Results:** In this study data were collected from 104 Chronic Kidney Disease patients who are undergoing hemodialysis. The collected data were tabulated and analyzed with SPSS version 23.00, the variables such as Age, Gender, Stage of CKD, Duration of Dialysis, No of Dialysis in a Week, Co-morbidities (Hypertension, Diabetes, Coronary artery disease), Maximal Activity Score, Adjusted Activity Score, Pre Dialysis Weight, Post Dialysis Weight, Intra Dialysis Weight Loss, Inter Dialysis Weight Gain were calculated and their mean and standard deviation were computed. The physical activity level was segregated according to the AAS (< 53 sedentary, 53-74 moderately active, >74 active). The association between physical activity level with age, gender and each perceived barriers chi-square test has done. Six commoner barriers like fatigue or tiredness, shortness of breath, pain, disturbed sleep, fear of get hurt, family over protection have been taken for the further analysis for identifying the most influential barrier to the physical activity by logistical regression analysis was done.

### Table 1: Demographic Analysis Sample Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>MEAN (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>54.56 (5.560)</td>
</tr>
<tr>
<td>DURATION OF DIALYSIS</td>
<td>27.85 (21.643)</td>
</tr>
<tr>
<td>MAS</td>
<td>54.83 (11.501)</td>
</tr>
<tr>
<td>AAS</td>
<td>49.09 (15.762)</td>
</tr>
<tr>
<td>PRE HD WEIGHT</td>
<td>63.21 (10.337)</td>
</tr>
<tr>
<td>POST HD WEIGHT</td>
<td>60.89 (10.118)</td>
</tr>
<tr>
<td>INTRA HD WEIGHT LOSS</td>
<td>2.36 (0.934)</td>
</tr>
<tr>
<td>INTER HD WEIGHT GAIN</td>
<td>2.78 (1.513)</td>
</tr>
</tbody>
</table>
Among 104 CKD patients in this study 91% are having hypertension, 54% are reported as diabetic, 3% are having hypothyroidism & coronary artery disease and only 2% are reported as anemic. In this study Physical Activity Level distribution shows that as per AAS value of HAP most of the CKD patients are impaired 56%, 43% were moderately active & only 1% was active. There is an inverse relationship between age & physical activity level and is statistically significant (p=0.06) There is no statistical difference in Physical activity level among Gender.(Table:2). The barriers frequency distribution showing that 30 (29.1%) patients having 3 barriers, where 11 (10.7%) patients reported as no barriers & only 1 (1%) patients stated that having highest 8 barriers in this study population. Barriers of physical activity distribution shows fatigue/tiredness and shortness of breath were the commonest barriers among CKD patients. The Other reported barriers are lower limb pain/discomfort, back pain, family over protection, lower limb swelling or pedal edema, foot ulcer, weakness, knee pain, shoulder pain, chest pain, less self confidence, giddiness, unable to do activity or feeling too old to do activity, anxiety, not willing or avoid to do any activity, chest discomfort, numbness, overstressed, depression, balance disturbance, sole pain. The commonest barriers are fatigue/tiredness (54.8%), shortness of breath (51.9%) & disturbed sleeping (38.7%). Though most of the impaired physical activity leveled patients reported fatigue & shortness of breath as their commonest barrier, but only shortness of breath & lower limb pain were statistically significant barriers for the physical activity.(Table:3) Beta value of SOB is highest (0.861), means it is the most influential barrier & statistically significant (p=0.04**) (Table: 4).

<table>
<thead>
<tr>
<th>Table 2: Association between Age, Gender &amp; Physical Activity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>Age &amp; Physical Activity Level</td>
</tr>
<tr>
<td>Gender &amp; Physical Activity Level</td>
</tr>
</tbody>
</table>

* p < 0.05 significant

Figure 1: Frequency of Barriers
Figure 2: Barriers

Table 3: Association between Patients Perceived Barriers And Physical Activity Level

<table>
<thead>
<tr>
<th>Perceived Barrier</th>
<th>Chi square value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FATIGUE/TIREDNESS</td>
<td>2.747\textsuperscript{a}</td>
<td>0.25</td>
</tr>
<tr>
<td>SHORTNESS OF BREATH</td>
<td>6.925\textsuperscript{a}</td>
<td>0.03**</td>
</tr>
<tr>
<td>DISTURBED SLEEPING</td>
<td>2.120\textsuperscript{a}</td>
<td>0.35</td>
</tr>
<tr>
<td>FEAR OF GETTING HURT</td>
<td>1.248\textsuperscript{a}</td>
<td>0.54</td>
</tr>
<tr>
<td>BODY PAIN</td>
<td>0.307\textsuperscript{a}</td>
<td>0.86</td>
</tr>
<tr>
<td>LOWER LIMB PAIN</td>
<td>6.799\textsuperscript{a}</td>
<td>0.03**</td>
</tr>
</tbody>
</table>

**p < 0.05 significant

Table 4: Regression

<table>
<thead>
<tr>
<th>Constant</th>
<th>R\textsuperscript{2}</th>
<th>WALD</th>
<th>B</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FATIGUE</td>
<td>1.163</td>
<td>0.456</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>SOB</td>
<td>0.123</td>
<td>4.172</td>
<td>0.861</td>
<td>0.04**</td>
</tr>
<tr>
<td>PAIN</td>
<td>2.520</td>
<td>0.685</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>DISTURBED SLEEP</td>
<td>0.018</td>
<td>-0.060</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>FEAR OF GET HURT</td>
<td>0.159</td>
<td>0.208</td>
<td>0.69</td>
<td></td>
</tr>
</tbody>
</table>

**p < 0.05 significant
Discussion

Chronic kidney disease is a complex & progressive condition and now it is one among the major worldwide health crisis. As CKD is highly associated with HTN & DM, it could be termed as Diabetic Hypertension-Kidney Disease (DHKD) Syndrome. India, with the highest incidences of DM and HTN in the world, is likely to face a high CKD/ESRD burden, with more than 50% of its population at risk.

Among 104 patients, (62 patients, 59.6%) were male and (42 patient, 40.4%) were female, mean age was 54.56 years. Mean dialysis vintage was 27.85 (range 6-120 months); dialysis was done for most of the patients through an arterovenous fistula, twice weekly (3 patients, 2.9% once weekly; 77 patients, 74% twice weekly; 24 patients, 23.1% thrice weekly).

In present study Hypertension (91.3%), diabetes mellitus (53.8%) were the most frequent chronic co-morbidities. A study done by Pani et al, states Diabetes, hypertension, hyperuricemia were associated with a decline of GFR and associated with CKD which is similar to our study.

Several studies documented that dialysis patients are having very less physical activity level regardless of age. A study on Italian dialysis population which has presented more than half of the CKD patients had been defined totally inactive. In our present study according to Maximum activity score (MAS) and Adjusted activity score (AAS) of Human Activity profile (HAP), most of the CKD patients in this group were having impaired physical activity level as per as AAS values (impaired–58 patients, 55.8%; moderately active-45 patients, 43.3%; active-1 patient, 1%). Most of the patients are inactive which is similar to previous study.

In present study the association between age & physical activity level is statistically significant (p value 0.06**), which means if age increase the physical activity level will decrease which is similar to a earlier study which reported that Age and BMI were associated with physical activity at an inverse relation.

Out of 104 patients, 11(10.7%) patients have reported that there is no barriers for physical activity (5 patients are having impaired physical activity level), and only 1 patient has reported of having maximum 8 barriers .14(13.6%) patients had 1 barrier, 20(19.4%) patients had 2 barriers, 30 (29.1%) patients had 3 barriers,18(17.5%) patients had 4 barriers, 7(6.8%) patients had 5 barriers, 2 (1.9%) patients had 6 barriers.

The most frequently reported barriers stated in a previous study were fatigue in dialysis days (56.7%), perception of too many medical problems (54.8%), sadness (50%), lack of motivation (42.3%) and lack of time on dialysis days (32.7). In present study the most frequently reported barriers were fatigue or tiredness (54.8%) and shortness of breath (51.9%). Though fatigue was a commonest barrier for physical activity which is reported by all groups of physical activity leveled patients but it is not statistically significant. Whereas only shortness of breath (p 0.03**) and lower limb pain (p 0.03**) were statistically significant barriers for physical activity.

Our study result in Indian population was similar to other countries where most common seen barriers were fatigue on dialysis days, shortness of breath, lack of motivation and Co-morbidity and symptom burden (fatigue, joints and back pain and shortness of breath) were the most prevalent barriers. There are a number of factors that can cause clinically significant fatigue in CKD patients, including sleep disorders, depression, sedentary lifestyle, anemia, and chronic inflammation. Low physical activity subjects showed more number of barriers than moderately active patients.

Among 26 barriers only 6 commonest barriers like fatigue, shortness of breath, pain (included all various types of pain), disturbed sleep, fear of getting hurt, family over protection were selected for logistic regression analysis to find out the most influential barrier. The result revealed that beta score (B 0.861) of shortness of breath is highest & statistically significant (p 0.04 and thus concludes the shortness of breath as most influential barrier for physical activity for these patients.

In all the previous studies done, fatigue was the major barrier whereas in present study SOB was the most influential factor. Dyspnea is one of the most common symptoms related with CKD. It has an intense influence on the quality of life of CKD patients, and its underlying causes are often associated with a negative prognosis. Underlying physiological changes in cardiovascular and pulmonary system can lead to SOB and Early recognition may reduce mortality in CKD patients.

Early recognition of SOB to be addressed for improving physical activity level and QOL. There is need of proper education about disease condition & the...
importance of physical activity to the CKD patients as well as the family members & care givers.

Conflict of Interest: Nil

Funding: Self Funded

Ethical Clearance: Taken from Institutional Ethical Committee (REF: CSP/17/AUG/60/244).

References


Economic Development and Employment Creation in India

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Abstract

Employment has featured as an important item in the development agenda in India. Approaches to the subject have, however, varied in different periods during the last over 50 years. In the initial years of development planning, unemployment was not expected to emerge as a major problem. Yet care was taken to see that employment of a reasonable magnitude is generated in the development process to productively employ the growing labour force. A reasonably high rate of economic growth combined with an emphasis on labour intensive sectors like the small scale industry was envisaged to achieve this goal.

To analyze the trend and to estimate the growth rates of the employment in different organized sectors of India, simple linear regression model and semi-log linear regression model have been fitted respectively to the data on the organized sector for the periods 1990-91 to 2009-10. The estimated value of the regression co-efficient, their standard error and other important results are given. Employment in mining and quarrying sector increased by 0.072 lakh persons per year. The manufacturing sector’s employment increased by 0.389 lakh persons annually.

Keywords: Employment, Economic Development, Manufacturing Sector.

Introduction

Employment has featured as an important item in the development agenda in India. Approaches to the subject have, however, varied in different periods during the last over 50 years. In the initial years of development planning, unemployment was not expected to emerge as a major problem. Yet care was taken to see that employment of a reasonable magnitude is generated in the development process to productively employ the growing labour force.¹ A reasonably high rate of economic growth combined with an emphasis on labour intensive sectors like the small scale industry was envisaged to achieve this goal. The rate and structure of growth rather than technology were seen as the instruments of employment generation. If the Employment GDP is taken one of the indicators to measure the growth of employment in organized sector in general, employment in different organized sector GDP ratio may be taken as a measure to indicate the economic growth in the organized sector employment.²

Main Objectives of the Study:

1. To find out the growth of employment in different organized sectors of India during 1997-98 to 2016-17.
2. To investigate the relationship between the GDP and employment in different organized sectors of India.
3. To give some policy suggestions from the analysis of data.

Data and Methodology

To study the employment in different organized sectors and the contribution of economic growth, macro economic data on GDP, various sectors employments have been used. To analyze the present position of economic growth, time series data for a period of 20 years, from 1997-98 to 2016-17 have been used.

Employment in Different Organized Sectors of India: Employment in different organized sectors of India may be classified either on the basis of time period maturity or on the basis of the sectors in India. In this paper, an attempt is made to study the employment generation in different components of organized sector, during the period 1997-98 to 2016-17. For this purpose
the employment in organized sectors of India is classified into agriculture & hunting, mining and quarrying, manufacturing, Electricity, gas and water, construction, trade, Transport, storage and communications, Finance, Insurance Real estates and community, Social and personal Services. This type of classification is followed by the Reserve Bank of India, Economic survey and the data on employment in different organized sectors are available in this type of classification.3

Table 1: Employment in Different Organised Sectors of India (Lakhs in persons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture, Hunting etc.</th>
<th>Mining and quarrying</th>
<th>Manufacturing</th>
<th>Electricity Gas and Water</th>
<th>Construction</th>
<th>Trade</th>
<th>Transport, storage &amp; Communications</th>
<th>Finance, Insurance, Real estates</th>
<th>Community, Social &amp; personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-00</td>
<td>14.78</td>
<td>10.93</td>
<td>63.96</td>
<td>9.69</td>
<td>12.27</td>
<td>4.49</td>
<td>31.10</td>
<td>15.29</td>
<td>109.27</td>
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<tr>
<td>2000-01</td>
<td>14.28</td>
<td>11.16</td>
<td>64.14</td>
<td>9.78</td>
<td>12.18</td>
<td>4.63</td>
<td>31.40</td>
<td>15.55</td>
<td>110.63</td>
</tr>
<tr>
<td>2001-02</td>
<td>14.33</td>
<td>11.19</td>
<td>64.62</td>
<td>9.75</td>
<td>12.17</td>
<td>4.7</td>
<td>31.64</td>
<td>15.76</td>
<td>111.07</td>
</tr>
<tr>
<td>2002-03</td>
<td>14.59</td>
<td>11.00</td>
<td>67.87</td>
<td>9.88</td>
<td>12.12</td>
<td>4.79</td>
<td>31.52</td>
<td>15.86</td>
<td>111.78</td>
</tr>
<tr>
<td>2003-04</td>
<td>14.45</td>
<td>10.70</td>
<td>69.00</td>
<td>9.97</td>
<td>11.88</td>
<td>4.81</td>
<td>31.55</td>
<td>16.16</td>
<td>113.91</td>
</tr>
<tr>
<td>2006-07</td>
<td>14.18</td>
<td>10.05</td>
<td>66.16</td>
<td>9.87</td>
<td>11.49</td>
<td>4.93</td>
<td>31.17</td>
<td>16.54</td>
<td>114.98</td>
</tr>
<tr>
<td>2007-08</td>
<td>14.33</td>
<td>9.54</td>
<td>64.43</td>
<td>9.86</td>
<td>11.38</td>
<td>5.02</td>
<td>31.18</td>
<td>16.51</td>
<td>115.64</td>
</tr>
<tr>
<td>2009-10</td>
<td>14.01</td>
<td>9.13</td>
<td>60.04</td>
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<td>18.03</td>
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<td>56.78</td>
<td>9.21</td>
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<td>28.96</td>
<td>18.66</td>
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<td>2011-12</td>
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<td>56.19</td>
<td>9.09</td>
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<td>28.36</td>
<td>19.31</td>
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<tr>
<td>2012-13</td>
<td>14.97</td>
<td>12.41</td>
<td>56.41</td>
<td>8.89</td>
<td>9.49</td>
<td>5.69</td>
<td>27.62</td>
<td>20.42</td>
<td>110.54</td>
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<tr>
<td>2015-16</td>
<td>13.73</td>
<td>12.27</td>
<td>62.58</td>
<td>9.03</td>
<td>9.25</td>
<td>6.46</td>
<td>27.33</td>
<td>26.67</td>
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<tr>
<td>2016-17</td>
<td>14.01</td>
<td>12.64</td>
<td>62.50</td>
<td>8.99</td>
<td>9.50</td>
<td>6.77</td>
<td>26.95</td>
<td>29.65</td>
<td>111.91</td>
</tr>
</tbody>
</table>

Source: Economic survey of India, 2016-17.

Table 2: Estimation of Regression Co-efficient of Employment in Different Organized Sectors of India

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model</th>
<th>a</th>
<th>b</th>
<th>SEₜ</th>
<th>t</th>
<th>R²</th>
<th>R²⁺</th>
<th>Durbin Watson</th>
<th>CGR</th>
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<tbody>
<tr>
<td>Agriculture, Hunting etc.</td>
<td>Linear</td>
<td>14.529</td>
<td>-0.020</td>
<td>0.015</td>
<td>-1.33</td>
<td>0.34</td>
<td>0.32</td>
<td>1.515</td>
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<tr>
<td>Mining and Quarrying</td>
<td>Semi-log</td>
<td>2.676</td>
<td>0.023*</td>
<td>0.010</td>
<td>-1.33</td>
<td>0.36</td>
<td>0.35</td>
<td>1.526</td>
<td>1.61</td>
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<tr>
<td>Manufacturing</td>
<td>Linear</td>
<td>10.201</td>
<td>0.072</td>
<td>0.038</td>
<td>1.905</td>
<td>0.42</td>
<td>0.40</td>
<td>0.361</td>
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</tr>
<tr>
<td>Energy, Gas and Water</td>
<td>Semi-log</td>
<td>2.326</td>
<td>0.016*</td>
<td>0.014</td>
<td>1.710</td>
<td>0.43</td>
<td>0.41</td>
<td>0.372</td>
<td>1.61</td>
</tr>
<tr>
<td>Construction</td>
<td>Linear</td>
<td>67.033</td>
<td>0.389</td>
<td>0.128</td>
<td>-3.04</td>
<td>0.45</td>
<td>0.44</td>
<td>0.281</td>
<td>1.40</td>
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<tr>
<td>Trade</td>
<td>Semi-log</td>
<td>4.206</td>
<td>0.016*</td>
<td>0.012</td>
<td>-3.05</td>
<td>0.47</td>
<td>0.46</td>
<td>0.284</td>
<td>1.61</td>
</tr>
<tr>
<td>Transport, storage and communications</td>
<td>Linear</td>
<td>10.048</td>
<td>0.053*</td>
<td>0.013</td>
<td>-4.26</td>
<td>0.50</td>
<td>0.48</td>
<td>0.517</td>
<td>1.61</td>
</tr>
<tr>
<td>Finance, Insurance, Real Estates</td>
<td>Semi-log</td>
<td>2.309</td>
<td>0.014*</td>
<td>0.001</td>
<td>-4.29</td>
<td>0.51</td>
<td>0.47</td>
<td>0.558</td>
<td>1.61</td>
</tr>
<tr>
<td>Community, Social and Personal Service</td>
<td>Linear</td>
<td>13.022</td>
<td>0.200**</td>
<td>0.015</td>
<td>-13.03</td>
<td>0.90</td>
<td>0.89</td>
<td>0.405</td>
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<td>Transport, storage and communications</td>
<td>Semi-log</td>
<td>2.580</td>
<td>0.019*</td>
<td>0.001</td>
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<td>0.90</td>
<td>0.89</td>
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<tr>
<td>Finance, Insurance, Real Estates</td>
<td>Linear</td>
<td>11.970</td>
<td>0.620**</td>
<td>0.083</td>
<td>7.57</td>
<td>0.76</td>
<td>0.74</td>
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<td>0.82</td>
<td>0.81</td>
<td>0.202</td>
<td>1.11</td>
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</table>

Note. *-Significant at 1% per cent level, **-significant at 10% level
Trend Analysis of the Employment Organized Sectors of India: To analyze the trend and to estimate the growth rates of the employment in different organized sectors of India, simple linear regression model and semi-log linear regression model have been fitted respectively to the data on the organized sector for the periods 1997-98 to 2016-17. The estimated value of the regression co-efficient, their standard error and other important results are given in Table 2.

For the Period from 1997-98 to 2016-17: The regression co-efficient of the regression model for the period 1997-98 to 2016-17 revealed that employment in agriculture, employment in hunting sector employment decreased by -0.020 lakh persons per year. Employment in electricity, gas and water sector increased by 0.053 lakh persons annually and that of construction increased by 0.200 lakh persons per year, followed by employment in trade sector increased by 0.085 lakh of persons per year. Employment in transport storage and communications sector increased by 0.260 lakh persons, Finance, insurance, real estate’s sector employment increased by 0.620 lakh persons and community, social and personal service increased by 0.175 lakh persons per year.

The compound growth rates worked out from the regression co-efficient of the semi-log linear reveal that the growth rate of agriculture, hunting sector was 2.32 per cent, mining and quarrying, manufacturing and trade grew at the compound growth rate of 1.61 per cent. The Electricity, gas and water sector employment grew by 1.40 per cent. For the Transport, storage and communications sector the growth rate of employment was 0.90 per cent. The compound growth rate of employment in Finance, insurance and real estate’s sector was 3.14 per cent. The community, social and personal services sector employment has grown by 1.11 percent. In terms of growth rate, Finance, insurance and real estate’s sector employment were placed first, and agriculture, hunting sector employment was in the second place. The construction sector employment stood in the third place, followed by mining & quarrying, manufacturing and trade sectors in the fourth place. The electricity, gas and water sector employment come in the fifth place.

Contribution of Organized Sector Employment To The GDP: Employment in different organized sectors of India may contribute, on the basis of the sectors in India. For this reason the employment in organized sectors of India is classified into the following nine sectors. Agriculture & hunting, mining and quarrying, manufacturing, Electricity, gas and water, construction, trade, Transport, storage and communications, Finance, Insurance Real estates and community, Social and personal Services.

Table 3: Gross Domestic Product in Different Sectors of India (Rs. in crores)

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture, Hunting etc.,</th>
<th>Mining and quarrying</th>
<th>Manufacturing</th>
<th>Electricity Gas and Water</th>
<th>Construction</th>
<th>Trade</th>
<th>Transport, storage &amp; Communications</th>
<th>Finance, Insurance, Real estates</th>
<th>Community, Social &amp; personal services</th>
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<tbody>
<tr>
<td>1997-98</td>
<td>339893</td>
<td>29014</td>
<td>161979</td>
<td>23559</td>
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<td>68090</td>
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<td>149357</td>
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<td>333256</td>
<td>29988</td>
<td>158094</td>
<td>25843</td>
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<td>196133</td>
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<td>226458</td>
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<td>2006-07</td>
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<td>315240</td>
<td>211627</td>
<td>297250</td>
<td>318514</td>
</tr>
</tbody>
</table>
### Economic Growth and Employment in the Organized Sector:

In terms of Economic growth, the transport, storage and communications sector is 10.96 per cent, but the employment growth was 0.90 per cent only. The finance, insurance, real estate’s sector’s growth was 8.76 per cent, but the contribution of same sector in the growth of employment was 3.14 per cent. The growth in construction and trade sector was at the same level i.e., 8.65 per cent. But the employment growth level was 1.91 per cent and 1.61 per cent respectively. For the manufacturing sector growth was 7.03 per cent, the contribution of employment level was 1.61 per cent only. The community, social and personal service sector’s growth was 6.92 per cent, at same time the employment level was 1.11 per cent. The electricity, gas and water sector’s growth was 5.97 per cent; the share of employment growth was 1.40 per cent. The agriculture, hunting sector growth was 3.12 per cent; employment growth in this sector level is 2.62 per cent.

For the whole period, GDP growth rate, for different sectors in India ranges from 2 to 10 per cent level, but the employment growth rate of different organized sector ranges between 0.90 and 3 per cent only.¹

### Conclusion

The above results indicate that the aggregate employment in the organized sector has fallen in absolute terms since 1997. Organized employment had been falling since the early 1990s. There are reasons to believe that the pattern of economic growth under an open economic regime tends to be such that the responsiveness of employment growth to the growth in output declines. It is worth noting that the combination of high output growth and low employment growth is a feature that has characterized in India during the years when the economy underwent a change in the global policy. This new trend therefore suggests that greater employment generation is not a necessary result of more growth in organized sector—indeed, it could even be associated with falling employment in future as well. This is an extremely important fact that policy makers must take on board, if there is to be an even pretence of “more inclusive” economic growth in the country.²

### Ethical Clearance

Completed

### Source of Funding

Self

### Conflict of Interest

Nil

### References

Effectiveness of TMJ Mulligan Mobilization in Individuals with Trismus

Sameer Sudhir Karpe¹, Poonam Patil²

¹Intern, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India, ²Assistant Professor, Department of Cardio Pulmonary, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India

Abstract

Objectives: To find out the effect of mulligan mobilization in individuals with trismus.

Method: Ethical Clearance was obtained from institutional ethical committee. A total 30 subjects with trismus were selected and mulligan mobilization were given for 1 hour/day and 5 days/week. The preassessment of ROM was measured by vernier caliper and pain was measured on VAS and post interventional assessment was taken for the same after 10 days.

Result: This study showed significant improvement in the outcome variables concluding that it increases ROM and decreases PAIN. This was confirmed using statistical analysis by using paired t test for within group comparison. ROM Post training there was extremely significant improvement noted with individuals with trismus. p value =<0.0001, VAS post training there was extremely significant improvement noted with trismus p value= <0.0001

Conclusion: Hence Mulligan mobilization is effective in improving ROM and it is also effective in decreasing pain in TRISMUS condition.

Keywords: Trismus, physiotherapy, mulligan mobilization.

Introduction

- Temporomandibular joint is a synovial, condylar, modified ovoid, and hinge type joint with fibro cartilaginous surfaces rather than hyaline cartilage and an articular disc, this disc divides each joint into two categories.
- Gliding, translation or sliding movements occur in upper cavity of the temporomandibular joint, whereas rotation or hinge movement occur in lower cavity.¹⁰
- Trismus, whenever there is restriction of normal opening or inability to open the mouth fully, the term trismus is used.
- It is the condition in which muscle spasm or contracture prevents the opening of mouth.¹
- It is known to interfere with eating, speaking and maintaining proper oral hygiene. This interference, specifically with the individual’s ability to swallow properly, results in an increased risk of aspiration. The conditions may be distressing and painful for the individuals.
- Trismus also called lock jaw, is reduced opening of jaw is most common problem encountered by dental practitioner which has number of cause.²
- Trismus has number of causes, which may be simple and non-progressive or may be potentially life threatening.
- Cause of trismus includes infection, trauma, dental treatment, temporomandibular joint disorders, tumours, and oral care, drugs, radiotherapy and chemotherapy, ankylosis, prolonged dental treatment (eg root canal), tetanus, sub mucous fibrosis, myositis ossificans.³
- Mobilization is the treatment option used in treating the temporomandibular joint. Mulligan mobilization with movement (MWM) is the concurrent application of sustained accessory mobilization
applied by the therapist and an active physiological
movement to end range applied by the individuals(4)

Materials and Methodology

Study design: experimental study, sample size-30
subjects, study place-KIMS hospital, Karad, duration-10
days, sampling method-simple random sampling,
treatment duration: 1 hour per day.

Inclusion criteria: 1) Age group between 30-50
years 2) Both sex 3) Individuals with trismus 4) Subjects
willing to participate in the study on voluntary basis

Exclusion criteria: 1) Subjects with congenital
problems of tmj 2) Subjects with neoplastic disease.

Outcome Measures: 1) Vernier caliper
2) Measuring scale 3) Visual analog scale

Ethical clearance was obtained from the institutional
Ethical Committee, KIMSDU, Karad. 30 subjects were
assessed and diagnosed with trismus for eligibility
of the study. 30 trismus individuals were enrolled. 30
individuals were included in the study. Prior to the
treatment pre assessment was done which includes
range of motion assessment of temporomandibular
joint and visual analogue scale assessment for jaw pain
was done. After finding restricted range of motion of
TMJ patients were given Mulligan’s mobilization for
temporomandibular joint for 10 days 1 hour per day
and 5 times per week. Range of motion was measured
after every session and noted in data collection sheet.
Then after 10 days of session range of motion and VAS
compared with the pre-treatment range.

During the study in 2 individuals dropped out due
to migration ,1 individual due to irregular follow up and
1 because of some other personal reason. Totally 30
individuals were taken for analysis in the study.

Treatment protocol was as follows: Before
treatment, visual analogue scale and range of motion of
TMJ was assessed. 4 glides of Mulligan’s mobilization
for temporomandibular joint were given which are as
follows:
1. Anterior glide
2. Posterior glide
3. Medial glide
4. Lateral glide

Dosage was 6 repetitions and 3 sets of each glide.

After treatment session range of motion and VAS
were reassessed.

Self-mobilization was taught to the patient and
asked to perform at home once in a day.

Data Analysis:

1. Gender Distribution

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Gender</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Males</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>females</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Interpretation: This table shows that out of 30
subjects, there were 11 females and 19 males in this
study.

2. Age Distribution

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>36-40</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>41-45</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>46-50</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>11</td>
<td>30</td>
</tr>
</tbody>
</table>

Interpretation: This table shows that the age
distribution in this study included is more in the age
group of 41–45 yrs.

Rom Graph:

Figure 1: Interpretation-In this graph post
treatment shows increase in range of motion
Result and Statistical Analysis

Data of all outcome measures were measured as pre training and post training values: Arithmetic mean and standard deviation was calculated for each outcome measure. Arithmetic mean was derived from adding all the values together and dividing the total number of values. Standard deviation (SD) was calculated according to the following formula. Post training there was extremely significant improvement in ROM noted according to the p values <0.0001, and in post training there was extremely significant improvement in Visual analogue scale was noted according to the p values <0.0001.

Discussion

Trismus also called locked jaw, is reduced opening of jaw is most common problem encountered by dental practitioner which has number of causes. It is known to interfere with eating, speaking and maintaining proper oral hygiene. This interference, specifically with the individual’s ability to swallow properly, results in an increased risk of aspiration. The condition may be distressing painful for the individuals. The objectives of the study were to find the effect of mulligan mobilization in individuals with trismus. The study was conducted in 30 subjects. Both males and females were taken in the groups. Prior consent was taken from them. The interventions were carried out for 10 days. The outcome measures of the study were VAS and ROM. ROM was measured by verniere'scaliper.

The subjects receive MULLIGAN mobilization in individuals with trismus, four glides were given to each individual. The study showed significant improvement in outcome variables concluding that it increases ROM and decreases pain.

This was confirmed using statistical analysis by using Paired t test for within group comparison.

1. Range of Motion: Post training there was extremely significant improvement noted with individuals with trismus. p value = <0.0001

2. Visual Analogue Scale: Post training there was extremely significant improvement noted with individuals with trismus. p value=<0.0001

This suggests that Mulligans mobilization is effective in individuals with trismus individuals and for rehabilitation the interventions should be continued for 10 days.

Conclusion

On the basis of the results of our study, it was concluded that Mulligans mobilization was significantly effective in improving range of motion and decreasing pain more than conventional physiotherapy.
Conflict of Interests: The authors declare that there is no conflict of interest concerning the content of the present study.

Source of Funding: Self

References
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4. DR. Deepak Kumar, Brian R. Mulligan; Manual of mulligan concept; Capri Institute of Manual Therapy; first edition; 2014;
Efficacy of Occlusal Splints in Managing Temporomandibular Disorders

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Abstract

Objective: To compare the efficiency of Occlusal Splints, with placebo treatment with Stabilization splints (SS) or no treatment, for reduction in pain, in adults with TMD.

Method: This systematic review was conducted following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement and the patient, intervention, comparison, outcomes (PICO). It was limited to randomized controlled trials (RCTs) with randomization at individual level. Included studies were those with participants who were adults >18 years. The intervention group consisted of subjects using stabilization splints or, a modified stabilization splint or, a combination of splint. The control group may be using the non-stabilization splints or placebos. We performed an evaluation of the heterogeneity of the data using Cochran’s Q statistic, a chi-square test, with a threshold p-value of less than 0.10 (Huedo-Medina et al. 2006 Jun 1). The consistency of the results was assessed visually using forest plots and by the I² statistic. The I² statistic describes the proportion of variation in point estimates attributable to heterogeneity as compared to sampling error.

Results: The 23 RCTs comprised of 1,512 patients. Overall in 5 pooled studies involving 381 adults participants in control group were more likely to experience a reduction in TMD signs and symptoms compared to those using stabilization splints [SMD 16.16, 95% CI (16.08 to 16.23)], but there was heterogeneity among studies (100%). The results did not favor stabilization splints when compared to control group.

Conclusion: All trials individually reported positive results on reducing TMD signs and symptoms for both stabilisation splints and control groups, with stabilisation splint being more effective. But there was no significant difference in the meta-analysis of pooled estimates.

Keywords: Temporomandibular Disorders, Pain, Splints.

Introduction

Temporomandibular disorders are a collective term embracing several clinical problems that involve the masticatory musculature, Temporomandibular joint (TMJ) and associated structures, or both1. Dentists are the primary healthcare specialists in managing temporomandibular disorders2. The most of common conservative management of TMD is with occlusal splints3 stabilization appliances being the most commonly used4.

There are conflicts of reports regarding the efficacy of stabilization splints (SS) over other splints. Studies which compared the efficacy of stabilization splints over soft splints showed that SS did not yield a better clinical outcome than the latter5, 6. There exist inconsistencies about choosing a splint for a TMD disorder, fabrication
Objective: To compare the efficiency of Occlusal Splints, or a combination of occlusal splints with any other treatment modality, or placebo treatment with Stabilization splints (SS) or no treatment, for reduction in pain, in people diagnosed with TMD.

Materials and Method

This systematic review was conducted following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement and the patient, intervention, comparison, outcomes (PICO) method as applicable in relation to the topic of the review.

Patient: Adults > 18 years

Intervention: Stabilization splints (SS)

Comparison: placebo or no treatment or a modified stabilization splint or a combination of splint with adjunct therapy or other occlusal splints

Outcomes: Reduction in Pain

Information sources and search: The electronic search was performed with the databases MEDLINE Ovid, EMBASE Ovid, WHO clinical trial register, ClinicalTrials.gov and Cochrane Library, with a platform-specific search strategy consisting of combinations of controlled terms (MeSH) and text words. This systematic review was limited to randomized controlled trials (RCTs) where randomization occurred at the level of the individual. Quasi-randomized trials were excluded.

Data Collection Process: Two authors (SK and PT) independently eliminated any duplicate from the gathered results and examined the remaining articles by title and abstract. Subsequently, the full texts were obtained and analysed for further inclusion/exclusion. Studies that did not meet the inclusion criteria were excluded. The search was performed on June 2018 for all mentioned databases with no lower limit for the analysed time frame. Random-effects models (Higgins and Green 2011) were used to calculate a pooled estimate of effect and its 95% confidence intervals (CIs). Data were analysed with RevMan 5.3.

Assessment of Risk of Bias: The risk of bias assessment of the included studies used the approach recommended by with the Cochrane Collaboration’s tool (Higgins et al. 2011). A score of 3, 1, and 0 were considered as low, unclear, and high risk of bias respectively for each of the seven categories of biases. The scores were averaged for each included study and results are provided in the Figure 1 and 2.

Synthesis of Results: The decision to pool studies was based on the absence of significant clinical heterogeneity which was based on patient demographics, clinical circumstances, and the comparability of the interventions applied. We performed an evaluation of the heterogeneity of the data using Cochran’s Q statistic, a chi-square test, with a threshold p-value of less than 0.10 (Huedo-Medina et al. 2006 Jun 1). The consistency of the results was assessed visually using forest plots and by the I^2 statistic (Higgins and Thompson 2002). The I^2 statistic describes the proportion of variation in point estimates attributable to heterogeneity as compared to sampling error. Subgroup analyses were performed to assess the impact of the treatment. Forest plot was used for graphic presentation (Figure 3). A ‘Summary of Findings’ table (table 1) used the GRADE Profiler software (version 3.6) for the primary outcomes (2004).

Results

Electronic searches from all sources retrieved 189 citations. 129 articles were excluded due to non-clinical studies in humans or were reviews or opinion papers. Out of 60 clinical trials, 37 did not meet the inclusion criteria. The 23 RCTs comprised of 1,512 patients. The diagnostic aid used by 13 studies was Research Diagnostic Criteria for TMDs (RDC/TMD). Special screening forms, modified from Nassif and Hilsen for diagnosis of TMD were used by Al Saadet et al. While Al Quran et al used basic chair side examination procedure; Kuttila et al used clinical examination and interview. The criteria for inclusion of patients for Lundh et al were (1) pain on chewing assessed by the patient as more than 50 on a 100 mm visual analogue scale; (2) arthrographic evidence of disk displacement without reduction in one or both TMJs. Schmitter et al used Bilateral magnetic resonance
images, clinical Temporomandibular joint disorder examination protocol, including muscle palpation, mandibular range-of-motion measurement, and joint sound detection, according to the recommendations of the German Dental Association. Stieschscholez et al.\textsuperscript{25} depended on clinical examination and MRI and Tatli et al.\textsuperscript{26}, used Clinical examination with RDC/TMD and MRI. Wassell et al. 2004\textsuperscript{27} and Wassell et al. 2006\textsuperscript{28} used the International Headache Society Criteria for the diagnosis of the disease. One study\textsuperscript{29} failed to report the diagnostic aid used.

10 studies\textsuperscript{12,13,15,16,19,20,22,25,27,29}, assessed the short term effects of stabilization splints and 5\textsuperscript{7,11,17,18,23} studies assessed the long term effects of it. Both the short term and long-term effects were assessed by 8 studies\textsuperscript{8, 9,10,14,21,24,26,28}. Different scales and pain evaluation tools were used by different studies.

**Risk of Bias Assessments:** A synthesis of the assessment of the methodological quality items (authors’ judgement of risk of bias for each included study) is presented in Figure 1. There were no studies with low risk of bias. 3 studies\textsuperscript{8, 11, 13} were identified with unclear risk of bias and all the others were of moderate risk of bias. Al Saadet al.\textsuperscript{20} had the highest risk of bias among the studies. The bias present in majority (11 of the studies) was allocation concealment (selection bias) followed by blinding of participants and personnel (performance bias) in 8 studies. Figure 2 depicts a risk of bias graph, illustrating the author’s judgements about each risk of bias item presented as percentages across all included studies.

**Synthesis of results-Effect of Interventions:** Overall in 5 pooled studies involving 381 adults participants in control group were more likely to experience a reduction in TMD signs and symptoms compared to those using stabilization splints [SMD 16.16, 95% CI(16.08 to 16.23)], but there was heterogeneity among studies (100%). The results did not favor the stabilization splints when compared to the control group.

![Figure 1: Risk of bias summary-review authors’ judgements about each risk of bias item for each included study.](image-url)
Table 1: Summary of findings

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Illustrative comparative risks* (95% CI)</th>
<th>Relative effect (95% CI)</th>
<th>No of Participants (studies)</th>
<th>Quality of the evidence (GRADE)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabilization splints compared to placebo or no treatment or a modified stabilization splint or a combination of splint with adjunct therapy or other occlusal splints for Reduction in Pain</td>
<td>Assumed risk</td>
<td>Corresponding risk</td>
<td>Stabilization splints</td>
<td>TMD Pain reduction VAS scale . Scale from: 0 to 10.</td>
<td>The mean tmd pain reduction in the intervention groups was 5.54 higher (4.17 lower to 15.25 higher)</td>
</tr>
</tbody>
</table>

*The basis for the assumed risk (e.g. the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). CI: Confidence interval;

GRADE Working Group grades of evidence High quality: Further research is very unlikely to change our confidence in the estimate of effect. Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. Very low quality: We are very uncertain about the estimate.

Figure 2: Risk of bias graph: review authors’ judgements about each risk of bias item presented as percentages across all included studies.

Figure 3: Forest plot of comparison: 1 TMD PAIN, outcome: 1.1 TMD PAIN
Discussion

Currently there is lack of definitive universal diagnostic criterion for diagnosis of TMD. Even though the Research Diagnostic Criteria for TMD (RDC/TMD) is the most accepted, out of the 23 studies only 12 depended on the RDC/TMD. The outcome assessment of TMD signs and symptoms were not standard and heterogeneous in nature. The studies used various method in assessing pain such as VAS, CPI and GCPS. Usage of uniform scale is highly recommended. Again, we could observe the heterogeneity in duration of follow-up following intervention in studies which is difficult to conclude or pool with the effect of the splint on reduction of the pain symptoms. The post insertion instruction that was given following the insertion of the splints was also different for different studies. There is substantial clinical heterogeneity of outcome assessment suggests low evidence of splints on the reduction of TMD. This suggest the need of development of the standard protocol for the assessment effectiveness of splints of TMD

23 studies were included for qualitative assessment, while 10 were selected for the quantitative evaluation as there was substantial clinical and methodological variation in the rest of studies. Included 10 studies for quantitative assessment had less clinical and outcome assessment variation which assessed the stabilisation appliance as one of the intervention against control appliance or like counselling or exercise or both. Due to missing information of individual estimates the data from the five studies were not analysed.

Future research would benefit from a uniform method of assessment for clinical effectiveness of these appliances and treatment method. Heterogeneity in diagnosis, patient inclusion criteria, appliance design, methodology and evaluation including the duration of follow-up and assessment is hindering the development of synthesized evidence to determine the appliance effectiveness.

Conclusion

Almost all trials included in this systematic review individually reported positive results on reducing the TMD signs and symptoms for both stabilisation splints and control groups, with stabilisation splint being better and more effective. Even then, the results of our meta-analyses did not produce significant differences of the pooled estimates, suggesting that that the evidence remains insufficient.

Financial Support and Sponsorship: Nil.

Conflict of Interest: There are no conflicts of interest.

Ethical Clearance: As this is a review ethical clearance was not required.

References


Comparative Evaluation of the Efficacy of Occlusal Splints Fabricated in Different Temporomandibular Positions for Treatment in Temporomandibular Disorder Patients

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Abstract

The purpose of this randomized control trial was to compare the efficacy of splints fabricated in maximum intercuspation position and bite plane induced occlusal position with splints fabricated in centric relation (control group) in the treatment of temporomandibular disorders. 30 patients with Temporomandibular disorder (TMD), were randomized into three groups by computer generated random sequence. Thus, 10 patients were allocated to any of the three groups–Splints fabricated in biteplate induced occlusal position, splints fabricated in maximum intercuspation and splints fabricated in centric relation. The variables—pain, head position and amplitude of mandibular movements were measured before insertion of splints and later after one week, one month and three months of treatment. There was statistically significant reduction in pain (p<0.05) after three months of treatment, statistically significant improvement in maximum mouth opening and head position within the three splint groups. The splints fabricated in three different mandibular positions were equally effective in reducing the symptoms in temporomandibular disorder patients.

Keywords: Temporomandibular disorder, occlusal splints, centric relation, maximum intercuspation.

Introduction

Temporomandibular disorders include a cluster of related disorders like masticatory muscle disorders, disc displacement disorders and inflammatory disorders of the temporomandibular joint. 75% of the populations have at least one sign of dysfunction and approximately 33% have at least one temporomandibular disorder symptom.¹,²

Dental management of temporomandibular disorder often involves occlusal splints and occlusal adjustment.³ Occlusal splints are conservative and reversible⁴-⁶ and have been reported as effective mode of treatment in managing temporomandibular disorder patients.⁴,⁷,⁸ Occlusal splints bring about temporary alteration in previous dental contacts, liberate masticatory system from occlusal disharmony, reduce hyperactivity of the mandibular muscles, reposition the mandible and alter the neuromuscular position of mandible there by reducing the symptom.⁹ Stabilization splint is considered as the gold standard in the treatment of temporomandibular disorders.¹⁰ Centric relation has been advocated as a reference position for fabrication of stabilization splints because they are effective only if the condyles are located in the most musculoskeletally stable position on wearing the splint. Mandibular condyles are located in their most musculoskeletally stable position in centric relation.¹¹,¹²

However the use of centric relation is arguable in
many conditions; for example, in temporomandibular disorder patients with pain. This is because centric relation has been defined in asymptomatic patients. The presence of pain, emotional or physical distress, inability of the operator and lack of neuromuscular conditioning may influence the recording of centric relation.\textsuperscript{11,13,14} Studies have utilized other mandibular positions like maximum intercuspation and muscular position like bite plate induced occlusal position (BPOP) as reference position for providing optimum occlusion in rehabilitation and temporomandibular disorders.\textsuperscript{11, 15-17} These alternative positions have the potential to reduce the complexity and treatment cost, chair time of treatment because recording them is not as technique sensitive as centric relation. However, it is not known whether any or both of the alternative positions can produce results comparable with results obtained using centric relation as the treatment position. The present study was undertaken to address this gap in knowledge. It is expected that the results of the present study might add to the emerging body of knowledge aimed at choice of treatment position of occlusal splints in management of TMDs.

**Materials and Method**

Consecutive patients attending the outpatient department of Prosthodontics were screened for TMD. 30 patients who satisfied these predefined inclusion criteria were selected: (a) Pain in the masticatory muscle; (b) pain in the temporomandibular joint area; (c) pain on mandibular movement; (d) articular sounds on mandibular movement (e) head ache (f) bruxism and clenching (g) Angle’s class 1 molar relation (h) signs and symptoms present for a minimum of six months (i) minimum twenty functional teeth. The following exclusion criteria were adopted;(a) Angle’s class 3 molar teeth; (b) indication for or ongoing orthodontic treatment; (c) history of temporomandibular dislodgment; (d) extensive treatment for prosthetic rehabilitation. The selected subjects were informed about the study and an informed consent was sought.

**Randomization:** The selected subjects were randomized in to three groups by computer generated random sequence. Thus 10 patients were allocated to any of the three groups– Splints fabricated in biteplate induced occlusal position, splints fabricated in maximum intercuspation and splints fabricated in centric relation (control group). All the measurements were recorded by the same operator. Each measurement was performed thrice and the average selected as the entry to reduce operator bias.

Variables measured in the study were pain, head position and amplitude of mandibular movements. Amplitude of mandibular movements included right and left lateral movement of mandible, maximum mouth opening and protrusion. The variables were measured before the insertion of splints and later after one week, one month and three months of the treatment.

**Pain:** The intensity of painful symptoms and pain on palpation was evaluated using Visual Analog Scale, calibration from 0 to 10mm. The score 0 represented no pain and 10 represented the worst pain ever felt by the patient.

**Head Position:** The assessment of posture was held with the patient standing bare footed on a smooth surface with his/her feet in the same width of shoulders, in a frontal and natural head position. The head position was measured by placing a millimetre ruler vertically from the rear portion of the skull to the thoracic spine. The horizontal distance of the cervical spine by that line of the vertical bob was measured using a ruler. This measurement gave the head position. The normal head position ranges from 6-8 cm.

**Amplitude of Mandibular Movements:** Maximum opening of the mouth was measured with the millimetre ruler between the edges of maxillary and mandibular incisors. The midline of the mandibular incisors and incisal margin of the maxillary incisors were marked to evaluate the right and left lateral movements. The protrusion was also measured using the millimetre ruler. The normal maximum opening varies between 40 and 50 mm. The protrusion of the mandible in a normal individual ranges between 6 and 9 mm and lateral movement varies between 9 and 14 mm.

**Fabrication of Splints:** The upper and lower impressions were recorded using irreversible hydrocolloid and cast models fabricated. The dental casts were mounted in an articulator with aid of face
The difference between the three splints was the intermaxillary positioning of mounting of mandibular cast in the articulator.

Occlusal splints were fabricated in self-cure acrylic. Anterior deprogramming jig was used for fabricating the occlusal splints in centric relation. Anterior jig created a space of around 2-3mm in the posterior teeth. The patient was then guided to centric relation with the jig in position using Dawson’s bimanual technique. The record was registered using polyvinyl siloxane bite registration paste.

Base plate wax was also used as an interocclusal record in the study. Mandibular cast was then mounted on the articulator using the centric relation record. Splint thickness was established by the wax record thickness.

The splint in maximum intercuspation was fabricated by mounting the mandibular cast in the articulator by tactile and visual intercuspation. After mounting, the upper member of the semi-adjustable articulator was raised by 3mm to allow enough interocclusal space for the fabrication of the splint.

Splint in bite plate induced occlusal position was fabricated after asking the patient to wear a bite plate for five minutes. Anterior bite plate was fabricated using self-cure acrylic resin for each patient. The bite plate extended from first premolar on one side to the first premolar on the other side in the upper arch. The bite plate was flat and perpendicular to the mandibular incisors. This helped to condition the patient at a new neuromuscular position. This allowed free movement of the incisors in all directions. To condition the patient at the new neuromuscular position, patient was asked to tap or slide their anterior teeth against the bite plate. After conditioning, the bite plate was removed and the patient was allowed to close the mouth until the point at which patient’s teeth came into contact. This position was recorded using an interocclusal record and was then transferred into articulator. The space for the splint was created by lifting the upper member of the articulator.

The patients were instructed to wear the occlusal splint at night time. They were informed of the cyclic nature of TMD and the relationship between parafunction, muscle fatigue, muscle pain and psychological factors. The variables are measured at first week, first month and third month after insertion of splints. The patients were asked to report if the symptoms aggravated on usage of the splints. In the follow up visits, the occlusal contacts on the splints were checked and adjustments were performed in the absence of one or more teeth in contact during closure due to the change in mandibular position on usage of splint to a more musculoskeletally stable position of the condyle.

Analysis: The variables were recorded and the data was evaluated using SPSS software to find the statistical significance of the comparative efficacy between the splints fabricated in the three different mandibular positions in the management of temporomandibular disorder patients. Kolmogrov Smirnov test was used to check the normality of the data. All the variables were compared using ANOVA between the three groups. Pair wise comparison was done to evaluate the improvement in variables within the groups.

Results

There was statistically significant reduction in pain within the three splint groups (p<0.05) after three months of treatment. Splints fabricated in three groups did not show any statistically significant difference between the groups in reducing the intensity of pain during the course of treatment (Table 1 and Figure 1). Right and lateral movement showed statistically significant improvement within the three groups and between the groups (p <0.05). Patients in bite plate induced occlusal position group showed statistically significant difference (p <0.05) in right lateral movement and left lateral movement when compared to patients in other two groups before the treatment. (Table 1). There was statistically significant improvement in maximum mouth opening within the group and no significant difference between the groups in maximum mouth opening (Table 1 and Figure 2). Patients in centric relation splint group showed better improvement in protrusion after one month when compared to the maximum intercuspation splint group (Table 1 and Figure 3). There was statistically significant improvement in head position within the groups (p<0.05). But there was no statistically significant difference between the groups in improvement in head position (Table 1 and Figure 4).
Table 1: Comparison of different variables between the three splint groups: ANOVA

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Pre-treatment</th>
<th>1 week</th>
<th>1 month</th>
<th>3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (VAS scale)</td>
<td>0.541</td>
<td>0.583</td>
<td>0.774</td>
<td>0.804</td>
</tr>
<tr>
<td>Right lateral movement</td>
<td>0.010</td>
<td>0.018</td>
<td>0.004</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Left lateral movement</td>
<td>0.404</td>
<td>0.185</td>
<td>0.015</td>
<td>0.016</td>
</tr>
<tr>
<td>Maximum mouth opening</td>
<td>0.602</td>
<td>0.409</td>
<td>0.391</td>
<td>0.308</td>
</tr>
<tr>
<td>Protrusion</td>
<td>0.025</td>
<td>0.019</td>
<td>0.026</td>
<td>0.133</td>
</tr>
<tr>
<td>Head position</td>
<td>0.202</td>
<td>0.365</td>
<td>0.511</td>
<td>0.742</td>
</tr>
</tbody>
</table>

Fig. 1. Evaluation of pain using descriptive statistics in the three splint groups

Fig. 2. Evaluation of maximum mouth opening using descriptive statistics in the three splint groups
Discussion

Within the confines of the clinical study, splints fabricated in the three different neuromuscular position, centric relation, maximum intercuspation and bite plate induced occlusal position did not differ over three months in reducing the signs and symptoms in temporomandibular disorder patients. In the present study we compared the efficacy of occlusal splints fabricated in maximum intercuspation and bite plate induced occlusal position with splints fabricated in centric relation in the treatment of temporomandibular disorder patients, as these were the three most probable reproducible mandibular positions in relation to body posture and muscle function.16,17

In our study splints fabricated in centric relation required less occlusal adjustment to reach occlusal stability compared to splints fabricated in other position. Some patients in the present study showed fluctuation of stability of contacts on the splint even after achievement of occlusal stability earlier. The fluctuation of occlusal
stability was associated with increase in pain. On evaluation some form of mental stress was the most common reason for increase in pain. This association of increase in pain and mental stress was earlier reported by Turk et al in his study.\textsuperscript{18}

Three patients in our study did not achieve occlusal stability in the course of the treatment. Studies have shown this could be of two reasons--(a) due to the variation in arc of closure, which occurs during the day, (b) the presence of pain on palpation, which was not completely reduced in these patients. This result in some changes in the physical status of the muscles could lead to instability in the arc of mandibular closure.\textsuperscript{19} Patients with severe dysfunction showed better improvement than those with moderate and mild dysfunction. The result was similar to the study conducted by Ekberg.\textsuperscript{20} Amplitude of mandibular motion improved considerably on reduction of pain. Head position also showed improvement on reduction of pain. Studies have shown the association between temporomandibular dysfunction and head and cervical posture.\textsuperscript{21}

**Conclusion**

Based on the methodology, study sample and results obtained in the present study, it was concluded that splints fabricated in three different mandibular positions were equally effective in reducing the symptoms in temporomandibular disorder patients.

**Conflict of Interest:** We have no conflict of interest to declare.

**Source of Funding:** Nil

**Ethical Clearance:** The protocol for this randomized control trial was reviewed and approved by the Institutional Ethical Review Board.

**References**

2. Wright EF. Manual of temporomandibular disorders [Internet]. Wiley-Blackwell; 2009


Effect of Gaze Stability Exercises on Balance Confidence and Mobility in Elderly Population

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Abstract

Background: To determine whether gaze stability exercises are effective in improving the balance confidence and mobility in elderly population. Design: Randomized controlled. Study Setting: Physiotherapy Out Patient Department, SRM Medical College Hospital and Research Center. Participants: 40 subjects both male and female without any definite balance disorder but with history of subjective apprehension to do activities, who attend the outpatient physiotherapy department of SRM Medical College Hospital and Research Center, were selected for the study.

Intervention: Subjects are divided into 2 groups, the experimental group (n=20) performed gaze stability exercises and conventional exercises for balance, and the control group (n=20) performed conventional physiotherapy exercises for balance. Weekly progression of exercise was done as per the designed exercise protocol. The participants of both the groups performed the exercises 3 times daily over a 2-week period.

Outcome Measures: Berg Balance Scale (BBS), The Activities-specific Balance Confidence scale (ABC) was take before and after 2-weeks of intervention. Result: There were no baseline differences (P d” .05) between the Experimental and Control groups in any outcome measures. Experimental group improved significantly in both the outcome measures compared with the control group.

Conclusion: The results of this study suggest that gaze stability exercises leads to improvement of balance and subjective confidence to carry out the activities of daily life due to adaptation of age related degeneration found in elderly population.

Keywords: Gaze Stability Exercises, Elderly Population, Balance confidence.

Introduction

Good balance is an imperative skill for daily life that requires the complex integration of sensory information regarding the position of the body relative to the surroundings and the ability to generate appropriate motor responses to control body movement. Vestibular system is one of the main structures to maintain balance, given that it is considered as an absolute reference in relation to the others that also participate in this function, such as visual and somato–sensorial systems.¹,² With increased age, there is a progressive loss of functioning of these systems which can contribute to balance deficits. The healthy elderly individuals are found to have significant impairments in static as well as dynamic balance as compared to healthy young adults³ as the risk of falls increases beyond 60 years of age.⁴ The literature affirms that the vestibule-ocular reflex degeneration is the main consequence of natural aging of the vestibular system.⁵ The classical manifestation of its failure is unbalance towards body rotation by affecting the act of walking. The intensive training of this reflex, associated to other stimuli, has become efficient to balance recovery and prevention of falls.⁶,⁷

Gaze stability exercises are the adaptation exercises which are based on the demonstrated ability of the vestibular system to modify the magnitude of the vestibule-ocular reflex in response to a given input (head movement).

The adaptation of the vestibule-ocular reflex has been demonstrated in individuals with normal vestibular function and those with unilateral vestibular hypofunction.⁸,⁹ One of the signals that induce adaptation of the vestibule-ocular reflex is retinal slip combined...
with head movement.\textsuperscript{10} This is the basis for what have traditionally been considered adaptation exercises. These exercises require the individual to perform rapid, active head rotations while watching a visual target, with the stipulation that the target remains in focus during the head movements.\textsuperscript{11}

Oculo-motor exercises and gaze stability exercises are found to be effective for postural stability and dynamic visual acuity in healthy young adults.\textsuperscript{12} Previous studies have compared subjects who performed vestibular adaptation exercises plus balance and gait exercises to subjects who were simply encouraged to perform their daily activities.

**Methodology**

This study was a randomized pre-test and post-test experimental design. Physiotherapy Out Patient Department, SRM Medical College Hospital and Research Center, Kattankulathur, this study received institutional ethical approval from SRM college of physiotherapy, srm INSTUIITE OF SCIENCE AND TECHNOLOGY. permission to recruit subjects and access to medical records were granted by the participating hospital and all participants provided informed written consent.

Inclusion criteria included both male and female in the age group of 60 to 70 years with documented balance or mobility problems, with history of subjective apprehension to do activities, Exclusion criteria included Mini-Mental State Examination (MMSE) score <24/30, subjective history of dizziness, progressive medical issues that would affect mobility, presence of neurological, or ENT disorder and any other vascular, metabolic, degenerative or neoplastic disorders, which are confirmedly known to cause balance disorders. All participants gave informed consent. Control group received conventional physiotherapy exercises for balance, whereas Experimental Group received conventional physiotherapy exercises for balance, and Gaze stability exercises. Both the exercise protocols were modified in such a way that the total time duration would not exceed more than 30 minutes a day in progression by the 2\textsuperscript{nd} week onwards.

The baseline data (Pre test) were measured using BBS\textsuperscript{16} and ABC\textsuperscript{17} datasheets before the starting of treatment session. These scales have found been found to have good test-retest reliability and validity for balance and reflecting fear of falling and confidence in balance respectively.

**Gaze Stability Exercises:** These exercises require the individual to perform rapid, active head rotations while watching a visual target, with the stipulation that the target remains in focus during the head movements. If the target is stationary, then the exercises are referred to as viewing exercises. If the target is moving in the opposite direction of the head movement, then these exercises are referred to as viewing exercises. The control group performed conventional physiotherapy exercises for balance. Weekly progression of exercises for both the groups was done as per the Table 1. The participants were instructed to perform the exercises 3 times daily over a 2-week period. After 2\textsuperscript{nd} week, post intervention data was collected again to analyze the statistical differences.

**Data Analysis:** Comparing score between the pre and post treatment balance outcome measures (i.e BBS & ABC) of two groups were compared by independent t test. The pre post difference within the group was analyzed using paired t test. A two tailed (\(\alpha=2\)) probability (p) value p<0.05 was considered to be statistically significant.

### Results

**Table 1: The pre and post treatment measuring outcomes of two groups**

<table>
<thead>
<tr>
<th></th>
<th>Groups</th>
<th>Pretest</th>
<th>Posttest</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBS</td>
<td>Experimental group</td>
<td>49.06±2.49</td>
<td>52.66±1.83</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>50.00±2.36</td>
<td>50.26±2.37</td>
<td>0.103</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>0.301</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>ABC</td>
<td>Experimental Group</td>
<td>72.41±3.18</td>
<td>75.91±3.07</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>72.58±3.15</td>
<td>72.75±3.17</td>
<td>0.164</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.886</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

P value a indicates the pre post difference within the group whereas P value indicates comparison between the groups at pre test as well as post test levels. A two tailed (\(\alpha=2\)) probability (p) value p<0.05 was considered to be statistically significant.
Graph 1: The pre and post treatment measuring outcomes The Activities-specific Balance Confidence scale of two groups. Experimental group showed significant increase in mean scores at post test as compared to pre test whereas mean change of these scores in control group was found to be insignificant. On comparing these scores between the groups, the mean change differed significantly (p<0.05).

Graph 2: The pre and post treatment measuring outcomes Berg Balance Scale of two groups. Experimental group showed significant increase in mean scores at post test as compared to pre test whereas mean change of these scores in control group was found to be insignificant. On comparing these scores between the groups, the mean change differed significantly (p<0.05).

Discussions

The results of this study indicate that experimental group improved significantly in balance measured with BBS and ABC outcomes measures whereas no significant differences were found in balance scores of the control group. Though the participants in this study were found to have the less risk of fall based on the BBS baseline scores but were found to have marked loss of confidence in balance in carrying out the activities of daily life.

This suggest that even the statistical meaningless baseline BBS scoring and small magnitude change at post intervention is capable of reducing the psychological impact of balance impairment in elderly individuals. The recommended protocols for Vestibular Rehabilitation of elderly patients consist of global stimulation of the balance which is based on exercises of substitution, adaptation and habituation.

These exercises are based on the physiopathology of unbalance that affects the elderly caused by the aging process of the sensory systems and muscle-skeletal effectors. However, these alterations begin by the aging process of the vestibular system, whose main consequence is the vestibule-ocular reflex degeneration (VOR) which leads to the unbalance towards body rotation and a deviation on the walking act. Based on all this information, the efficiency of use of specific exercises for the VOR adaptation was verified and it was observed that it had been equally effective as the long protocols of global stimulation, in elderly population.

It was reported that decreased angular head velocities improve target stabilization on the retina. Further, it was also suggested that this may begin to explain the head-trunk segmental stiffening observed in the elderly, since it may act to decrease head angular velocity during fall and subsequent balance recovery. Based on this information it may be assumed that significant improvement in experimental group might be because of another probability that participants in the GSE group do have an element of head movements to make them more accustomed to head movements with better control and stability of head-trunk segment.

The study by Courtney D. Hall et al provides evidence that in older adults with symptoms of dizziness and no documented vestibular deficits, the addition of vestibular-specific gaze stability exercises to standard balance rehabilitation results in greater reduction in fall risk.

Altogether, the intensive training of this reflex, together with other stimuli, has been presenting efficiency for both balance recovery and fall prevention. Further, results of this study fall in accordance with the suggested efficacy of specific type of vestibular (gaze stability exercises) and ocular system exercises (oculo-motor exercises) in improving postural stability for healthy young adults too. One possible mechanism leading to differential improvement is the adaptation of the vestibule-ocular reflex through performance of specific vestibular exercises. These improvements may be largely due to the learning and practice effects associated with the intervention in the GSE group.

Conclusion

Gaze stability exercises are effective in improving balance confidence and reducing the psychological impact of balance impairment in elderly adult population.

Limitations: A follow-up study to find out the long-term effects of gaze stability exercises in healthy older adult subjects may be beneficial in promoting the restoration of mobility and independence of subjects.

Conflict of Interest Declaration: The authors declare that there was no conflict of interest and no funding was received during this current project.
References


14. Richard A. Clendaniel at al: The Effects of Habitation and Gaze Stability Exercises in the Treatment of...


Manifestation of Clinical Symptoms and Associated Complications in Varicose Veins: An Institutional Study

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University of Health Sciences, Rohtak, Haryana, India

Abstract

Introduction: Varicose veins have been recognized as chronic disorder since ancient times. Untreated varicose veins tend to worsen over time and can lead to many associated complications. Varicose veins have become a serious threat to the lives of millions of people across the globe.

Aim: Present study has been conducted with aim to make an effective self instructional module on knowledge of clinical associated complication of varicose vein.

Methodology: Information has been collected from varicose veins patients visited the out-patient unit of surgery department of Pandit Bhagwat Dayal Sharma University of Health Sciences, Rohtak. These patients were morphologically and clinically examined by a surgeon. Detailed analysis regarding age of diagnosis, sex ratio, clinical symptoms and associated complications was done. Fisher’s exact analysis and Chi-square test was used to calculate statistical significance.

Results: Present study showed Saphenous vein as most frequent among all veins. Prominent veins and aching were most frequent symptoms in varicose veins. Chi square analysis revealed significant difference between frequency of symptoms among male and female patients ($\chi^2 = 16.221^*$, df= 6, p value= 0.01). Forty two percent patients showed variable complications associated with varicose veins symptoms.

Conclusion: Symptoms in early varicose veins were minimal and they became severe with time. One must know early symptoms of this disease to avoid complications in the later stage. More importantly, varicose risk factors should be taken care of before appearance of symptoms.

Keywords: Complication, Risk factor, Symptom, Varicose veins and Veins.

Introduction

Varicose veins are swollen veins, and appear anywhere in the body, but most commonly occur in the legs. These veins may also be twisted in appearance. It is most common vascular disease in which blood escapes from a normal path and circulates in a reverse flow in already overfilled veins with blood. Vein size can vary from small (2-3mm across) to large (2-3 cm across) [1]. These veins may be superficial or deep, and generally bilateral affecting both legs (75-76%) [2] and when unilateral they are detected with the same frequency on each leg [2,3]. Many studies found that 20% population suffer from varicosity out of which 2% cases have complication of skin changes finally proceeding to venous ulceration [4].

Varicose veins patients have swelling of the feet and ankles due to fluid from stagnant blood leaking through the walls of the veins into surrounding tissues. Feelings of heaviness, tiredness and aching, especially after
periods of prolonged standing may occur. There may be change in skin color; the affected skin may turn into brownish grey color, especially around the ankles. Minor injuries to the area may bleed more than normal and/or take a long time to heal. In some people abnormally high pressure in the leg veins can damage the skin, and eventually lead to ulcer. Development of carcinoma in varicose patients can occur due to long standing venous ulcers. There have been over 100 reported cases of malignant transformation and the rate is reported as 0.4% to 1%[5]. Restless legs syndrome appears to be a common overlapping clinical syndrome in patients with varicose veins and other chronic venous insufficiency. The “more severe” are the ones that result in serious problems, as bleeding, ulcers (wounds), eczema, infections, redness, stains, thickness of the skin, pain, phlebitis and even the lung clot, that although rare in primary varicose veins, may put in risk the patient’s life.

Although there is lack of epidemiological data or studies on incidence of varicose veins from developing countries but the frequency of disease is increasing day by day. Many people in India suffer from it, but most tend to ignore it. Researcher personally has observed that most of the people were unaware of varicose veins, and also of their preventive measures. In the present study clinical symptoms and associated complications of varicose veins have been analysed in both male and female patients of varicose veins.

Methodology

Sample collection: The study has been conducted on two hundred sixteen patients of varicose veins admitted to surgery ward of PGIMS, Pandit Bhagwat Dayal Sharma University of Health Sciences, Rohtak.

Inclusion criteria: The inclusion criteria, being, patients presenting with symptomatic varicose veins, those patients presenting with complications of the disease such as pigmentation, eczema, ulceration, superficial thrombophlebitis, etc. and patients with cosmetic concern. The most specific criteria included patients with primary varicose veins of lower limb.

Study design: General assessment of patients including age of diagnosis, sex ratio, symptoms, types of varicose veins, limb involvement as well as associated complications were recorded to know the impairment in the patients of varicose veins. The overall participation rate in the questionnaire survey was 96%. The status of the superficial veins in lower limb was examined with the help of clinicians. The questionnaire data and clinically examined data were cross-tabulated. In all patients the legs were clinically examined by clinician with the help of Doppler Ultrasound and clinical tests to detect reflux in the veins.

All the patients presenting with varicose veins of lower limb, which met the inclusion and exclusion criteria were selected for the present study. Consent from the parents/guardian was taken. Institutional human ethical committee permission was taken to conduct the present research.

Results

Clinical Presentation of Varicose Veins: Varicose veins are dilated, tortuous and elongated veins of the lower extremities and classified into four types i.e. saphenous veins, segmented veins, reticular veins and web type veins. Data of two hundred sixteen cases of varicose veins was analysed in the present study. Saphenous type of vein is longest vein in body running along the length of leg and was present in 82% (177) of cases. Thirty eight point two percent patients were having segment type of veins. These veins are the small dilated blue and green veins beneath the skin surface. Reticular veins do not protrude above the skin as varicose veins do. Percentage frequency of reticular type vein was 28.16%. Webbed types of veins were present only in 14% of patients (Fig 1).

![Figure 1: Percentage frequency of different types of varicose veins (N-216).](image)
The distribution pattern of saphenous varicose veins in women and men showed more percentage frequency in the right limb. The prevalence of saphenous varicose veins was higher in males than in females.

Frequency of bilateral leg was very low in case of women as compared to men. Fisher’s exact analysis showed statistically significant association between female sex and limb involvement in different types of veins (two tailed p < 0.12), whereas, it was non-significant in males (p < .003).

**Clinical Symptoms of Varicose Veins:** Major symptoms in patients of varicose veins were prominent veins, aching, swollen ankles, itching, night cramps and ulcer. There were 95.08% of the patients with prominent veins. The next most common symptom was aching in leg (85.24%) with prominent veins which occurred alone or in combination with swollen ankle or edemas (37.70%). There were 31.53% patients with ulcer in one or both limbs. 68.70% of varicose patients complained of night cramps in affected veins (Fig 2). Frequency distribution of varicose symptoms among male and females showed that, male patients were more affected with all these symptoms. Chi square analysis revealed significant difference between frequency of symptoms among male and female patients ($\chi^2 = 16.221^*$, df = 6, p value = 0.01).

**Associated Complications of Varicose Veins:** Majority of the patients considered in the present study came to the hospital for some complications of the disease rather than for the treatment of the visible veins itself. Total complication rate observed during the study period was 42%. Leg ulceration, hematoma and deep vein thrombosis (DVT) were commonest associated complications with 31.53%, 29.30% and 27.77% of cases respectively. Hematoma along with DVT was found in 24.46% of cases. There were 16% of patients that showed recurrence of varicosity after surgery. Bleeding from superficial veins was noticed in 10.3% of varicose patients. Only 2.60% of patients were seen with femoral vein injury as associated complication of varicose veins (Fig 3).
Discussion

Varicose veins of the lower extremities are the most common vascular disease. It is common, and present in 10–30% of the general population. Once developed, there is no spontaneous recovery, and symptoms get worse with the time of disease duration\(^6\). Therefore, it should be treated in early phases.

The present study showed increased incidence of varicosity on the left limb (63.93%) than right limb (53.11%) as compared to existing literature (Table 1). The cause of increased incidence of left side is not known. The probable reason for increased incidence on left side is that the venous drainage of the left leg follows a more tortuous course through the pelvis\(^7\). The bilateral varicose veins in present study were seen in 32% of patients which is approximately in consistent to 26.67% and 26% bilateral cases of Malik and Mofidi respectively\(^8\). However in some cases no difference was observed between left and right limb involvement\(^9\).

Table 1: Limb involvement in varicose veins.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>48.55%</td>
<td>43.75%</td>
<td>42%</td>
<td>28.08%</td>
<td>53.11%</td>
</tr>
<tr>
<td>Left</td>
<td>51.45%</td>
<td>46.87%</td>
<td>52%</td>
<td>34.01%</td>
<td>63.93%</td>
</tr>
<tr>
<td>Both</td>
<td>-</td>
<td>09.37%</td>
<td>6%</td>
<td>37.01%</td>
<td>32.00%</td>
</tr>
</tbody>
</table>

Varicose veins of the lower extremities were classified into four types i.e. saphenous veins, segmented veins, reticular veins and web type veins. In present study saphenous type varices were observed in 82%, segment type in 32%, reticular type in 28.16% and web type in 14% of varicose veins patients. Komsuoglu, found the high frequency of segment type of varicose veins followed by saphenous veins reticular and web type varices\(^2\). The saphenous vein is the largest vein in legs so the prevalence is high in this vein. In the present study the prevalence of saphenous vein was high in men whereas frequency of non-saphenous varices was higher in women. In a study prevalence of saphenous varicose veins was equal in men and women and frequency of non-saphenous was high in women\(^9\). Varices of smaller veins, were present more frequently in women\(^9, 14\). The present study reported long or great saphenous system involvement in 53% as compared to literature(Table 2). The varicose veins are treated differently in the clinical classification of dilated veins by clinicians. It is therefore difficult to compare results of different studies.
Table 2: Percentage frequency of Great and short Saphenous vein.

<table>
<thead>
<tr>
<th>Studies (Year)</th>
<th>Great Saphenous vein %</th>
<th>Short Saphenous vein %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2003) [15]</td>
<td>68.42%</td>
<td>07.02%</td>
</tr>
<tr>
<td>(2011) [11]</td>
<td>90.63%</td>
<td>03.13%</td>
</tr>
<tr>
<td>(2014) [12]</td>
<td>42.00%</td>
<td>14.00%</td>
</tr>
<tr>
<td>Present study (2018)</td>
<td>53.00%</td>
<td>19.10%</td>
</tr>
</tbody>
</table>

In present study it was found that males were more affected with all symptoms than females as compared to previous studies [16]. In all studies including the present study, dilated and prominent veins were the commonest presenting symptom while other symptoms were present in variable percentage depending on the stage of disease (Table 3).

Table 3: Percentage frequency of various symptoms in patients with varicose veins.

<table>
<thead>
<tr>
<th>Studies (Year)</th>
<th>Dilated vein</th>
<th>Pain</th>
<th>Limb edema (Swelling)</th>
<th>Ulcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2003) [17]</td>
<td>98%</td>
<td>56%</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>(2004) [8]</td>
<td>80%</td>
<td>66.67%</td>
<td>13.40%</td>
<td>33.34%</td>
</tr>
<tr>
<td>(2010) [18]</td>
<td>90%</td>
<td>78%</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td>(2011) [11]</td>
<td>12.50%</td>
<td>37.50%</td>
<td>31.25%</td>
<td>37.70%</td>
</tr>
<tr>
<td>Present study (2018)</td>
<td>95.08%</td>
<td>68.70%</td>
<td>37.70%</td>
<td>31.53%</td>
</tr>
</tbody>
</table>

Recurrence of varicose veins is also a serious condition affecting varicose patients even after varicose surgery or after surgical removal of varicose veins [19]. Studies have reported 20% chance of recurrence at 5 years and 60% by 10 years [20, 21]. In present study 16% of patients had varicose veins after surgery for varicose veins. Untreated varicose veins tend to worsen over time and can lead to many associated complications like, hemorrhage (Bleeding) and swelling with in vein tissue, deep vein thrombosis and venous ulcers [22]. In present study 10.30% of patients were having the hemorrhage problem with varicose veins. Approximately 500,000 patients in the United States have venous ulcers with varicose veins, and physical impairment seen with venous ulcers was comparable with that of congestive heart disease and chronic lung disease [23]. Thirty one point five percent of varicose veins patients had the ulceration in present study. Deep vein thrombosis (DVT) is a serious complication of varicose veins. Superficial thrombosis or varicose vein is frequently associated with DVT which may be clinically silent [24, 25]. Three different studies in which ultra sonography used for diagnosis showed 20% to 40% prevalence of DVT with superficial vein disease [25]. In the present study 31.50% of patients were noted with DVT concurrent to varicose veins disease. So, varicose veins should be carefully followed clinically and repeat duplex ultrasound should be performed if patient symptoms get worsen.

Conclusion

Saphenous type of vein was most frequent in present study. Prominent veins and aching were observed as most frequent symptoms in varicose veins. Forty two percent patients showed variable complications associated with varicose veins symptoms. Present study revealed that males were more affected with all symptoms than females. Despite successful surgical removal of the sites of reflux varicose veins may recur again. A number of risk factors may contribute to occurrence of varicose veins i.e. underlying degenerative process of varicose veins, the disturbed venous physiology, lifestyle and genetic mutation. Symptoms in early varicose veins are minimal and they become severe with time. One must know early symptoms of this disease so as to avoid complications which can be dangerous. More importantly, varicose risk factors should be taken care of before appearance of symptoms.

Acknowledgments: Department of Genetics of Maharshidayanand University is gratefully acknowledged for providing financial and all necessary help.

Conflict of interest disclosure: The authors declare that there are no conflicts of interest.

References

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Evaluation of Autonomic Dysfunction in Underweight, Normal Weight, Overweight and Obese Patients with Chronic Obstructive Pulmonary Disease

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Abstract

Background: Though there are several studies available on effects of obesity on cardiac autonomic dysfunction and effects of COPD on cardiac autonomic dysfunction separately but search on combined effect of obesity and COPD on cardiac autonomic dysfunction fails to produce results. Therefore there was a need to evaluate the changes in autonomic dysfunction with increasing BMI in patients with COPD.

Objective: The aims of this study were 1) to compare autonomic dysfunction in patients with COPD with increasing BMI, 2) to correlate autonomic dysfunction in patients with COPD with increasing BMI.

Methodology: In the present study, 42 subjects were categorized into underweight, normal weight, overweight and obese category. Non invasive cardiac autonomic function tests were carried out in these subjects.

Results: The mean ± SD age of underweight, normal weight, overweight, and obese patients with COPD were 57.667 ± 5.1640, 61.007 ±8.8991, 55.800±6.6106 and 56.200±7.1204 respectively. It was found that there was no correlation between BMI and autonomic dysfunction responses in patients with COPD. All four cardiac autonomic function test came out to be non significant statistically [Karl Pearson correlation (r), ns-p >0.05]. Multiple comparisons between underweight, normal weight, overweight, and obese patients with COPD for cardiac autonomic responses, FEV₁, PEF were statistically non significant.

Conclusion: In present study, although the results have shown that there was definite autonomic neuropathy in patients with COPD with increasing BMI, there was no significant difference in autonomic dysfunction with increasing BMI in patients with COPD.

Keywords: Forced expiratory volume (FEV₁), Peak expiratory flow rate (PEF), Obesity, Chronic Obstructive Pulmonary Disease.

Introduction

The chronic obstructive pulmonary disease (COPD) is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammation response of the airways. It has been estimated that in 2030, COPD will become the third biggest cause of death.¹,²

Previous studies show that in COPD patients, cardiovascular autonomic neuropathy (CAN) is a common consequence and has been shown to negatively affect the cardiovascular and autonomic nervous system.³,⁴ Previous studies have demonstrated that COPD patients have depressed heart rate variability (HRV), indicating increased sympathetic activity at rest⁵,⁶ and Bronchoconstriction, hypoxia, hypercapnia, weight loss and systemic inflammation are other associated features.⁷,⁸ Studies on adults show that the HRV is decreased in overweight young adults especially men indicating sympathovagal imbalance. No changes were observed in HRV in underweight group. Changes in the autonomic nervous activity begin in the overweight and
may become more prominent in the obese thus indicating increased cardiovascular risk. But the number of studies that analysed the autonomic functions in obese adult population is still limited.

Available data suggests that obesity is more prevalent in patients with COPD than in the general population, depending on the severity of chronic airflow limitation. Obesity is an independent risk factor for cardiovascular disease and mortality. Autonomic neuropathy is another complication in obese patients. But limited literature is available to examine the relation between increasing body mass index (BMI) and cardiac autonomic function tests in patients with COPD. Hence, this study on the evaluation and correlation of autonomic function in the underweight, normal weight, overweight and obese patients with COPD was undertaken.

**Materials and Method**

**Subjects:** 42 COPD subjects on the basis of BMI were categorized into 6 underweight, 26 normal weight, 5 overweight and 5 obese category. Written informed consent was taken from the subjects and approval was obtained from the Institutional ethical committee. Procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national).

**Parameters measured:** Autonomic function tests were employed to evaluate the integrity of both parasympathetic and sympathetic innervations of the heart in all the groups.

**A. Parasympathetic Function Tests:** Blood pressure was recorded from OMERON digital sphygmomanometer and heart rate beat to beat changes can be measured from a continuous running ECG record (lead II).

1. **Valsalva maneuver:** The heart rate response to valsalva maneuver i.e forced expiration against resistance to assess baroreceptor integrity was assessed. The valsalva ratio was calculated as the ratio of longest R-R interval after maneuver to shortest R-R interval during maneuver.

2. Heart rate variation (HRV) with respiration was measured in supine position. Resting ECG was recorded and baseline heart rate was measured. The subject was asked to breathe in deeply at a rate of 6 breaths per minute allowing 5 seconds each of inspiration and expiration. The expiratory (E) to inspiratory (I) ratio was calculated as the sum of 6 longest R-R interval, divided by 6 shortest R-R intervals.

**B. Sympathetic function tests:**

1. **Cold pressor test (CPT):** Subject was asked to immerse his hand in cold water maintained at 4-6 degree Celsius and blood pressure measurement was made from other arm. Failure of systolic BP to rise by 16-20 mm Hg and diastolic BP by 12-15 mmHg was indication of autonomic neuropathy.

2. **Blood pressure response to standing:** After blood pressure measurement in supine position the subject was made to stand. Blood pressure was recorded in 30 second interval. Difference between readings of blood pressure in lying position and then after standing was calculated.

**Statistical Analysis:** SPSS 21.0 software and graph pad prism 3.0 for windows were used. Co-efficient of correlation in bivariate relationship was obtained using the Karl Pearson correlation test. The autonomic responses were compared between underweight, normal weight, overweight and obese COPD using the multiple analysis of variance (MANOVA Tukey). A “p” value of <0.005 was considered as statistically significant.

**Result**

<table>
<thead>
<tr>
<th>Test</th>
<th>Under Weight N=6</th>
<th>Normal Weight N=26</th>
<th>Over Weight N=5</th>
<th>Obese N=5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valsalva ratio &lt;1.20-abnormal, 1.20-1.45, borderline, and &gt;1.45-normal</td>
<td>Abnormal</td>
<td>2(33%)</td>
<td>8(31%)</td>
<td>3(60%)</td>
</tr>
<tr>
<td></td>
<td>Borderline</td>
<td>1(17%)</td>
<td>11(42%)</td>
<td>2(40%)</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>3(50%)</td>
<td>7(27%)</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

Table 1: Frequency of different responses to tests of autonomic dysfunction according to severity of COPD.
Table 2: Correlation between BMI and autonomic tests responses

<table>
<thead>
<tr>
<th>Test</th>
<th>Under Weight N=6</th>
<th>Normal Weight N=26</th>
<th>Over Weight N= 5</th>
<th>Obese N=5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate variation (HRV) after deep breathing</td>
<td>Abnormal 6(100%)</td>
<td>10(38%) 3(60%) 3(60%)</td>
<td>Borderline 0</td>
<td>11(42%) 1(20%) 2(20%)</td>
</tr>
<tr>
<td>BP response to posture change</td>
<td>Abnormal 1(17%)</td>
<td>1(4%) 0</td>
<td>Borderline 2(33%)</td>
<td>8(30%) 2(40%) 0</td>
</tr>
<tr>
<td>BP response to Cold pressor test</td>
<td>Abnormal 3(50%)</td>
<td>18(70%) 3(60%) 18(70%)</td>
<td>Normal 3(50%)</td>
<td>8(30%) 2(40%) 8(30%)</td>
</tr>
</tbody>
</table>

Table 3: Between groups MANOVA analysis

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>F value</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valsalva Maneuver</td>
<td>1</td>
<td>1.3427 .38015</td>
<td>0.572</td>
<td>0.637</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.2440 .12442</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1.1580 .06058</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1.3533 .20906</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate variation after deep breathing</td>
<td>1</td>
<td>12.846 .78470</td>
<td>1.46</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>8.600 .40373</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11.800 .73959</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6.950 .21107</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV$_1$</td>
<td>1</td>
<td>37.62 .10.534</td>
<td>0.599</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>40.60 .13.939</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>44.00 .13.435</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>43.17 .18.192</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEF</td>
<td>1</td>
<td>34.50 .12.791</td>
<td>1.039</td>
<td>0.386</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>45.60 .16.319</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>40.00 .9.055</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>40.33 .21.528</td>
<td></td>
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</tr>
</tbody>
</table>

SBP-Systolic blood pressure, DBP-Diastolic blood pressure, FEV$_1$ Forced expiratory volume in 1 second, PEF-Peak expiratory flow rate. There were no correlation between BMI and autonomic dysfunction responses in patients with COPD. [Karl Pearson correlation (r), ns-p >0.05] given in Table-2.
Multiple comparisons between underweight, normal weight, overweight, and obese patients with COPD for cardiac autonomic responses. FEV₁, PEF were statistically non-significant (MANOVA Tukey, P>0.05) given in table-3.

### Discussion

The role of BMI in the pathogenesis of COPD is not clear. In previous researches it has been found that both, parasympathetic as well as sympathetic divisions have been found to be affected in the adult obese population as compared to the non-obese adult population. 16, 17 Whereas Chabra S K et al reported a reduction in both parasympathetic and sympathetic function in subjects with normal BMI with or without hypoxemia. 4 Among patients 21.4% had no evidence of autonomic neuropathy while 28.6% had early neuropathy and 28% had definite neuropathy. The relationship between autonomic neuropathy and BMI was not given by Chabra S K et al. The results of the present study found that there was definite autonomic neuropathy in normal weight COPD population similar to Chhabra S K et al. The results of the present study found that there was definite autonomic neuropathy in normal weight COPD population similar to Chhabra S K et al. Amongst all the groups of COPD population in our study 90% have definite or early autonomic neuropathy and 10% have no evidence of autonomic neuropathy (Table-1).

Wu J et al compared autonomic dysfunction in underweight, normal weight, overweight and obese adults. The study compared HRV (heart rate variation during forced breathing) and HF (high frequency spectrum) power and correlated SDNN (the standard deviation of the average NN intervals) autonomic dysfunction in underweight, normal weight, overweight and obese adults. HRV and HF power were statistically significant for obese (p<0.01) but there were non-significant results for underweight and overweight (P= 0.86, 0.15 respectively). There was no significant independent correlation of SDNN with underweight (p=0.41), overweight (p =0.80) and obesity (p= 0.43) group. It was concluded that underweight was not a correlate of any indices of Cardiac autonomic function (CAF) but over weight and obesity were independently associated factors of altered CAF. 18

In our present study, we compared autonomic dysfunction in underweight, normal weight, overweight and obese COPD population. Parasympathetic function tests were statistically non-significant between underweight, normal weight, overweight, and obese COPD patients (P<0.64, P<0.24 respectively, table-3). Sympathetic function tests i.e BP response to postural change and BP response to cold pressor tests also were statistically non-significant between underweight, normal weight, overweight and obese COPD patients. (P<0.8, P<0.84, table-4). We also found non-significant correlation between BMI and autonomic function tests (table-2)

In present study most of the underweight COPD population have definite or borderline autonomic neuropathy (table-1) which was different from the results of study of Wu J et al. 18 This may be the reason that COPD patients have enhanced sympathetic tone at rest and are
less able to respond to sympathetic and parasympathetic stimuli in comparison to healthy persons. Previous study show that resting muscle sympathetic nerve activity is significantly higher in patients with COPD as compared to age and sex matched healthy control subjects.  

Studies show that plasma nor-epinephrine was elevated in patients with emphysema compared with healthy controls. Altered lung inflation reflexes may also mediate sympathetic activation in COPD.\textsuperscript{11,20} Sympathetic activation with its chronotropic effects may be responsible for elevated heart rate response seen in COPD patients.\textsuperscript{20}

In underweight COPD patients, neuro-humoral activation caused by sympathetic activation may be a cause of skeletal muscle dysfunction. This seems to involve the diaphragm and accessory respiratory muscles, with aggravation of ventilation disturbances characteristic for COPD. Chronic hypoxemia seems to play a role in sympathetic activation, even in healthy subjects.\textsuperscript{21}

The results of this study show that there was non-significant (weak positive, r-0.006) correlation for FEV\textsubscript{1} and PEF with increasing BMI [ FEV\textsubscript{1}(P-0.62, P-0.97), PEF(P-0.39,P-0.23) respectively, table-2]. Lad U et al found in their study that there was positive correlation in underweight male and female with FEV\textsubscript{1} and overweight male, and female had negative correlation with FEV\textsubscript{1}.\textsuperscript{21}

**Conclusion**

There were several studies available on effects of obesity on cardiac autonomic dysfunction and effects of COPD on cardiac autonomic dysfunction. But till date no study is available on combined effects of obesity and COPD on cardiac autonomic dysfunction. Therefore present study was done on evaluation of autonomic dysfunction with increasing BMI in patients with COPD. In present study, although the results have shown that there was definite autonomic neuropathy in patients with COPD with increasing BMI, there was no significant difference in autonomic dysfunction with increasing BMI in patients with COPD. Furthermore, in several studies we found that irrespective of the stages of the disease, underweight was an independent risk factor for cardiovascular complication and mortality. In mild and moderate COPD the best prognosis is found in normal weight or over weight subjects. In severe COPD, over weight, and obesity, is associated with better survival (obesity paradox, prognostic). Therefore we suggest that patients with COPD in the normal to overweight range have better prognosis.

**Limitations of the Study:** Our study was constrained by the small size of the sample available. The morbidly obese were not included in our study.

**Conflict of Interest:** The authors do not have any conflicts of interest to declare.

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**References**


Health Concerns in Elderly:  
A Survey and Public Education in Bhubaneswar, India

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Abstract

Background: While it is apparent that old age is associated with multiple health concerns the extent of its multiplicity suggestive of the burden is often not clear. It was intended to find out self-reported health concerns for the duration of one month and cardiovascular risk factors in older adults.

Method: In a cross-sectional survey attendees of a Healthy Ageing Conference were approached with a semi-structured questionnaire about their health concerns and cardiovascular risks. Risk of cardiovascular event in 10 years based on QRISK3 was calculated.

Results: A considerable proportion of elderly had range of physical symptoms, depressive mood state and memory problems. Mean number of health problems reported were 4.8±3.3 (male 4.4±3.1 and female 5.0±4.3). Cardiovascular risk was high, mean QRISK3 score for males were 22.2% (±14.4) and for females 10.3% (±6.6) (p<0.05). On an average the heart age was increased by 7.9±6.2 years (8.6±6.6 years for males and 5.0±3.3 for females). The relative risk was 2.1 for males and 1.5 for females. The symptoms and risk factors were elicited easily and the process probably facilitated improving the awareness about the health concerns holistically.

Conclusions: The results suggested the extent of health concerns in general and cardiovascular risks in particular and may help to reflect about required range of appropriate public health awareness and intervention programmes in the community.

Keywords: Ageing, awareness, cardiovascular diseases, education, illness, prevention, public health.

Introduction

It is well known that the disease burden increases with the age suggesting that older persons have more number of illnesses that the younger adults. Most of these are chronic non-communicable diseases. Amongst these cardiovascular diseases (CVD) are leading cause of mortality and morbidity worldwide and these are a specific concern for India.1,2 The burden of CVD is increasing in India over the years along with the prevalence of major risk factors.1 While this has reflected in increased number of people being investigated and treated for the CVD these days; however the efforts on preventing these illnesses do not seem to be in the forefront. Public awareness has risen over the years, although it is still rather low;3

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The risk of cardiovascular disorders is high among the Indian population; however, the awareness about it seems to be a concern. It was intended to study the feasibility of assessing the awareness of cardiovascular risk at a community level and providing the related information about remedial measures through a Health Passport approach.

Consecutive 38 individuals attending health camp were assessed for specific personal and family history of obesity, hypertension, diabetes, and heart disease. Current risk factors such as exercise, smoking, drug use, stress, and depression were ascertained, and body mass index (BMI especially considering that the risk factors are also rising. Alarmingly it has been reported that there is a growing vulnerability of lower socioeconomic groups to CVD, the section of population which may be less likely to be able to afford the cost of interventions. All these highlight the importance of prevention of CVD and the role of increasing public awareness and motivations to take health actions.

Besides CVD, many other age-related health concerns are prevalent and there is not much information about these, regarding their awareness, prevention potential, facilities for assessment and intervention. The prevalence of metabolic disorders is increasing along with many other non-communicable diseases. Information regarding diabetes, hypercholesterolemia, and other illnesses are certainly going to help in early detection and adequate management of these, ultimately decreasing the morbidity level.

There is a growing concern that the public awareness especially about the preventive measures, health actions and lifestyle issues is very low and these are not adequately addressed. We intended to find out self-reported health concerns for the duration of one month and cardiovascular risk factors in older adults through a survey. It may help to indicate the illness burden on the elderly.

**Method**

The survey was conducted during a Healthy Ageing conference in Bhubaneswar, India, in August 2018. It was a public health event where elderly people were invited to attend. The sample included all consenting older adults who attended the conference. The questionnaire of the survey were given to the elderly during registration and explained about it. Anonymity of the survey, option of non-participation or opting out at any point was conveyed. Support from a research assistant or a large print questionnaire were available for elderly who had difficulty in reading. Older adults were requested to complete the form in their own time and return at desk by the end of the day.

We used a semi-structured GeriCaRe Health Screening Questionnaire (GHSQ) which has 20 items covering various common ailments of old age, such as difficulty in vision and hearing, breathlessness, joint pain, weakness, appetite changes, tremors or slowness, lumps, bleeding, sleep problems, memory loss, depression, etc. with a ‘yes’ or ‘no’ response. These questions identify specific areas of concern and provide scope for further exploration. These were worded in a way general public can understand. Internal consistency for GHSQ in this sample was acceptable (Cronbach’s Alpha = 0.73).

We collected their demographic details of age and gender along with health related variables such as height, weight, waist circumference, smoking, diabetes, blood pressure treatment, family history of angina or heart attack in a first degree relative before age 60.

We also checked for presence of chronic kidney disease, migraine, rheumatoid arthritis, mental illness, systemic lupus erythematosus, erectile dysfunction and use of antipsychotic medication, steroids, based on the QRISK (qrisk.org). In addition there were options to provide any other health related information or investigation results.

All the elderly were provided with printed health related information on Healthy Ageing. There was a scope to discuss the health related problems and interact with the experts about the preventive measures during the course of the conference.

All the data were transferred to an excel database. We calculated individual 10-year risk for developing a heart attack or stroke using the QRISK3-2018 Web Calculator; selecting the ethnicity as Indian. The data were analysed in SPSS version 24.

**Results**

The response rate for the survey was 51.1%. The final sample consisted of 45 respondents. There were 34 males and 9 females and 2 did not provide their gender. Table 1 gives the details of health problems reported by both genders. Mean number of health problems reported
were 4.8±3.3 (male 4.4±3.1 and female 5.0±4.3, not significant) with a range of 0 to 12.

Body mass index (BMI) range was 17.7 to 30.5 with a mean of 25.2±2.8. Based on Asian cut off scores, we categorised BMI as low (18.4 or less), normal (18.5 thru 23), overweight requiring health action (23.1 thru 27.5) and obese (27.6 and above). The proportions of attendees with various categories of BMI were: low: 2.9%, normal: 17.6%, overweight 55.9%, and obese: 23.5%.

Variables suggestive of cardiovascular risk are given in table 2. There was no significant difference among the genders except for migraine, which was reported by only the females. With the available information about 5.6% had normal blood pressure, 44.4% had prehypertension and 50.0% had hypertension.

Analysis for QRISK3 score suggested that the mean score for males were 22.2% (±14.4) and for females 10.3% (±6.6) (p=0.05), compared with 12.5% (±7.9) and 6.7% (±4.0) respectively for a healthy person with the same age, sex, and ethnicity. On an average the heart age was increased by 7.9±6.2 years (8.6±6.6 years for males and 5.0±3.3 for females, not significant). The relative risk (RR) for males was 2.1 and that for female was 1.5.

Although it was evident that many people were aware of the ailments, however they were not aware about the exact nature of the risks and possible outcomes. There was inadequate engagement with health services or personal effort to deal with these. Most people were aware of the benefits of life style changes and other preventive actions, but their adherence was perceived as not optimum. Majority of the respondents (92.7%) found the public education information about different illnesses, preventive measures, lifestyle changes useful.

<table>
<thead>
<tr>
<th>Health concerns</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision difficulties</td>
<td>44.1</td>
<td>55.6</td>
<td>46.5</td>
</tr>
<tr>
<td>Hearing difficulties</td>
<td>14.7</td>
<td>11.1</td>
<td>14.0</td>
</tr>
<tr>
<td>Joint pain or restrictions*</td>
<td>35.3</td>
<td>44.4</td>
<td>37.2</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>14.7</td>
<td>22.2</td>
<td>16.3</td>
</tr>
<tr>
<td>Comparatively less physical activity leading to exertion</td>
<td>41.2</td>
<td>33.3</td>
<td>39.5</td>
</tr>
<tr>
<td>Physical/muscle weakness</td>
<td>41.2</td>
<td>66.7</td>
<td>46.5</td>
</tr>
<tr>
<td>Tremors</td>
<td>17.6</td>
<td>22.2</td>
<td>18.6</td>
</tr>
<tr>
<td>Increased thirst</td>
<td>5.9</td>
<td>11.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Appetite changes</td>
<td>20.6</td>
<td>11.1</td>
<td>18.6</td>
</tr>
<tr>
<td>Increased urination</td>
<td>29.4</td>
<td>33.3</td>
<td>30.2</td>
</tr>
<tr>
<td>Urinary problems</td>
<td>26.5</td>
<td>11.1</td>
<td>23.3</td>
</tr>
<tr>
<td>Defecation problems</td>
<td>26.5</td>
<td>22.2</td>
<td>25.6</td>
</tr>
<tr>
<td>Hernia or prolapse uterus/rectum?</td>
<td>2.9</td>
<td>11.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Dental problems</td>
<td>52.9</td>
<td>44.4</td>
<td>51.2</td>
</tr>
<tr>
<td>Sleep problems</td>
<td>20.6</td>
<td>55.6</td>
<td>27.9</td>
</tr>
<tr>
<td>Depressed or irritable mood</td>
<td>26.5</td>
<td>11.1</td>
<td>23.3</td>
</tr>
<tr>
<td>Memory problems</td>
<td>26.5</td>
<td>11.1</td>
<td>23.3</td>
</tr>
<tr>
<td>Unexplained weight loss</td>
<td>2.9</td>
<td>11.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Lumps or swellings</td>
<td>11.8</td>
<td>44.4</td>
<td>18.6</td>
</tr>
<tr>
<td>Bleeding</td>
<td>5.9</td>
<td>0.0</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Table 1: Self-reported health parameters in the last month by the older adults

Based on GeriCaRe Health Screening Questionnaire. Figures are in percentages. *p<0.05
Table 2: Cardiovascular Risk Indicators in both genders

<table>
<thead>
<tr>
<th>Cardiovascular Risk Indicators</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diabetes</td>
<td>38.2</td>
<td>22.2</td>
<td>34.9</td>
</tr>
<tr>
<td>• On blood pressure treatment</td>
<td>47.1</td>
<td>33.3</td>
<td>44.2</td>
</tr>
<tr>
<td>• Ex-smoker</td>
<td>17.6</td>
<td>0.0</td>
<td>14.0</td>
</tr>
<tr>
<td>• Family history of angina or heart attack in a 1st degree relative (parents, brothers, sisters, children) before the age of 60</td>
<td>23.5</td>
<td>22.2</td>
<td>23.3</td>
</tr>
<tr>
<td>• Chronic kidney disease (stage 3, 4 or 5)</td>
<td>2.9</td>
<td>0.0</td>
<td>2.3</td>
</tr>
<tr>
<td>• Atrial fibrillation</td>
<td>5.9</td>
<td>0.0</td>
<td>4.7</td>
</tr>
<tr>
<td>• Migraines*</td>
<td>0.0</td>
<td>33.3</td>
<td>7.0</td>
</tr>
<tr>
<td>• Rheumatoid arthritis</td>
<td>14.7</td>
<td>0.0</td>
<td>11.6</td>
</tr>
<tr>
<td>• Systemic lupus erythematosus</td>
<td>2.9</td>
<td>0.0</td>
<td>2.3</td>
</tr>
<tr>
<td>• Severe mental illness (schizophrenia, bipolar disorder and moderate/severe depression)?</td>
<td>5.9</td>
<td>0.0</td>
<td>4.7</td>
</tr>
<tr>
<td>• A diagnosis of or treatment for erectile dysfunction</td>
<td>8.8</td>
<td>0.0</td>
<td>7.0</td>
</tr>
<tr>
<td>• On atypical antipsychotic medication</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>• On regular steroid tablets</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Figures are in percentages. *p<0.001.

Discussion

The survey results conveyed the health concerns in general and CVD risks in particular in the attendees. Keeping in mind the limitation of a small sample size, few reflections can be made from the findings.

The survey process enquiring about a range of common health conditions in old age may increase the awareness about the current health status of the elderly holistically and help them to appreciate the ways and method to address those health issues through appropriate preventive or health management actions.

Health Concerns: A considerable proportion of older adults reported ill health; which is rather obvious. The results could suggest holistically what the major concerns were. While appropriate clinical assessment and investigations would suggest exact nature of the illnesses associated, the degree of health related concerns could be reflected from the average number of around 5 concerns.

It can also be gleaned that based on this screening and bringing to the fore all the health concerns, it was easier for the older population to be aware and reflect about the diagnoses possibly associated. So a screening questionnaire may help increasing awareness and communicating the health issues to the clinicians. This will help addressing the issues holistically rather than specifically which usually happens in highly specialised medical systems these days.

Specific Nature of Problems: Presence of multiple physical problems in the elderly as observed in this study have been reported elsewhere from India, and also to explore any gender and urban–rural difference morbidity.

Subject and Method:
A community-based cross-sectional study was carried out by house to house survey of all people aged over 60 years in an urban slum and a village in the field practice area of a teaching hospital. The total elderly population in these two areas was 407, with an almost equal representation from urban slum and rural area. Information (most of them self-reported with few variations. The tobacco and alcohol use in this studied population was considerably low. Our findings were in line with those from Chandigarh, where females reported higher morbidity in many areas; and more frequent health-related problems were cardiovascular, muscle and joint related problems.

A considerable portion had vision difficulties, weakness and easily getting physical exertion, joint pain and restriction were too common. These are suggestive of chronic non-communicable diseases which are becoming more common. It was surprising to note that half of the attendees had dental problem, similar to another report. It is probable that most people do not attend dentists and the services may not be adequately available.
Almost one in four had depressive or irritable mood state. In elderly, depression has been reported to be common in India, and is often associated with physical ill health. if any, was seen between depression and physical problems. The ‘patient group’ comprised of 40 drawn from MHI, Cuttack, having a depressive disorder (ICD-10). Similarly memory disturbances were reported too in around one in four. This suggested the need for detailed evaluation and monitoring to rule out cognitive impairments or early diagnoses of dementias. This is especially important as elderly population in India is increasing fast, and the dementia prevalence is considerable. Aging population is increasing in developing countries and dementia is going to become epidemic among elderly in the coming decades. This demands early action to prevent the disease and treatment of the affected persons, which is poorly existent in middle-and low-income countries. The need of the hour to tackle dementia in India is to estimate disease burden in the community, search for risk and protective factors of dementia, and undertake measures to provide social benefits to the sufferers and those who are at risk. Raising awareness among the public and general physicians is an important task ahead. In India, there is lack of good longitudinal studies which can provide true trend of the disease and determine risk factors, paucity of basic and clinical researches on dementia, poor awareness, and inadequate availability of social benefit. India, being a country of diverse ethnicity and cultures, has great advantages to carry out genetic epidemiological study. The information may be useful for undertaking remedial measure. This article will highlight the existing state of the above medical and social issues and deficiencies, so that the stakeholders can make adequate preparation to provide relief to the dementia patients and those who are at risk. It is expected that the medical and scientific community will draw attention to the medical problem with the help of governmental and non-governmental agencies, and the political leadership will be motivated to undertake the issue of providing socioeconomic benefit to families of the victims.

**Factors for inadequate non-engagement with health services:** Although it was not particularly assessed in this survey whether they have visited a doctor for their health reported problems, many themes emerged during the discussion. It is pertinent to discuss the reasons behind these. It was observed that in most cases older adults do not prefer going to clinics or hospitals. Often older people and their carers take the symptoms granted as a part of old age and neglect to address these. Some people may have financial problems, depression leading to hopelessness and inaction, even iatrophobia. However sometimes just the practicalities of travelling, long waiting, prolonged and repetitive investigations lead to disinterest; and they do not find the worth of taking the effort. Inadequate communications by the clinicians do not help as well. Often instead of feeling reassured following a visit, patients and their carers often perceive the message of dread and negative outcomes instead of possibilities and options, which leads to anxiety and avoidance of the interventions. Many times even suggestions from quacks and what someone else has found helpful are tried, rather than going for medical treatment.

**Cardiovascular risk:** Cardiovascular risk was prominent in the attendees, with 34.9% with diabetes, 44.2% with hypertensive treatment, and 23.3% having a family history of cardiac event in first degree relative before age of 60. Diabetes and hypertension are growing concerns in India, and there is an urgent need about controlling these risk factors adequately.

Males where at a higher risk (p<0.05) with around 1 in 5 chance of having a heart attack in 10 years, compared with 1 in 10 in female. This was evident by a relatively simple screening in community, and an appropriate explanation of the findings is expected to increase the awareness about it. This may help them to take appropriate preventive health actions along with the treatment.

Sleep problems were common too. One of the worrying issues associated with sleep problem is the use of over the counter sleep medications which are mostly benzodiazepines. These are known to be associated with side effects of cognitive impairment and risk of falls, besides the addiction problems.
regard individualised Health Passport can motivate, track and support to achieve long-term health action objectives.

**Background:** The risk of cardiovascular disorders is high among the Indian population; however, the awareness about it seems to be a concern.

**Aim:** It was intended to study the feasibility of assessing the awareness of cardiovascular risk at a community level and providing the related information about remedial measures through a Health Passport approach.

**Method:** Consecutive 38 individuals attending health camp were assessed for specific personal and family history of obesity, hypertension, diabetes, and heart disease. Current risk factors such as exercise, smoking, drug use, stress, and depression were ascertained, and body mass index (BMI).

While these findings are expected in the elderly, it appears that the existing systems of health care catering primarily to acute illnesses may not be geared to deal with these old age related issues. Specific geriatric assessment and treatment units may be better options which would provide holistic care.

**Conclusion**

The survey highlighted the huge prevalence of health concerns of elderly in the community. Most of these can be easily managed and many health actions can decrease the burden of these illnesses from prevention to effective management. Besides public education which is becoming common; evaluation of health concerns and risks and setting up individualised specific guidance on lifestyle changes, health promotion in a structured way may help the process of dealing with many preventable illnesses. Similarly, periodic, proactive basic health check-ups and focused attention to any emerging symptoms, clarity of communication from doctors and evidence based treatment approaches may help not only in early detection and management of illnesses but restore the confidence of elderly in the process, improving their engagement.

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**Conflict Interest:** There is no conflict of interest.

**Sources of Funding:** Self No external funding.

**Ethical Clearance:** Ethical clearance was taken from the Institutional Ethics Committee of Geriatric Care and Research Organisation (GeriCaRe).

**References**


Biomimics: Skeletal System to Structural System

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Abstract

Biomimicry is the concept of mimicking nature and is efficient in terms of its performance, sustainable and innovative in terms of solving a problem in a unique way rather than the conventional method and has future scope. In the field of architecture, the concept can be used to improve the design of the structure, its construction techniques and to reduce its impact on the environment. This knowledge makes us think in an innovative way for creating improved civil engineering and architectural structures. Human Skeleton is the highest evolving species. The human leg bone (Femur) carries the total weight of the body and the human hand bone (Humerus) acts as a tension member. Similar to the natural human skeletal elements, the column which is a structural element plays the major role in the building by transferring the total weight of the body to the earth surface. This key idea of nature is mimicking to the composite columns of the framed structures, which should withstand both vertical and horizontal loading of structure. Research is carried out to model a column similar to the stress pattern of the human leg bone and a tie member similar to the stress pattern of human hand bone. By which the human skeletal system is being mimicked to form a structural system for building construction. In this paper some of the bio inspired structures and the literatures related to biomimics and the femur and humerus bone analysis were discussed.

Keywords: Biomimics, Skeletal System, Structural Systems, Literature, Femur, Humerus.

Introduction

Biomimicry is a concept of innovative design that utilises information from nature and imitates it to arrive at a solution for the complex human problems. Nature is a wide region that educates us about systems, materials, processes, structures and aesthetics. Many problems are already been solved by nature. By digging deep into how nature solves its problems, we could attain an easy solution. The biomimicry concept is used to find innovative solutions in many field like engineering, architecture, product design and technology. Their usage may vary but the ultimate aim is to make products that are adaptive to life in long run. It reduces the destruction of natural resources and inspires the engineers to build more efficient structures.

The idea of imitation of birds to build a human flight was one of the earliest biomimicry example. Otto Schmitt, an American biophysicist illustrates the term Biomimetics as “the engineering and construction of materials and machines are arrived from the models created from the study of biological system”. His research was to design a device that reflects the biological system of nerve in squid. The notion of biomimicry is not only to give a sustainable solution but also to produce an eco friendly environment. Biomimicry is generally a study of an element or an organism in the environment and implementing those ideas in design by mimicking shapes, properties, process, method, which finally results in a safe structure.

Some of the important parameters involved in biomimicry are form, material, function, process and construction. Form refers to the shape and size of the element, material refers to the type of material of the element, its mechanical properties, function refers to the purpose and usage of the element, process refers to the working order of the element and construction refers to the building of the structure.

BIO Inspired Structures: Canopy structure in Brisbane shown in Figure 1 mimics the concept of expansive subtropical shade trees. The design is such that the metal louvers filters the sunlight entering inside the structure similar to the trees. The metallic panels which form the truss has been cut individually and fixed to match the complex shape.
The Beijing National Stadium in China shown in Figure 2 resembles the pattern of a bird’s nest. The stadium is made of web of steel sections in a twisting pattern like a bird’s nest. This structure has grand curving beams that criss-cross in an intercut pattern of woven steel.

In USA, Denver Airport shown in Figure 3 is one other example of this kind of architecture. Naturally occurring Rocky Mountains are the inspiration for this kind of structure. It has a tensile fabric roof like the shape of rocky mountains.

Nesenbach valley bridge shown in Figure 4 was inspired from the pattern of oak tree. The steel columns of the bridge were similar to the branches of the trees.

During Greek and Roman ages, trees and plants were a source for the structural columns. Corinthian column head in Pantheon shown in Figure 5 was constructed by studying the Acanthus plants. The leaves of the plants were considered and the column head was prepared as per the pattern.

Transbay tower in San Francisco shown in Figure 6 depicts the concept of spiral systems like hurricane, sea shell, spider web, etc. Anthony Michell in 1904 developed a mathematical derivation on the perfect cantilever, the structural system of the tower is based on his concept. This structure takes minimal raw materials and gives a very effective design.
Nature as a Structural System: Human skeletal system as shown in Figure 7 is a framework connected by bones. The skeletal system has its own shape, size and properties and behaves in a particular manner when an external force acts on it. Femur bone is a thigh bone and is one of the important part of human body. These bones are responsible for actions like sitting, standing, walking and jumping. It has a complex shape and has different compositions.

Humerus bone is the longest hand bone that connects from shoulder to elbow. The upper end has a cylindrical shaft that is fitted in a socket in shoulder and the lower end is connected to elbow. The human body has structural joints like roller, hinged and fixed and different parts of the body. Human body also undergoes both tensile and compressive forces.

Biomimicry to Increase Sustainability: Biomimicry is described as a tool to increase the sustainability of human designed products, materials and the built environment. It should be noted however that a lot of biomimetic technologies or materials are not inherently more sustainable than conventional equivalents. The built environment is increasingly held accountable for global environmental and social problems with vast proportions of waste, materials and energy use and greenhouse gas emissions attributed to the habitats humas have created for themselves. It is becoming increasingly clear that a shift must be made in such a way how built environment is created and maintained. Mimicking life including the complex interactions between living organisms that make up ecosystems is both a readily available example for humans to learn from and an exciting prospect for future human habitats that may able to be entwined with the habitats of other species in a mutually beneficial way. Architectural biomimicry in general yet to be tested in built form, design that mimics how most ecosystems are able to function in a sustainable and even regenerative way, has the potential to positively transform the environmental performance of built environmental performance of the built environment. Some of the few examples for biomimicry which increased sustainability are shown in Figure 8.
Literature Study

Anjali Prashant K shirsagar, et al., (2017) tells about some of the nature inspired building structures. Nature has always been a source of inspiration for the human beings. Biomimicry can be used in various fields like engineering, architecture, material development fields. Biological organisms that have been refined over billion year research, their technologies or design can be used for solutions of the present day problems. This paper has shown new approaches to the field of architecture by discussing various bio inspired buildings.\(^{(1)}\)

Neelesh K. Sharmaa (2017) has done analysis of humerus bone. Humerus bone is the longest bone connecting shoulder to elbow. They have two cups: shoulder cup and elbow cup. The cup radius was varied in humerus bone and biodynamic response in terms of modal frequency and mode shapes was found out. The humerus bone was designed by Solid Edge. It was observed that the difference in natural frequency is less for the four different sizes and also the cup variation were the shoulder cup radius is less and elbow cup radius is more was found to be the standard variation. ANSYS as found to be the most suitable software to analyze complex shapes.\(^{(2)}\)

Moheb Sabry Aziz and Amr Y. El sherif (2016) discusses biomimicry in structures. Biomimicry helps designers in solving human problems. Few bio inspired structures are discussed. Biomimicry approaches are Design looking to biology (Top-Down approach) and Biology influencing design (Bottom-Up approach). Using computers reduces the complexity of modeling the nature.\(^{(3)}\)

Nithin Kumar KC and Tushar Tandon (2015) have done analysis of femur bone. Femur bone is an important bone in human body. It gives support during few movements like standing, sitting and walking. The material properties of the femur bone are discussed. Modelling of Femur bone in Solid Edge V19 during normal walking, standing, running and jumping activities and the stress analysis was done by ANSYS 14.0. The stress at which the failure of bone occurs is found out and the thickness and type of material required to repair the fractured bone is found.\(^{(4)}\)

Ashwani Kumar, et al., (2014) has done analysis of femur bone by finite element method. The modelling of the bone was done in SOLIDEDGE and the finite element analysis was done in ANSYS 14.5. these software has made it easy in modelling and analyzing complex shapes. The femur bone was analyzed for free-free and fixed–fixed boundary conditions. The natural frequencies and natural vibrations were examined for these conditions. It was observed that sudden accident and continuous application of load were the reasons for failure of femur bone.\(^{(5)}\)

Sumit Kumar Majumder, S.M and Purnachandra Saha, M (2014) tells about the examples of biomimicry structures. Biomimicry includes mimic of shape, properties, method, principle and processes of the nature.
Bridge design is derived from the load carrying process of a tree. A passive cooling system could be developed by mimicking a termite mound. There is reduction in material consumption and decrease in pollution.\(^{6}\)

Neelesh Sharma, Brijesh Yadav (2014) studied the natural frequencies and mode shapes of hand bone during vibration. Finite Element Analysis is a mathematical technique used for the analysis of complex objects and geometries. Analysis is done with two boundary condition, free-free(fixed in centre) and fixed-fixed boundary condition. All degree of freedom of boundaries are subjected to variations in free-free, and constraints in boundaries in fixed-fixed.Fixed-fixed boundary condition is more appropriate and it describe biodynamic behavior.\(^{7}\)

Mohd Syahrul Hisyam Mohd Sani, et al., (2013) discusses about biomimicry in civil engineering. This idea gives an economic way of construction, it improves the efficiency and reduces environmental degradation. This paper shows us ideas regarding biomimicry in concrete section. The materials are replaced which mimics the natural coarse aggregate in concrete. They have listed some bio-inspired shapes used in structures and case studies on mimics in concrete. They have concluded by saying that bio mimicry can be introduced in the industry to produce innovative, efficient and creative solutions. They have also said that in future biomimicry can be used in cold formed steel structure that can solve many problems and reduce the cost.\(^{8}\)

S. Lokanadham, N. Khaleel, P. Arun Raj (2013) studied the statistical and morphometric analysis of humerus bone is done for the purpose of determination of sex.In this 100 adult humerus bones were taken and measured 14 different parameters by using metal sliding caliper, Osteometric board, and Tape.\(^{9}\)

Yousif. A.E. and Aziz. M.Y. (2012) has done biomechanical analysis of human femur bone during normal walking and standing conditions. The stress patterns of the bone under such conditions are observed. It is found that the stress is more at the neck region of the bone for both the conditions.\(^{10}\)

Umadevi and Geethalakshmi (2011) explains the main functions of the skeleton system which are; to support and movement. The skeletons provide the framework which supports the body and maintain its shape. The joint between bones permit movement, some allows a wider range of movement than other e.g.: the ball and socket joint allows a greater range of movement than the pivot joint at the neck. They mentioned that bone is tough and rigid form of connective tissue. It is the weight bearing organ of human body and id responsible for almost all the strength of human skeleton.\(^{11}\)

Raji Nareliya and Veerendra Kumar (2011) deals with analysis of femur bone. The accurate geometry and material properties are studied to find the mechanical behavior of bones. The femur bone is analyzed in ANSYS with physiological load conditions. The stress distribution, total deformation and fatigue failure of femur bone is detected.\(^{12}\)

Zadpoor. A.A. (2006) explains about the humerus bone which is like a cylindrical shaft with two hemispheres attached to its two ends. It is considered as homogeneous and isotropic material. The vibration study of the natural frequency and natural modes was done by finite element method. The effects of boundary conditions and geometry on natural frequencies were studied. Natural vibrations are decreased with enlargement of geometrical dimensions.\(^{13}\)

Lensfeld and Kaminsky (1998) has done comparative study on geometry–based and CT voxel–based finite element modelling and validated by strain gauge measurements i.e. experimental validation. Geometry–based meshing requires the extraction of inner and outer contours from CT scan of bones whereas voxel–based meshing usually implies that the element faces are oriented parallel to the three orthogonal axes defined by the coordinates system of CT scan.\(^{14}\)

Lensfeld and Kaminsky (1996) three dimensional finite element models of the human femur created based on post processed computed tomography data meshing with brick element. Three different material properties were modelled for sensitivity analysis which demonstrated that the strain energy density patterns of different femoral parts. They found the most sensitive to the variation of the resultant force within sagittal plane i.e. plane in the direction from dorsal to ventral.\(^{15}\)

Conclusion

Biomimicry helps to solve human problems. With the above literatures, the idea of mimicking human leg and hand bones to compression and tension member is being implemented for research. By which the skeletal system is mimicked to form the structural system. Thus an optimized model of compression member
and tie member similar to stress pattern of femur bone and humerus bone will be developed. This results in economic, effective, efficient and sustainable structure.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** With the submission of this manuscript I would like to undertake that:

All authors of this research paper have directly participated in the planning, execution, or analysis of this study.

All authors of this paper have read and approved the final version submitted;

- The contents of this manuscript have not been copyrighted or published previously;
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- There are no directly related manuscripts or abstracts, published or unpublished, by any authors of this paper;
- My Institute’s representative is fully aware of this submission.

**Reference**

Assessment of Performance of Services for Three to Six Years Old Children in Urban Anganwadi’s in Kozhikode Corporation in Kerala: A Cross Sectional Study

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Introduction: Integrated Child Development Services is the largest national programme for the development of mothers and children in the world. The services are rendered through Anganwadi worker (AWW) at Anganwadi centre (AWC). An evaluation study is carried out to assess the services provided by the anganwadi centres to 3 to 6 year old children in Urban ICDS blocks in Kozhikode Corporation to study the shortcomings in implementation, improving the services and in decision making of the programme.

Method: A cross sectional descriptive study was carried out in 4 urban ICDS blocks in Kozhikode. Data was collected using pretested semi structured questionnaire and by observation of anganwadi centres and records at the time of visit and interviewing anganwadi workers and anganwadi helpers.

Results: Among 117 anganwadi centres, 73(62.4%) of AWC’s provided average services to 3 to 6 year old children, only 26(22.2%) of centres provided good services and 18 (15.4%) of AWC’s with poor performance needs to be targeted for improvement.

Conclusions: There is a need for effective coordination between the health functionaries and the anganwadi workers in immunisation, growth monitoring, health checkups and referral services, nutrition and health education.

Keywords: Supplementary nutrition, Preschool education, Health checkups, Referral services, Immunisation, Health education.

Introduction

“The lives of children are the important indicators for the development of communities and nations, the health of the youngest and most vulnerable are vital to nations economy, hence special programmes were launched in India for these under 6 years who constitutes 13.1 % of population in India(1). Various national programmes launched for health of children such as, mid day meal (1962-63), Balwadi–community child care centre (1970-71) and Special nutrition programme (1970-71), Integrated Child Development Services (ICDS) scheme (1975).

ICDS is the largest national programme for the development of mothers and children. The beneficiary includes children less than 6 years, pregnant and lactating mothers, women in the age group between 15-44 years. The package of services provided by ICDS scheme includes Supplementary nutrition & Growth monitoring, preschool education, Immunisation, Health checkups, referral and Nutrition and Health education services. The services are rendered through Anganwadi worker (AWW) at Anganwadi centre (AWC).

ICDS has expanded remarkably in its scope and coverage, and today it covers around 33.738 million children between three to six years of age, 39.871 million children between 6 months to three years, 18.047 million children between 3 years to 6 years, and 63.684 million children below 3 years.
million expectant and nursing mothers\(^2\)). In Kerala, it covers around 4, 6249 children between three to six years of age and 4, 21540 children between 6 months to 3 years and 1, 95927 pregnant and lactating mothers\(^2\). A number of studies on evaluation of ICDS centres are available but there is a scarcity of studies regarding the functioning of urban ICDS blocks. In Kerala there are 11 urban ICDS blocks functioning of which 5 are in Kozhikode, so an evaluation study was undertaken to improve the childcare services at urban areas in Kozhikode.

**Method**

A cross sectional descriptive study was carried out in 4 urban ICDS blocks in Kozhikode city. Using Simple random sampling method sample size of 117 anganwadi centres were selected from total 543 anganwadi centres in Urban Kozhikode Corporation. Keeping in view of prevalence of average and below average anganwadis in a study in Bangalore city by Vaijayanthi et al in 2010 noted as 54%, a confidence level of 95%, absolute precision of 9.2%, a sample size of 117 anganwadi centres was calculated\(^{14}\). Data was collected over a period of one year from July 2012 to June 2013. Ethical clearance was obtained from institutional ethics committee and relevant permission from Social welfare department in Kerala. Using various tools for data collection which included pretested semi structured questionnaire and by observation of anganwadi centres and records at the time of visit and interviewing anganwadi workers andanganwadihelpers. An ad hoc-scoring system for services was devised and the AWC’s were graded. The Anganwadi centres that have achieved more than 75% of scores were graded as Good, 50 to 75% as Average and less than 50% as poor. Data entered in MS excel and analysed using SPSS Software.

**Results**

A total of 117 anganwadi centres were selected from 543 anganwadi centres in Urban Kozhikode Corporation.

Out of 117 urban anganwadi’s, majority of the anganwadi’s 100(85.47%) covered a population of 800-1600, in 10 (8.55%) had more than 1600 population and Only 7(5.98 %) anganwadis covered a population of less than 800.

The total number of children 3 to 6 years in urban locality was 4517. Around 2325 (51.5 %) were registered in anganwadi centres out of 4517 three to six yearold children in the locality of which 1159 (49.84%) were boys and 1166(50.16%) were girls. However only 1535 (66.02%) were utilised services against the registered 2325 three to six year old children. The results are discussed based on the package of services provided by ICDS scheme includes Supplementary nutrition & Growth monitoring, preschool education, Immunisation, Health checkups, Referral and Nutrition and Health education services.

It was observed that most of the anganwadi centres, (82.1%) had more than 75% attendance of enrolled children for Supplementary Nutrition Programme. In all the anganwadi’s foodis prepared in the centre itself. Take home foodis not given to the children. The model menu supplies total calories-500 kcal and total protein-12.15 gm to children as per norms. There is no irregularity in food supply. The mean duration of feeding days in last one year was noted to be 268.85(± 3.33) days which was lesser than the ICDS norms.

About (72.6%) of anganwadi’s had more than 80% attendance of enrolled children for Preschool Education. The mean time spent in preschool activity was 2.28(±0.412) hours. In the present study, at least 3 or more types of language activities and Small activities like rhythmic movements, dramatisation was conducted in all the anganwadi’s. Lesser number of indoor play activities and outdoor play activities were noted as shown in table 1. Natural walk, outings, field trips were not conducted in any of the anganwadi’s. Language activities like storytelling, songs and rhymes were conducted in all anganwadis but writing was conducted only in (57.3%) of anganwadi centres. Similarly among anganwadi centres (117), indoor activities noted were drawing & painting (35.9%), paper cutting-folding (38.5%), threading (59.8%) respectively. About (58.9%) had outdoor activities like ball/swing.

**Table 1: Major Preschool Education activity conducted in anganwadi’s**

<table>
<thead>
<tr>
<th>Preschool education activity</th>
<th>No. (n=117)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language activities ≥ 3</td>
<td>117</td>
<td>100</td>
</tr>
<tr>
<td>Indoor play activities ≥ 3</td>
<td>46</td>
<td>39.3</td>
</tr>
<tr>
<td>Outdoor play activities ≥ 3</td>
<td>13</td>
<td>11.1</td>
</tr>
<tr>
<td>Small activities</td>
<td>117</td>
<td>100</td>
</tr>
<tr>
<td>Outings</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In the present study among 1535 children, there were no Unimmunised children in anganwadi
centres, the coverage of fully immunised children was 1258(81.95%) and partially immunised children was 277(18.05%). The coverage of DPT 3 doses was 88.9%, the OPV 3 doses was 88.9 % and the measles coverage was 85.9% as shown in Table 2. Vitamin A was not given to any of the children during last 1 year in anganwadi centres as shortage of Vitamin A was reported by state administration and it was not available.

Table 2: Individual Vaccination Status of Children

<table>
<thead>
<tr>
<th>Immunisation</th>
<th>No. of children (n = 1535)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>1535</td>
<td>100</td>
</tr>
<tr>
<td>DPT (3Doses)</td>
<td>1365</td>
<td>88.93</td>
</tr>
<tr>
<td>OPV (3Doses)</td>
<td>1365</td>
<td>88.93</td>
</tr>
<tr>
<td>Measles</td>
<td>1320</td>
<td>85.99</td>
</tr>
<tr>
<td>DPT 1st booster</td>
<td>1197</td>
<td>77.98</td>
</tr>
</tbody>
</table>

In this study out of 1535 children, 276(17.98%) of children were moderately underweight and 30(1.95%) were severely malnourished as per the WHO Growth chart. In (72.6%) of anganwadi centres, more than 80% of enrolled children were weighed monthly. The growth registers were maintained regularly for all the children in all the centres.

The average number of health checkups conducted in a year was noted to be 9.41 (± 2.934). The ranges was 4 to 12. In (86.3%) of anganwadi centres had more than 6 health checkups during last 1 year. For health checkups, in (52.1%) of anganwadi’s, health workers made monthly visits and in (47.9%) they made 3 monthly visits .In (46.15%) of anganwadi’s there were monthly or 3 monthly visits by medical officer and in (53.85%) visits were infrequent. In (69.2%) of anganwadi’s had more than 80% coverage of enrolled children for health checkups during last 3 months.

Almost all the anganwadi’s have a practice of referring children to sub centre or urban health centre or district hospitals. Among 117 anganwadi worker’s, 36(30.8%) and 56(47.9%) of workers have referred to medical college and private hospitals respectively too.

More than nine sessions were conducted only in (24.8%) of anganwadi centres and (75.2%) of the anganwadi’s conducted 5-9 health education session during last one year. The mean number of health education session was noted to be 7.68(±2.188). The average attendance of women at the health education sessions was 18.51(±7.848). Only 10.96% of women between 15-45 years in the area attended the session. The average number of sessions in which health personnel participated was noted to be 3.74(±0.675).On an average 48.18% of the session was conducted by the health personnel. Some of the topics discussed were prevention of malnutrition, common childhood disease/ARI, growth monitoring, safe drinking water, diarrhoea prevention, breast feeding, immunisation, complementary feeding, hygiene and sanitation, complementary feeding .In all the AWC’s more than 6 topics were discussed during last one year.

Based on scoring the results of provision of services to 3 to 6 years old beneficiary children, the grading of anganwadi centres is shown in figure 1. Among 117 anganwadi centres, 73(62.4%) of AWC’S provided average services to 3 to 6 year old children whereas only 26(22.2%) of centres provided good services. 18(15.4%) of anganwadi’s with poor performance needs to be targeted for improvement.

Fig. 1: Grades of Provision of Services to 3 to 6 years Old Beneficiary Children
Discussions

Similar to our study findings, the NCAER report (2001 India) showed that 60% of the children were noted to be enrolled in the anganwadis (3). The NIPCCD study (2006 India) showed that 63% of the eligible children were enrolled in AWC’s and out of these 75% were availing benefits (4). The Pratichi child report (West Bengal 2009) noted 50% attendance among eligible children (5).

Similar findings were by noted in Delhi study (Neenv in 2006) with 100% of the centres providing supplementary nutrition (6). In contrast to the present study, Arundathi dhuru et al in Uttarpradesh reported that only 23% of AWC’s had regular Supplementary Nutrition Programme (7). According to the Moribund ICDS–study on child survival issues by Vikas Samvat, Sanket et al (In Madhya Pradesh 2009), cooked meals were given only in 28% of anganwadi centres (8).

A study by Seema et al (Kerala 2001) noted that in only 53% of anganwadis story telling was conducted, and 60% of centres undertook painting (9).

Immunisation coverage is similar to DLHS-3 study (Kerala) where 79.6% were fully immunised, 19.9% were partially immunised and only 0.5% were unimmunised (10). The present study reveals a higher proportion of fully immunised children (81%) as compared to DLHS-3 data of Kozhikode (65%) (10). Our findings are similar to DLHS-3 (Kerala) where coverage of DPT 3 doses was 87.1%, the OPV 3 doses was 86.6% and the measles coverage was 87.9% (10).

DLHS-3 in Kerala noted that 35.8% among children between 0-6 years were moderately under weight and 9.3% were severely malnourished. In Kozhikode 46.6% children were moderately under weight and 18.7% were severely malnourished (10) which was higher than the present study.

In contrast to present study Health checkups in Orissa was irregular based on a study-gram sabha for social audit of ICDS programme (2007) by Adhar(11) anda study on human development in India–challenges for a society in transition in Madhya Pradesh in 2009 (WHO and UNESCO) showed that health checkups and referral services was the weakest link of ICDS (12). A Study by Dayanandh singh et al (Rajasthan 2013) noted that referral services were received from 30% of anganwadi workers (13). A study by Seemetal (Kerala 2001) showed that 63% of AWC’s were not visited by medical officer (3) as similar to our findings.

Similar to the present study low percentage of attendance of women was noted in Jammu and Kashmir study (2009 PRC)-35% (3) and ICDS study (UP)-5% (7).

Conclusion

In conclusion, the study revealed that in majority of anganwadis the performance of services provided to 3 to 6 year’s old beneficiary children in urban Integrated Child Development Services blocks in Kozhikode Corporation was noted to be average. The supplementary nutrition services provided under Anganwadi centres is noted to be as per Integrated Child Development Services norms and there is no irregularity in food supply. But low enrolment and attendance of the children for SNP is a drawback. There was not much variety in food items served in Anganwadis. Under non-formal Preschool education services more emphasis is being on language activities whereas indoor and outdoor play activities are less. Majority of the AWC’s showed average performance in relation to immunisation services. A few partially immunised beneficiaries in the AWC’s are notable finding. Health checkups were mainly conducted by the female health workers and with lesser involvement of Medical officers. Though Growth chart monitoring and maintenance were regular, presence of malnourished beneficiaries are noted which suggests lack of timely intervention. This may be linked to the fact that the attendance of women in nutrition and health education sessions were noted to be low. The practice of referral services in AWC’S was found to be satisfactory. Based on scoring and grading more attention needs to be given to Preschool education, health checkups and nutrition & health education. According to mother’s perception health checkups and health education services were poor. There is a need for effective coordination between the health functionaries and the anganwadi workers in immunisation, growth monitoring, health checkups and referral services, nutrition and health education.

Conflict of Interest: Nil

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References


Incidence and Pattern of Bear Maul Injuries in Mount Abu

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Abstract

Background: Bears typically compete directly with humans for space, food, security and cover. Frequent numbers of casualties with bear maul injuries observed in our hospital which is located in the Sloth Bear sanctuary of Arravali range, prompted us to undertake the study of incidence & pattern of such injuries in our department.

Materials and Method: This study was both retrospective and prospective covering a period from 2001 to 2018. The pattern of bear maul injuries in term of time, location, provocation, animal/human group behavior and the injury type/distribution were recorded and analyzed.

Results: Only a total of 27 cases were registered in 17 years. All the injuries were caused by Sloth Bears alone. Most of the patients were middle aged to elders. In our study, males were victimized more (74.1%) than females (25.9%). Most of the incidents (66.7%) occurred in early morning time. In our observation 51.9% of accidents happened in croplands and 25.9% in forest.

Bear attacks were unprovoked in 81.5% cases. The face and head were injured in 74.07% cases followed by trunk and upper limb in 70.37% cases. Abdomen and lower limbs were injured in 37% cases. In spite of devastating injuries, mortality was 0 in our study.

Conclusion: The relatively low incidence of bear attack in the region of Mount Abu may be an indication of a harmonious man-animal existence. Eliminating the need for open defecation and collection of fire wood by the tribal population can go a long way in further improving the man-animal coexistence equilibrium.

Keywords: Bear Maul, Bear attack injuries, Multiple Injuries, Man–animal conflict.

Introduction

Sloth bears (Melursus Ursinus) are distributed from the southern tip of the Western Ghats Mountains to the foothills of the Himalayas. Bear population has declined due to habitat degradation with increased human population, diminished food resources and increased poaching for the bearbody parts.1,2 Sloth bears are attracted by anthropogenic food. They rarely prey on other animals.3 Bears typically compete directly with humans for space, food, security and cover.4

Sloth bears reportedly can attack without apparent provocation and may encounter humans when they raid croplands or when people enter forests to collect forest products. Sloth bears likely view humans as potential predator.5 Bear maul injuries vary from minor scratches to major trauma involving fractured bone, joint damage, skin and deep tissue injuries. Bear maul injuries to the head & neck region can result in facial disfigurement with distressing physical and psychological consequences.6,7

Mount Abu is an old wild life sanctuary blessed with different fauna and flora. Mount Abu was declared an Eco Sensitive Zone in 2009. 359 Sloth bears found safe habitat in Arravali range according to 2016 census. Apart from Sloth bears, other wild animals causative for human attacks are Leopards, Fox and Wolves found in good numbers in Mount Abu’s forest.8

Bear attacks constitute only 0.1% of all animal attacks in India.9 The incidence is obviously high in areas where bear population is high. Our hospital is situated in one such bear sanctuary (Mount Abu Eco...
Sensitive Zone), and a frequent numbers of casualty observed in our hospital with bear maul injuries prompted us to study the pattern & incidence of bear maul injuries. This is a hospital based study conducted by the department of General Surgery, J.W. Global Hospital & Research Centre, Mount Abu, Rajasthan which is a rural multispeciality hospital located within forest covered by Arravali ranges, where sloth bears are prevalent. In addition to studying the pattern of bear maul injuries, their frequency, type of encounters and seasonal variations were studied as well.

Material and Method:

This study was both retrospective and prospective in J.W. Global Hospital & Research Centre, Mount Abu, Rajasthan. Retrospective data of bear maul cases admitted to this hospital from 2001 to 2015 were collected retrospectively from the Medical Records Department of our hospital. Prospective study was continued till March 2018. Information regarding detailed history, seasonal variation, location of bear-human encounter, circumstances under which attack occurred and nature, duration and termination of attack were collected and analysed.

Results

A total 27 cases, 0.06% of the total hospital admissions were registered in this case series. All the injuries were caused by sloth bears only. Most of cases (51.9%) encountered with single bear except in (22.2%) where bear was accompanied by cubs and in (18.5%) incidents bears were in group. Most of the patients were middle aged to elders where (51.9%) patients were from >40 years age group and (40.7%) of 25-40 years age group. In our study, males were victimized more (74.1%) than females (25.9%). Most of the incidents (66.7%) occurred in day time (6AM-8PM) where majority of incidents occurred in early morning time. In our observation most of accidents happened in croplands (51.9%) and forest (25.9%), only a few incidences occurred in villages & crowded civic places (18.5%). Most of the times the victim was alone during human bear encounters (88.9%) & bear attacks were unprovoked in (81.5%) cases. Most of cases were encountered in the month of March & September. There was no peak season observed for human–bear encounters in Mount Abu. Termination of attack was spontaneous in (22.6%) of cases while in other cases victims rescued themselves or helped by others.

All 27 cases were involved with soft tissue injuries (100%), bones were injured in 14 (51.8%) cases while visceral organs involved in 7 (29.6%) cases.

The face and head were injured in 20 (74.07%) cases followed by trunk and upper limb in 19 (70.37%) cases. Abdomen and lower limbs were injured only in 10 (37%) cases. Avulsion/loss in 19 (70.37%) of scalp were noted in half the cases i.e. 14 (51.8%) and skull fractures only in 3 (11.11%) cases among head injuries. Facial fractures were found in one third (33.33%) cases, mostly involving nasal and maxilla bones. The nose was predominantly involved structure in face with laceration, fracture and avulsion led to major disfigurement of face.

The eyes were injured in 12 (48%) cases of which 7 (28%) lost eye function and 3 (12%) lost eye globe directly or indirectly as a result of bear maul injuries. Lip laceration occurred in half the cases (51.85%) along with injuries of nose and mid face area.

The ears were involved in 2 cases with loss of part of ear in 1 case and avulsion in the other.

In the extremities most commonly upper limbs were injured with fractures in 8 (32%) cases. Most commonly involved fractures were radius and ulna in 5 (20%) cases, ribs in 2 (8%) cases and clavicle in 1 (4%) case.

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Photograph: 1 showing extensive avulsion of scalp with bilateral orbital injuries
Photograph: 2 showing avulsion of scalp with cranial bone fracture

Discussion:

J.W. Global Hospital & Research Centre (GHRC) is a major health care centre situated amidst the Mount Abu Eco Sensitive Zone. Almost all cases of animal attacks come to this hospital for primary and/or definitive treatment. A total number of only 27 cases of Bear Maul injuries in 17 years is a very small number of incidents of human bear conflicts in contrast to studies undertaken in Himalayan range, Central India and North Gujarat. Altaf Rasool recorded 417 cases from 1990 to 2007\(^\text{10}\), 254 cases with bear attacks studied by Shafaat Rashid TAK from 2003 to 2007\(^\text{11}\) and Ajaz Shah recorded 200 patients of bear mauling from 2005 to 2009 in Kashmir valley\(^\text{7}\). H.S. Bargali et al studied 137 case of bear attacks from1998 to 2000\(^\text{12}\) and Aniruddha H. Dhamorikar et al interviewed 166 victims of bear maul injuries from 2004 to 2016\(^\text{13}\) in Central India (Chhattisgarh & Madhya Pradesh respectively). This small number of cases in our study is probably due to harmonious existence of man and animal in this region. Mount Abu was declared an Eco Sensitive Zone in 1991 and very limited construction activities have occurred in this region since then. The village population is largely tribal which is in equilibrium with man animal coexistence. Most of the incidents of human bear encounter were due to encroachment of human in bear habitat for forest resources like water, fire wood, honey and other plant products. The habit of defecation in open field is another human activity which provokes men to venture into the forest in the wee hours.

In our study majority of bear attacks were unprovoked (81.5%) similar to other studies like Altaf Rasool et al, Ajaz Shah et al\(^\text{7,10}\) recorded (93%) and (92.8%) unprovoked attacks respectively. Single bear was involved in (51.9%) cases, bears in group were involved in (18.5%) and bears with cubs were noticed in (22.2%) incidents. In all incidents where bears were found with their cubs, attacks were unprovoked as the sow becomes protective to her cubs and finds human as a predator. These data are supporting studies conducted by KS Abdul Samad\(^\text{14}\) where (57%) attacks were by solitary bears and 33%of attacks were by mother bear with their cubs, Aniruddha H. Dhamorikar et al \(^\text{13}\)observed 60% attacks by single bear, (15%) by group of bears and (25%) attacks with sows with cubs where H.S. Bargali et al\(^\text{12}\) also recorded (56%) cases by solitary bear and (41%) cases by bears in group. In our study animal ran away after attack in (22.2%)cases, in (37%) cases victim rescued by helper and in (29.6%) cases victim rescued themselves.
In our study majority of victims were male in 74.1% accidents as mostly men are breadwinner and involved in activities like farming and wood harvesting in Mount Abu. Male predominance also observed in other studies like by Altaf Rasool et al\textsuperscript{10} and Shafaat Rashid et al\textsuperscript{11}, where (80.33\%) & (71.7\%) victims were men respectively. Majority of victims (51.9\%) were aged >40 years, (40.7\%) cases were in age group of 25-40 years. This data supports other studies where majority of victims were middle age group 25–40 years.

Most of human bear conflicts (66.7\%) occurred in early morning 6am–8pm when people venture out for access to water, working in farm fields and also for defecation activity. Most of studies conducted on bear attacks on human in India evidenced early morning incidents.

In our study, human bear encounters occurred in (51.9\%) at civic secluded places, mostly in crop fields during harvesting crop, fruits and around water sources. 25.9\% incidents noticed in forest as majority of population in Mount Abu are depended on wood as fuel and other forest products like fruits, plants and honey. 18.5\% bear attacks occurred in townside in crowded area where bears were attracted to food & music. Mount Abu being a tourist place is a hub of many hotels and food stalls. Other studies conducted in bear habitat also observed majority cases in civic secluded places like farm fields and fruit garden.

There is no obvious peak season for human bear encounter noticed in our study. Most of the cases of bear attacks, 8 cases in March and 6 cases in September were observed in this study series. As after winter, March is the month of harvesting and September is the end of monsoon when bears are attracted to termites, insects, berries and black plum (jamun) in this region. In other studies peak season of bear attacks varied according to different geographical and weather condition, but most of the studies in Himalayan range observed human bear encounters during July to November. Aniruddha H. Dhamolikar et al\textsuperscript{13} recorded 40 \% cases in summer, 35\% in monsoon & 25\% in winter.

Most victims were injured over head & face in (74.07\%) cases, found to be commonest injured part of body. Face & Head commonly injured in bear attacks evidenced by studies of Altaf Rasool et al\textsuperscript{10}, Ajaz A.Shah et al\textsuperscript{7}, N.T.Geetha et al\textsuperscript{15} and Nikhil Puri et al\textsuperscript{16}. The reason behind common involvement of the head & face region could be that the bear can easily stand on his hind legs and attacks on prominent parts of face and head region with paws/claws to become dominant in human bear encounter and weaken opponent as most of the times the bear attacks are defensive.

In most cases involving Bony fractures, Facial & skull fractures were involved mostly in our study. 33.3\% facial fracture & 11.1 \% cases with skull fracture were noticed followed by upper limb fractures in 32\% cases. Altaf Rasool et al\textsuperscript{10} Observed 31.41\% case of facial fracture and Nikhil Puri et al\textsuperscript{16}, Ajaz A.Shah et al\textsuperscript{7} observed a majority of facial fractures in their series–mostly involved zygoma & nasal bone. This observation concludes face & head easy target for bears as they are prominent areas of body fixed by bear paws & claws. In our studies all cases had soft tissue injuries and 29.6\% cases with visceral injuries. Since viscera are deeply seated, only injured when there is a major avulsions, fall injury or puncture wound occurs during bear mauling. There was no mortality occurred in our series in spite of multiple life threatening injuries, where other studies also observed less numbers of mortality in bear maul injuries. Because most attacks by bears are defensive in nature and cause superficial injuries by paws, rarely injuring deep viscera.

**Conclusion**

The relatively low incidence of bear attack in the region of Mount Abu may be an indication of a harmonious man-animal existence, thanks to a near total ban on new constructions in this area ever since it was declared an Eco Sensitive Zone in 1991.

Eliminating the need for open defecation and fire wood can go a long way in further improving the man-animal coexistence equilibrium thereby drastically decreasing animal attacks on tribal population.

**Acknowledgements:** We acknowledge the support of the Director, J.W . Global Hospital & Research Centre,Mount Abu for allowing us to conduct this research, and also we are thankful to the Department of Medical Record Keeping to provide us the necessary records. We also are highly obliged to the Office of DCF Wildlife, Mount Abu for providing us various data.

**Conflict of Interest:** The authors have no conflict of interest.
**Ethical Clearance:** Ethical clearance to conduct and publish this study has been taken from the Ethical committee of the J W Global Hospital & Research centre, Mount Abu, Rajasthan, India.

**Source of Funding:** This project is self funded by the authors.

**Reference**

Physiotherapy Following Extensor Tendon Reconstruction in Zone 5 - A Case Study

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Abstract

Background: Extensor tendon attrition in Rheumatoid arthritis is very common and if not treated properly, can lead to substantial loss of hand function. Here we present the rehabilitation of a 45 years female patient following extensor tendon reconstruction in zone 5.

Materials and Method: The motor assessment included examination of active range of motion, grip and pinch strength and hand function was done during first visit and at the end of 3rd week, 6th week and 12th week. The patient received physiotherapy (immobilization method) and the program was divided into three phases.

Results: The test results were used to find the efficacy of immobilisation method, author’s modification of the program and home based exercises. There was 60 to 80 percentile of ROM improvement in wrist joint, 50 to 90 percentile of ROM improvement in digits .By comparing 6th week and 12th week DASH there was about 47% improvement in upper limb functional activities The results show that the management combined with a comprehensive rehabilitation programme and commitment on the part of the patient makes it possible to achieve satisfactory treatment out comes enabling a return to normal daily functioning

Conclusion: The functional recovery achieved indicates the advisability of using immobilisation method in post-operative rehabilitation of patients with extensor tendon injury.

Keywords: Rheumatoid arthritis, Extensor tendon injury and repair, Rehabilitation.

Introduction

Rheumatoid Arthritis (RA) is an autoimmune condition which primarily affects the synovium of the joints. RA is a chronic inflammatory disease caused by a T cell-driven autoimmune process, which majorly affects the diarthrodial joints. Women are involved four times more than men, between 35 and 45 years of age. It is characterized by soft tissue laxity, joint erosion, and deformities which happen as a result of inflamed synovial tissue. Approximately, 70% of patients with RA develop pathologies of the hand, especially of the metacarpophalangeal joints (MCP). Besides, tenosynovitis and tendon ruptures are also frequent. Joint damage and tendon ruptures are common in patients with RA, leading to severe deformities that hinder the ability to grip, grasp, and pinch. Patients often report a reduction of their quality of life due to inability to perform several activities of daily living. Extensor tendon ruptures are often associated with rheumatoid arthritis. Extensor tendon injuries are not as common as flexor tendon injuries in Indian scenario but if not treated properly might lead to substantial loss of hand function. This condition is best treated with surgical exploration and repair of the ruptured tendons, followed by hand therapy. Rehabilitation following an extensor tendon injury helps to improve range of motion, strength and hand function. Here, we present a case of extensor tendon repair with extensor indicis (EI) transfer to extensor digitorum communis (EDC) along with resection of distal ulna. We discuss its presentation, physiotherapy assessment and management.

Case presentation and Rehabilitation: The patient came to hospital with an inability to extend ring finger and little finger since 4 months. The patient was a
known case of Rheumatoid Arthritis for past 20 years on treatment. Patient had undergone Bilateral Total Knee Replacement in 2002 and hysterectomy in 2016.

The MRI of right hand revealed rupture of extensor tendon of Right little finger. On surgical exploration it was found that EDC of ring and little finger was completely ruptured. EIP was intact, but thinned out. Proximal and Distal cut ends of EDC was identified, EIP transected and transferred to EDC. Through the same incision distal ulnar periosteum also elevated. Subluxated ulnar excision. Ulnar styloid left intact. Periostium reapproximated. Postoperative period was uneventful and patient discharged in stable condition. Functional POP applied for three weeks.

The patient was referred for hand rehabilitation following surgical repair. The patient was evaluated for range of motion, grip strength, pinch strength and hand function at the end of 3rd, 8th and 12th week after surgery.

**Physical Therapy Treatment:** The patient received physiotherapy (immobilization method) as per Hunter’s guidelines. The Physical therapy treatment was divided into three phases.

**The first phase:** During the first three weeks wound care was performed by hand surgeon. The management of edema (elevation and compression) and exercises were performed by physiotherapist. A volar splint (POP) was applied by the surgeon with wrist in 40-45 degrees extension, 0 to 20 degrees of MP flexion, and 0 degrees of IP flexion. The POP cast extended up to the level of DIP joints. DIP joint protective ROM exercises were given. After a week POP was reapplied. Sutures were removed after 15 days and POP reapplied from below elbow up to MCP joints. Protected ROM exercises to MCP, PIP and DIP joints were started. These exercises were given to prevent tendons adhesions. At the end of 3 weeks, the POP was removed and a thermoplastic splint which maintained the wrist in 40 degrees extension, MCP in 70 degree flexion and IP in neutral position was provided. Since the extensor tendon injury was associated with DRUJ disruption following surgery the patient presented with extensor lag of 20 degrees in middle finger and it was graded as fair using dragon’s criteria.

**The second phase:** From 3-6 weeks we continued with the same exercises as phase I. For extensor lag specifically isolated EDC exercise were initiated. Active MCP exercises were added to treat extensor lag and “press and hold” were added followed by tendon gliding and grip strength exercises. In week 6, we also started with abduction and adduction of fingers; Individual finger extension, Isolated EDC extension and opposition of the pollicis to the other fingers and active exercise for radio-carpal joint, composite MCP and IP flexion with wrist extension were started.

**The third phase:** In week 8-12, the patients continued with described exercises as above and mild progressive strengthening including wrist flexion/extension, forearm pronation/supination, smile ball, putty clay exercise, pegboard exercises were performed. Moderate mechanical load exercises were initiated to promote collagen synthesis in tendon stem cells. Ultrasound therapy (Pulsed 1:1, 3MHZ, Direct contact) given over scar region for effective stretching of contracted scars and to prevent adhesion formation. Composite finger and wrist flexion was initiated (after 8th week with complete recovery from extensor lag). During phase 3 splint was used only during night, travelling time.

The patient was instructed to continue the home-based exercise programme. All exercises were performed every 2 hours a day (1 set, 10 repetitions).

**Results**

**Range of motion (ROM):** Standard goniometric measurement of fingers and wrist were performed using a standard goniometer. Total active range of motion (TAROM) of the digits (Table 2), Active Range of Motion (AROM) of wrist and radio-ulnar joint (Table 1) was measured at the beginning of 3rd and at the end of 8th and 12th week and was tabulated. There was 60 to 80 percentile of ROM improvement in wrist joint, 50 to 90 percentile of ROM improvement in digits. Range of motion was reduced at first assessment and gradually improved at subsequent assessments. During 1st assessment it was observed that the ROM of the digits was very minimal. This was due to the presence of POP for initial 3 weeks and hence ROM exercises were not possible and hence the rehab program was modified according to the medical management. An extensor lag of 20 degrees was present in middle finger, but during phase 2 and phase 3 the extensor lag improved due to splinting and isolated EDC activation exercises. Wrist ROM and radio-ulnar ROM improved steadily in phase 2 and 3.
Table 1: AROM of wrist

<table>
<thead>
<tr>
<th>Arom</th>
<th>WF</th>
<th>WE</th>
<th>RD</th>
<th>UD</th>
<th>SN</th>
<th>PN</th>
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<tr>
<td>3rd week</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>8th week</td>
<td>50</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>12th week</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>30</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 2: TAROM of digits

<table>
<thead>
<tr>
<th>Tarom</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd week</td>
<td>70</td>
<td>50</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>8th week</td>
<td>140</td>
<td>220</td>
<td>230</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>12th week</td>
<td>140</td>
<td>240</td>
<td>250</td>
<td>220</td>
<td>190</td>
</tr>
</tbody>
</table>

[WF-wrist flexion, WE-wrist extension, RD-radial deviation, UD-ulnar deviation, SN-supination, PN-pronation, TAROM-total active range of motion]

Table 3: Pinch Strength and Grip Strength

<table>
<thead>
<tr>
<th>Pinch Strength</th>
<th>Tip pinch</th>
<th>Lateral pinch</th>
<th>Palmar pinch</th>
<th>Grip Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right</td>
<td>Left</td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td>8th week</td>
<td>3kg</td>
<td>6kg</td>
<td>2kg</td>
<td>5kg</td>
</tr>
<tr>
<td>12th week</td>
<td>4kg</td>
<td>6kg</td>
<td>4kg</td>
<td>5kg</td>
</tr>
</tbody>
</table>

Measurement of hand function: Measurement of hand function was assessed using Disabilities of the Arm, Shoulder and Hand (DASH) scale. There was improvement in scores denoting improved hand function (Table 4). The minimal detectable change (MCD) for DASH is 12.75%-17.23%. By comparing 8th week and 12th week DASH there was about 47% improvement in upper limb functional activities.

Table 4: DASH Score

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th week</td>
<td>38</td>
</tr>
<tr>
<td>12th week</td>
<td>18</td>
</tr>
</tbody>
</table>

Discussion

Extensor tendon injuries are more common but have received relatively less attention in comparison with flexor tendon injuries. Physiotherapy management of extensor tendon injuries following repair is quite challenging, requires skill and knowledge.

When RA results in degenerative changes in tendons, the surgical management consist of tendon repair and transfer which result in tendon shortening and reducing gliding of affected tendons. The challenge in rehabilitation of repaired and transferred tendon lies in finding a balance between protection of repaired tendon and prevention of adhesions. In this case study even though, it was challenging we were able to produce better results using immobilization method. It can be used in management of extensor tendon repair following attrition in rheumatoid arthritis. There was greater increment in ROM of little and ring finger however lesser improvement in supination range.

There are various protocols in managing tendon repair namely 1) immobilization 2) early controlled mobilization 3) Early active mobilization. All these protocols are variably used for rehabilitation of flexor tendon. Recently they are gradually integrated in to the treatment of extensor tendon. Even though now a day’s early controlled mobilization and early active mobilization are frequently used we followed immobilization method as selecting the protocol depends upon experience of the Hand surgeon and Hand Therapist. Studies support that three month post operative, no difference was found between the different rehabilitation programmes. Here immobilization protocol proved to be useful in managing extensor tendon rehabilitation as there was a considerable improvement in AROM, hand function.
Conclusion

The immobilisation program used, enabled early post-operative physiotherapy which resulted in high degree of recovery of hand function. Hence the outcome achieved in this patient suggests the advisability of routine.

Ethical Clearance: Being a single case study, written informed consent was obtained from the patient and the permission for the study was obtained from the Rehabilitation centre.

Source of Fund: Self funded.

Conflict of Interest: Nil

Reference

Role of Colposcopy in Diagnosing Potentially Malignant Disorders and Oral Cancer: A Systematic Review

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Abstract

Colposcope is a non-invasive device when used it aids in Detecting the appropriate site for biopsy which saves the patients from multiple biopsies and allows in a broader range of diagnoses. For this review, the following electronic databases were searched namely PubMed (Mesh), Wiley online library, Cochrane Library using key words colposcopy, oral mucosal lesions. The total number of articles obtained are 17 with preset inclusion and exclusion criteria to select the appropriate clinical trial. The search strategy included 4 potentially relevant articles for literature review. The sensitivity and specificity of biopsy through colposcopic examination done in the studies were fairly more thus revealing the diagnosis of early dysplastic changes in the potentially malignant disorders. Therefore, the studies reviewed concluded that clinical criterion of colposcopic examination was found to be more appropriate for the selection of biopsy specimens in cases of potentially malignant disorders and carcinoma. Even though the results in the studies was positive and promising, further long term studies are to be done in large populations to determine the diagnostic changes.

Keywords: Biopsy, Mucosal Lesion, Colposcope.

Introduction

The prevalence of potentially malignant epithelial lesions and oral lesions is steadily increasing throughout the world¹. Clinical evaluation of oral carcinoma is less difficult when the lesion is obviously invasive or when the patient experiences symptoms like pain, functional limitation, or regional lymphadenopathy². The Conventional method of examination visually using incandescent light, has traditionally been the mainstay of oral malignancy screenings for decades, anyhow this method remains debatable³. Conversely, the diagnosis of lesions of the oral mucosa is not completely based on clinical findings. An early diagnosis, evaluation with prompt treatment ensures an improvement in the prognosis of malignancy. Despite of advancement in the prior detection, the rate of mortality and morbidity is increased related to oral malignancies. Hence, biopsy with a histopathologic examination of the lesion is very much essential, to establish a definitive diagnosis. Though the biopsy with histopathologic examination is considered as gold standard in the diagnosis of oral lesions and oral malignancy, but the requirement of the site for biopsy is still critical. The selection of biopsy site is of a subjective choice, and it is possible that the biopsy specimens are taken from unrepresentative areas of the lesion or before the morphologic changes could be detected in oral lesions. There are simple chair side method of histopathologic examination including staining with toluidine blue, light based detection systems, and exfoliative cytology or brush biopsy to help in the diagnosis of such changes, with related disadvantages with these method⁴. Clinical examination alone often leads to not a certain diagnosis, and thus the provisional diagnosis or final diagnosis of any carcinomatous or premalignant lesions of the oral mucosa is not mainly based on clinical findings⁵. With the aim of improving the efficacy of these diagnoses, various techniques have been developed to complement the clinical examination and to facilitate the identification of initial carcinomas. Toluidine blue staining is considered the most common

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technique used for early detection of oral cancer in high risk patients. Questions have also been raised regarding the risks of developing malignancies associated with the use of toluidine blue because it shows an affinity for DNA. Exfoliative cytology has a false-negative rate of approximately 30%\(^6\). The use of oral exfoliative cytology in clinical practice had been declined due to the subjective nature of its interpretation and only a small number of abnormal cells identifiable in a smear\(^7\). Various other methods used for the early detection of precancerous lesions and conditions include oral brush biopsy, autofluorescence, acetic acid staining, chemiluminescence\(^8,9\).

Therefore, a technique for non-invasively detected will choose the appropriate site for biopsy that can save patients from multiple biopsies and allow a broader range of diagnoses which can aid in early detection of oral potentially malignant lesions\(^10\). With the aim of improving the efficiency of these diagnoses, techniques are being developed to complement clinical examination and to facilitate the identification of lesion. One such technique is colposcopy, also known as direct oral microscopy that offers advantages in selecting more representative sites for biopsy than routine clinical examination and other available chair side diagnostic method\(^11\). Colposcopy is defined as the study of morphology of the cervical region with the aid stereoscopic binocular magnification by the colposcope. A colposcope is helpful to find the visible clues predominantly of abnormal tissue. The colposcope resembles a pair of binoculars and is stabilised on a pedestal with a light source attached to it\(^12,13\). The aim of the study is to review the articles on Colposcopy and evaluate the potential benefits of colposcopy in diagnosing oral mucosal lesions.

**Materials and Method**

**Search Strategy:** The following electronic databases were searched namely Pub Med (Mesh), Wiley online library, Cochrane Library using key words colposcopy and oral lesions. The current review article aims in assessing the use of Colposcope has a diagnostic technique in evaluating the oral mucosal lesions, hence the following inclusion and exclusion criteria was devised to select the appropriate clinical trial. The articles were screened on the basis of title and abstract. Full text was then procured for the relevant articles which fulfilled the inclusion criteria. Only articles published in the English language were considered for this review. Potentially relevant studies identified and screened for retrieval were 17, Abstracts of studies retrieved were 9, Studies evaluated in detail to determine the relevance to inclusion criteria were 4.

**Eligibility Criteria:**

**Inclusion Criteria:** Non-Randomized study on human clinical trials.

**Exclusion Criteria:** In-vitro studies, Animal studies and experimental studies, case reports, case series, literature reviews. All irrelevant studies were excluded and the reasons for their exclusion were noted.

**Outcome Measures:** The sensitivity and specificity obtained was assessed for all the articles obtained.

**Quality Assessment:** The Criteria for the methodological quality assessment was done in all the included studies taken under review. All studies performed under valid procedures were considered.

**Results**

According to the results obtained from each study the Squamous cell carcinoma of the oral mucosa and lips, however, comprises 90–95% of all oral malignancies. [Table 1] The study done based on Schmitt\(^14\) Coppleson\(^15\), Cartier\(^16\), John\(^17\) and Creasman\(^19\), where in cases of oral submucous fibrosis, for the colposcopic examination on application of 2% acetic acid, the lesions appeared as faint pink to orange in colour. At places, it was iodine negative. On histopathological examination, it was revealed that 9 cases had mild dysplasia, 2 were with moderate, 4 were with severe dysplasia and 11 cases revealed signs of chronic nonspecific inflammatory reaction. [Table.2] Where as White raised lesions with raised, papillary borders, a feature of leukoplakia, was observed as a consistent finding by Schmitt\(^14\), Coppleson\(^15\), Cartier\(^16\), John\(^17\) and Disaia and Creasman\(^18\) was also confirmed. The lesions appeared aceto-white with 2% acetic acid and iodine negative and straw-colored with Lugol’s iodine. The directed biopsy sites revealed five cases with mild dysplasia, five with moderate, three with severe dysplasia and seven cases with signs of chronic nonspecific inflammatory reaction.
Table 1. Colposcopic Features of Various Examined lesions

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Total No. of Patients</th>
<th>Lesion Examined</th>
<th>Colposcopic Features</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ujwala et al-2016</td>
<td>30</td>
<td>Oral Submucous Fibrosis</td>
<td>Faint pink to orange color</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hyperkeratotic Lesions</td>
<td>Acetowhitensness positive, iodine intake negative</td>
<td>71%</td>
<td>91%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lichen Planus</td>
<td>Acetowhitensness positive, iodine negative, with intermediate areas of thin vessels showing iodine positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Nayyar et al-2018</td>
<td>80</td>
<td>Oral Submucous Fibrosis</td>
<td>Increased punctuation and increased atypical vessels</td>
<td>62%</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leukoplakia</td>
<td>Reduced number of atypical vessels and punctuation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Abhishek Singh et al-2013</td>
<td>30</td>
<td>Oral Submucous Fibrosis</td>
<td>Acetowhite positive, true mosaic vessels</td>
<td>58%</td>
<td>64%</td>
</tr>
<tr>
<td>4. Abhishek Singh and Nayyar et al-2012</td>
<td>30</td>
<td>Oral Submucous Fibrosis</td>
<td>Acetowhite positive with increased punctuation</td>
<td>60%</td>
<td>64%</td>
</tr>
</tbody>
</table>

Table 2. Grading of Dysplastic Features in the Lesions Using A Colposcope

<table>
<thead>
<tr>
<th>Lesions</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Submucous Fibrosis</td>
<td>9</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Hyperkeratotic Lesions</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Lichen Planus</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Discussion

Oral cancer is considered as one of the 10 leading cancers in the world and its prevalence is high in several countries, including India, amounting to about 40% of all malignancies. Therefore, early diagnosis is of prime importance which helps in correct diagnosis at an early enough stage when the prognosis can be improved improving the over-all 5-year survival rates in such patients\textsuperscript{19,20}. The time honoured decision on the exclusiveness of exfoliative cytology and colposcopy in the diagnosis of cervical intraepithelial neoplasia (CIN) has further given place to view as to their complementariness increasing the significance of colposcopy in the near future\textsuperscript{21}.

The intention for the colposcopic study was undertaken based on:

- Observation and recording of the surface morphology by micro-colpo-hysteroscopy of the oral tissues in different oral premalignant lesions and condition; and
- Attempting Predictability of early changes suggestive of malignant transformation.

In this study the criteria for vascular changes given in Colposcopic literature for the selection of biopsy site includes vascular pattern, inter-capillary distance, surface pattern, colour tone and opacity as well as the clarity of demarcation of the mucosal lesions\textsuperscript{22,24,25}. Different grading and scoring systems have been devised for colposcopic examination. Some of the more commonly
used criteria include the one given by Coppleson and co-workers, the Combined colposcopic index proposed by Reid and Scalz. The lesion on application of acetic acid in the case of oral squamous cell carcinoma appeared as an erythematous area with scattered, large red dots, sometimes projecting above the surface under colposcopy and with a magnification of 15–20 times, the vessel caliber of the capillaries was found to be not equal, while the newly developing blood vessels was arranged in bundles or corkscrew appearances. The vascular hypertrophy had progressively smaller blood vessels. After application of acetic acid, the vessels remain visible since the overlying epithelium was very thin. The histopathological picture was of well-differentiated squamous cell carcinoma. The findings of this well differentiated squamous cell carcinoma was reported with findings of Cartier, showing that alterations in the vascular network reflect biochemical and metabolic changes in cervical tissue. Coppleson in his study also stated that atypical vessels are corkscrew or comma-shaped in appearance which shows greatly increased vascularity and immature vessels which is better in colposcopic examination. When compared to the benign carcinoma, the vessels in invasive cancers make sharp angulations and corkscrew or hairpin turns.

Hence according to this literature, its found that the biopsy specimens selected with Colposcopic criteria appeared to be more representative of the histopathological findings at least in certain cases than those selected with routine clinical examination (COE). The altered vascular patterns, in the initial stages of lesion progression, definitely helped with the correct selection of the biopsy site, which in turn helped us reach a more definitive diagnosis, thus avoiding false-negative results. The results of Colposcopic findings are significantly based on the vascular and tissue changes. The capillary changes preceding tumour growth with the pattern of tumor angiogenesis are different from the usual neo-vascularization taking place during repair and regeneration processes. At a cellular level, various molecules such as vascular endothelial growth factor, basic fibroblast growth factor, and transforming growth factor alpha are implicated, but the clinical perceptibility of these altered vascular patterns is poor. Direct optical visualization of these patterns would be helpful in the early determination of the underlying pathology and also aid in marking out the site of biopsy.

Conclusion

With the help of colposcope, it is possible to visualize dysplastic changes in the oral tissues. Intraoral application of colposcope has a promising future. Colposcopy appeared to be more representing the histopathological findings than those selected with set clinical criteria. The altered vascular patterns definitely helped with the correct selection of the site for biopsy, which in turn helped us reach a more definitive diagnosis thus avoiding false-negative results. Further studies are to be carried out in large population and sample size for diagnosing the early diagnostic changes in potentially malignant disorders and oral cancer.

Declaration on Conflict of Interest: We have no conflict of interest.

Financial Support and Sponsorship: Nil

Source of Funding: Self

‘All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.’

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Alveolar Ridge Dimension and Morphology Measurement in Anterior Maxilla for Immediate Implant Treatment Planning: A Cone Beam Computed Tomography Study

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Abstract

Background: Implants have been widely used to replace missing teeth. Successful implant treatment depends on proper planning. The height, width, morphology and density of alveolar bone surrounding the implant site is very important for determination of the size of implant. Conventional radiographic techniques have image distortion and superimposition and compromise the accuracy of treatment planning. Cone beam computed tomography provides high resolution and accurate images at low dosage which can be used in implant planning.

Aim: To measure alveolar ridge and buccal undercut dimension at the anterior maxilla to develop treatment planning for immediate implant placement using Cone beam computed tomography (CBCT).

Materials and Method: 80 CBCT scans of subjects with full dentition at right maxilla were taken. Measurements were taken at the cross sectional views in the middle of the maxillary right central incisor, lateral incisor, and canine regions. The parameters measured were alveolar height, alveolar width, buccal undercut location, buccal undercut depth.

Results: There was no significant difference in the alveolar height among the teeth. The mean alveolar widths (mm) were: central incisor, 8.1; lateral incisor, 7.4; canine, 8.9. The lateral incisor had a significantly smaller alveolar width than the other anterior teeth. Among the maxillary anterior teeth 72% of central incisors, 88% of lateral incisors and 51% of canines had buccal undercut. The lateral incisor had the maximum buccal undercut. The buccal undercut depth for central incisor, lateral incisor, canine are 1, 1.61 and 0.91 respectively.

Conclusion: Thus in anterior maxilla lateral incisor has the thinnest alveolar bone and buccal undercut among the other anterior teeth.

Keywords: Alveolar ridge, Implants, Alveolar height, Alveolar width, Buccal undercut.
were used as standard method for implant treatment planning\(^7,8\). However these 2D images have image distortion and superimposition which compromise the accuracy of treatment planning\(^9\). They fail to reveal the true morphology of the ridge particularly a defect in labial cortical plate in anterior maxilla.

Cone beam computed tomography (CBCT) is a 3-dimensional technique for assessment of alveolar bone anatomy. It provides a comprehensive preoperative implant site assessment and surgical guide in dental implantology\(^6,10\). CBCT gives views and volumetric reconstructions of craniofacial structures which is similar to multi-sliceconventional computed tomography(CT). However CBCT has reduced acquisition times, lower effective radiation doses, and a decreased financial burden compared to CT\(^11,12\).

In the present study, alveolar ridge dimension and the presence of buccal undercut were evaluated using CBCT images in maxillary anterior region. This study was aimed to provide more quantitative information to help immediate implant treatment at the maxillary anterior area.

**Materials and Method:** The subjects included all CBCT scans performed at Oral Radiology department of Saveetha Dental college, Chennai according to the selection criteria. Machine used was

**Software used was Galileos viewer:** A total of 80 CBCT scans of subjects with full dentition at right maxilla. There were 33 females and 47 males were included in the sample size. The exclusion criteria included: 1) systemic/endocrine diseases that influence bone metabolism; 2)Conditions that may affect the bone quality and quantity at anterior maxilla like moderate to severe periodontal disease, cyst, neoplasm, trauma or surgery.

**Measurements (Fig. 1):** All the measurements were taken by one examiner. The measurements taken are

1. **Alveolar height:** A line was drawn from alveolar crest paralleling with the long axis of alveolar ridge. The distance from alveolar crest to the floor of nasal fossa was defined as alveolar height.
2. **Alveolar width:** Alveolar height was divided into coronal, middle, and apical third. In the middle of each third, a line was drawn perpendicular to the long axis of alveolar ridge. The distance between buccal and palatal cortical plate was defined as alveolar width.
3. **Buccal undercut location:** For a tooth identified to have buccal undercut, a line was extended from alveolar crest which was perpendicular to the long axis of the alveolar ridge. The distance from where the buccal cortical plate started dipping to the aforementioned line was defined as buccal undercut location. This value demonstrated how close the buccal undercut was to the alveolar crest.
4. **Buccal undercut depth** For a tooth identified to have buccal undercut, a line tangent to buccal cortical plate and parallel to the long axis of alveolar ridge was drawn. The distance from the deepest point of the buccal undercut to the aforementioned line was defined as the buccal undercut depth.
5. **Percent of teeth with buccal undercut** For maxillary right central incisors, lateral incisors, and canines, the formula to calculate the percent of teeth with buccal undercut was: (the number of teeth with buccal undercut)/(total number of teeth evaluated) X100.

**Statistical analysis:** The Normality tests Kolmogorov-Smirnov and Shapiro-Wilks tests results reveal that somevariables follow Normal distribution and some variables do not follow Normal distribution. Therefore, to analyse the data both parametric and non-parametric method are applied. To compare the mean values between teeth types one-way ANOVA is applied followed by Tukey’s HSD post hoc tests for multiple pairwise comparisons.

**Results**

The mean alveolar height for maxillary right central incisor, lateral incisor, canine was 21.34mm, 20.65mm and 19.87 mmrespectively (Table 1). There was no significant difference in alveolar height among the teeth. The mean alveolar width for central incisor, lateral incisor, canine was 8.1mm, 7.4mm, 8.9mm respectively (Fig: 3).The coronal, middle, and apical third alveolar width for maxillary right central incisors was 7.8mm, 7.7mm, 8.8mm, for maxillary lateral incisor was 7.1mm, 6.8mm, 8.3mm and for canine was 8.6mm, 8.3mm, 9.1mm respectively. The alveolar width was greater in apical third of the tooth. The lateral incisors had thinner alveolar width when compared to other teeth (p<0.001). Correlation between subject’s gender and alveolar
volume measurements, showed that male demonstrated significantly larger alveolar width compared to female. Male and female alveolar width for maxillary right central incisor are 8.38 and 7.7 (p=0.010), for maxillary right lateral incisor it is 7.7 and 6.9 (p=0.001) and for maxillary right canine it is 9.4 and 8.1 (p= <0.001) (Fig: 3).

Among the maxillary anterior teeth 72% of central incisors, 88% of lateral incisors and 51% of canines had buccal undercut. The lateral incisor had the maximum buccal undercut. The buccal undercut depth for central incisor, lateral incisor, canine are 1, 1.61 and 0.91 respectively. Buccal undercut depth showed statistical difference between the teeth (p<0.001). (Fig: 5).
Fig: 3 Alveolar width measurements comparing male and female

Fig: 4 Measurements for buccal undercut location

Fig: 5 Measurements for buccal undercut depth
Table 1: Tukey HSD Post Hoc Tests for comparison between various parameters of the teeth

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tooth</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central incisor</td>
<td>Lateral incisor</td>
<td>.6970</td>
<td>.3649</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Canine</td>
<td>1.4740</td>
<td>.3649</td>
</tr>
<tr>
<td></td>
<td>Lateral incisor</td>
<td>Canine</td>
<td>.7770</td>
<td>.3649</td>
</tr>
<tr>
<td>Mean alveolar width</td>
<td>Central incisor</td>
<td>Lateral incisor</td>
<td>.7020</td>
<td>.1818</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Canine</td>
<td>-.8456</td>
<td>.1822</td>
</tr>
<tr>
<td></td>
<td>Lateral incisor</td>
<td>Canine</td>
<td>-1.5476</td>
<td>.1822</td>
</tr>
<tr>
<td></td>
<td>Central incisor</td>
<td>Lateral incisor</td>
<td>.6890</td>
<td>.1436</td>
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<tr>
<td></td>
<td></td>
<td>Canine</td>
<td>-.8540</td>
<td>.1436</td>
</tr>
<tr>
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<td>Canine</td>
<td>-1.5430</td>
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</tr>
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<td>.2038</td>
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<td></td>
<td></td>
<td>Canine</td>
<td>-.6010</td>
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<tr>
<td></td>
<td>Lateral incisor</td>
<td>Canine</td>
<td>-1.6390</td>
<td>.2605</td>
</tr>
</tbody>
</table>

Discussion

For implant placement, adequate bone volume at the future implant site is a prerequisite for good aesthetic outcome and sound biomechanical support of the osseointegrated implant\textsuperscript{13}. However due to trauma, alveolar deficiencies and unpredictable patterns of bone resorption occur which may prevent an ideal implant therapy for prosthodontic rehabilitation\textsuperscript{13}. It has been seen that an accurate preoperative evaluation of alveolar dimension of the future implant site is very important to develop an appropriate placement strategy and also to preserve adjacent anatomical structures, in need of immediate implant placement\textsuperscript{14}. Therefore identification of the exact anatomy of the implant site is mandatory. Alternative to conventional approach, immediate implant placement have been proposed. This was done to decrease the overall treatment time and surgical interventions\textsuperscript{15}. In the anterior maxilla, implant placement presents more challenges due to the demand for well-anchored implant, satisfactory aesthetic result and difficult preexisting anatomy\textsuperscript{16,17}. In the present study alveolar ridge dimension of anterior maxilla was measured using Cone beam computed tomography for immediate implant treatment planning.

In the study, the alveolar width was greater for canine and least for lateral incisor. The alveolar width was increased in the apical third for all the three teeth. Males had increased alveolar width compared to females. This was in consistent with a study done by Zhang et al in Houston and a study done in posterior mandible by Braut et al\textsuperscript{18,19}. There was no significant difference in the alveolar height in all the three teeth.

Among the maxillary anterior teeth 72% of central incisors, 88% of lateral incisors and 51% of canines had buccal undercut. This shows that lateral incisors have higher risk of perforation of the buccal plate compared to all the teeth. So additional grafting procedures is necessary for implant placement in this region. On the other hand, canines had increased alveolar width and least buccal undercuts. A careful preoperative evaluation of anterior maxilla, especially of the lateral incisor region, is invaluable for selection of the optimal treatment approach and reducing surgical complications.

Conclusion

This study concludes that careful preoperative evaluation with CBCT is necessary for implant placement. At anterior maxilla lateral incisor has the thinnest alveolar bone and buccal undercut among the other anterior teeth. In future, studies should be done with larger samples from diverse populations to enhance the reliability of the parameter.
Declaration on Conflict of Interest: We have no conflict of interest.

Financial Support and Sponsorship: Nil

Source of Funding: Self

‘All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.’

Reference


A Rare Case of Multiple Osteochondromas with Short Metatarsals and Seizure

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Abstract

Multiple Osteochondromas described first in 1786 is an autosomal dominant inherited disorder with 100% penetrance manifesting more in males (M:F =1.5:1) with a prevalence rate of 1:50000. The defect involves the tumour suppressor gene EXT 1 and EXT2. They appear in first decade of life with two or more bony outgrowths from the end of growing long bones and grow till puberty. They can arise from any bone except facial bones. They present with pain and symptoms due to pressure effects on the nerves, muscles, tendons, ligaments, brain and spinal cord and cause many type of deformities. Brachydacty l and relative shortening of metatarsals as well as possibility of seizure consequent to exostoses of skull bones have been described but has rarely been reported. Here we are presenting a case of MO with distinct shortening of metatarsals and seizure.

Keywords: Osteochondromas, Brachydactyl, seizure, exostoses.

Introduction

Exostoses are bony outgrowths usually arising from the diaphyseal end of the tubular bones containing marrow and cortex being continuous with that of the parent bone. When they are capped with a cartilage they are termed as osteochondromas.¹ It was first described by John Hunter in his lecture on the principles of surgery in 1786. Following first publication of exostoses in a family by Boyer in 1814 many such cases in families had been reported. However it was Jaffe who characterised it in detail as Hereditary multiple exostoses.² Other synonyms are Multiple hereditary exostoses(MHE), Hereditary multiple exostoses (HME), Diaphyseal aclasia, (multiple hereditary), multiple congenital osteochondromata, Chondrodysplasia, Chondromatosis, Russel-Hagen Disease. However in 2002 WHO termed it as Multiple Osteochondromas (MO)². It is genetically heterogenous affecting the tumour suppressor gene EXT1 and EXT2 which encodes the protein ‘EXOSTOSINS’. These are glycosyltransferases and are involved in the biosynthesis of heparin sulphate (HS). Thus the persons who are deficit in HS cause an error in negative feed back to prevent chondrocyte proliferation and maturation thus leading to abnormal bone growth ie the exostoses. When two or more such exostoses are noted the condition is termed as MO It is inherited as an autosomal dominant disorder with 100% penetrance with a prevalence rate of 1:50000 with a male to female ratio being 1.5:1. Although they are benign they cause multiple deformities, pain and complications due to pressure effect on nerves, vessels tendons, ligaments, muscles, brain and spinal cord. In 0.5-5% cases they may transform to malignancy.³

Case Report: A 16 years old girl born to non-consanguineous parents who had no history of anyantenatal, natal, postnatal insult, head trauma, fever with altered sensorium came under medical attention on 26 September 2014 with history of having fallen unconscious from bicycle a day before. A CT scan of brain was reported as normal while an EEG taken revealed 1-2 HZ generalised spike and wave discharges apparently arising from both frontal regions. She was diagnosed as a case of seizure disorder and was prescribed tab Dilantin ER300 mg OD. She had a recurrence of a seizure (an episode of loss of consciousness lasting for
a minute) on 27 May 2016 at 7 PM on discontinuation of drugs for about two months for which she reported to us. Her parents, a brother and a sister had no such abnormality. She was studying in class IX and was of average intelligence. She has attained menarche two years back and her periods have been regular. On enquiry she revealed of the bony swellings being noted by her 5 years back which of late has not shown any change.

Examination revealed height 146 cm, weight 44 kg BMI-20.7, multiple hard, non-tender bony projections varying from 0.3-1 cm in size were noted around both ankle and knee, without any varus/valgus deformity. However bilateral cubitus valgus deformity were noted. Third toe on right side and fourth toe on left side were markedly short (Fig-1). Otherwise general and systemic examination did not reveal any other abnormality.

**Fig-1. Photograph of the patient showing short 3rd toe on right foot and 4th toe on left foot. Osteochondomas can be noted around the ankles**

**Investigation:** Blood counts, urine, Renal Function Tests, Liver Function Tests, blood sugar, serum calcium, phosphorus were all normal. Radiological examination showed multifocal wide based cortical outgrowths seen arising from the both ends of tibia and fibula of both sides, lower end of the femoral bone on both sides with expanded cortex. All the lesions show metaphysical origin growing away from the joint space. Right 3rd and left 4th metatarsal bones are short. Ulna shows shortening with bowing of the radius on both side. No soft tissue calcification seen overlying the bony outgrowths. (Fig-2). A plain CT scan of brain (of September 2014) did not reveal any abnormality. (Fig-3) EEG (of September 2014) was abnormal. (Fig-4).

**Fig-2. Exostoses can be seen arising from both ends of tibia and fibula of both sides and lower end of femur of both sides growing away from joint space. Shortening of both ulna and bowing of radii can be noted. The 3rd metatarsal on right side and 4th metatarsal on left side are short.**

**Fig-3. CT Scan of brain did not reveal any parenchymal lesion nor any bony outgrowth.**
Fig 4: EEG-showing 1-2 Hz generalised spike and wave discharges apparently arising from both frontal regions.

She was diagnosed to be a case of MO with seizure and was counselled to continue tab Levopiracetam 500 mg twice daily uninterrupted and consult neurologist regularly.

Discussion. This short statured non-obese girl has normal biochemistry (Calcium, Phosphorus) with exostoses (total 16) and short metatarsals has presented with seizures. Diagnosis of MO is based on the patient history, family history, the radiological picture, histology of the lesions where available and germline mutation studies of EXT1 and EXT2. In our case it is based on history and radiological picture as there was no positive family history. Positive family history is detected in about 62% of cases. Mutation studies in this patient could not be carried out as the patient did not agree for any further studies.

The exostoses develop in childhood and are evident by the 1st decade (our patient noted them around 11 years). Their growth ceases at puberty. The cartilaginous cap is usually radiolucent and may show irregular calcification around that time. They can be sessile or pedunculated and usually project away from the joint space. They vary in number (2-100) but on an average 15-18 are noted (our patient had 16). They can arise from almost every bone except that of facial bones. Only one case of skull base involvement has been reported. However Sinha et al on analysing available images of skull has found out involvement of base of skull in about half of their cases.

Clinical manifestation. Usually the exostoses are benign and asymptomatic. Main and troublesome symptom is pain which in 50% of cases is general or else it could be due to pressure effect on tendon, ligament, nerve, vessel, or due to fracture of the exostoses and surgery which produces other symptoms as well. Our patient has no experience of pain. Multiple deformities have been noted like short stature (37-44%), unequal limb length (10-50%), short ulna, bowing of radius (39-60%), different deformities of hand, varus/valgus deformity of knee (8-33%) and ankle (2-54%). Relative shortening of metacarpal, metatarsal and phalanges may be noted. Our patient had short ulna and bowing of the radius, cubitas valgus and had short metatarsals.

The complications are all due to it’s pressure effects on muscles, tendons, ligaments, nerves, vessels, spinal cord, brain etc. Exostoses on skull can compress brain or entrap cranial nerves, cause focal neurological deficit. Extension of Intracranial lesions on impingement on neuro-axis by way of compression, irritation can cause a seizure focus which has happened in our case though exostoses on skull could not be demonstrated on the CT scan of Brain. An MRI could not be carried out as the patient refused to undergo any further investigation. Exostoses of foramen magnum and C1 have been described to cause vertebral artery occlusion manifesting with dizziness, headache and weakness. Other compressions of importance are that of spinal cord (0.6%) causing spastic paraparesis, rib exostoses leading to haemothorax and that of pelvis leading to obstructed labour. The vascular complications reported are pseudoaneurysm, aneurysm, vascular compression, arterial and venous thrombosis and account as high as 11.3%. The important complication is malignant transformation (0.5-5%) which is suspected if there is growth after puberty, persistent pain and the cartilaginous cap thickness is more than 1 cm. The mean age of malignant transformation is 31 years of age. It never occurs before 10 or after 50 years of age.

The clinical course of MO has been phases to phase one of lumps around joints, phase two to lumps with pain or deformity, phase three to lumps, deformity and pain. In a study of 283 children in Netherlands it was noted to restrict sports activities in 30% of cases, to have problems like difficulty in writing, using computers or being bullied in 50% of cases, to have complained...
of pain in 60% of cases.\textsuperscript{11} Our patient was in phase two (lump and deformity) and did not complain of any such psychosocial problem.

**Differential diagnoses.** Other causes of exostoses and short metatarsals like Turner’s syndrome (TS), Pseudohypoparathyroidism (PHP) and pseudopseudohypoparathyroidism (PPHP) have characteristic features. The exostoses seen in these conditions are periosteal, arise from the shaft and project straight outwards. Thus our patient fits to be a case of MO. Unlike MO the genetic pattern is 45XO in TS while DNA\textsubscript{1} gene is involved in PHP and PPHP. Foetal alcohol syndrome exhibit exostoses from tibia while in cases of Tuberous Sclerosis exostoses of long bones are noted. In Dysplasia Epiphysialis Hemimelica (DEH) epiphyseal overgrowths predominantly affecting lower limbs of one side are noted in young boys. There is no genetic transmission nor malignant transformation. Metachondromatosis (MC) exhibits osteochondromas in hands and feet pointing towards the growth plate. They do not cause deformity and have a tendency to resolve.\textsuperscript{3}

**Management:** Asymptomatic patients require no treatment. Analgesics are recommended for those having for pain. Corrective surgeries are indicated for patients presenting with pain, pressure symptoms, deformities and malignant transformation. Psychosocial support are recommended for those with pain, deformity, cosmetic problems and adjust problems in school/society. Our patient was counselled to continue anticonvulsants with periodic follow up.

**Genetic counselling** is possible as it can be diagnosed antenatally from amniotic fluid examination by 15\textsuperscript{th} week and from chorionic villi biopsy by 8-13 weeks.\textsuperscript{12} The affected patient can transmit to half of the offsprings, it being an autosomal dominant disorder. The patient had been counselled accordingly.

**Prognosis:** It is a benign disorder. But quality of life may be compromised due to pain, deformities, pressure effects and cosmetic appearance. In cases with malignant disease 10 year survival rate is 83% for grade 1 for 29% in grade 3 chondrosarcomas.\textsuperscript{13}

**Conclusion**

A case of MO in a 16 years old girl with short 3\textsuperscript{rd} and 4\textsuperscript{th} metatarsals and seizures has been presented. She has no family history of such lesions. The features to be noted in this patient are firstly distinct short metatarsals in contrast to relative shortening described in literature which can confuse with pseudopseudohypoparathyroidism (PPHP) and secondly of seizure which is a rare manifestation and we believe it to be the first report in literature. It is suggested that in all such cases of MO an all out effort by way of imaging be made to demonstrate exostoses in skull base and an EEG be taken, to delineate a seizure focus so that preventive antiepileptic drugs can be instituted.

**Conflict of Interest:** There is no conflict of interest.

**Source of Funding:** Nil

**References**


A Comparative Study to Analyse the Effectiveness of PNF Versus Balance Exercises in Parkinsonism

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1Assistant Professor, Faculty of Physiotherapy, 2Faculty of Physiotherapy, 3Professor, Principal, Faculty of Physiotherapy, 4Professor, Faculty of Physiotherapy, 5Assistant Professor, Faculty of Physiotherapy, 6Assistant Professor, Faculty of Physiotherapy, Dr.M.G.R. Educational and Research Institute.

Abstract

Objective: The aim of the study is to analyse the effectiveness of PNF techniques and balance exercises in Parkinsonism.

Background: Parkinson’s disease is a progressive neurodegenerative disorder that affects neurophysiologic function, movement abilities and quality of life (QOL). It commonly presents with postural instability, hypokinesia, rigidity and tremor. These symptoms decreases physical activity (PA) and increases time spent in sedentary behaviours. This in turn leads to a cycle of poor balance, muscle weakness, fear of falling and a sedentary life style. The background of the study is to find out the effectiveness of PNF techniques and balance exercises in Parkinsonism patients for the improvement of balance and improve the quality of life.

Materials and Method: Once the study is approved by institutional review board 30 patients both male and female were selected from clinically diagnosed parkinsonism. The study setting was in the Physiotherapy outpatient department of ACS Medical College and hospital, velappanchavadi, Chennai. The study includes patients with clear history of parkinsonism. Both male and female patients age group within 55-70 years. Subjects in the 1.5-3 HOEHN and YAHR stages. The study population excludes Dementia, Cardiovascular conditions, Musculoskeletal conditions, and subjects in the 4 & 5 stages of H & Y scale. The samples were fully explained about the benefits of participating in the study. They were asked to fill the consent form duly signed by the samples and therapist. Data regarding the balance were collected using berg balance scale and unified parkinsons’s disease rating scale.

Result: Result of this study shows that both the PNF techniques and balance exercises is effective in improving balance. However PNF techniques was better than balance exercises in improving the balance among parkinson’s diseased patients.

Keywords: PNF, Balance exercise, Hoehn and Yahr scale.

Introduction

In 1817, James Parkinson first described the clinical syndrome “the shaking palsy” that was previously referred as or Paralysis agitans. Later in the 19th century Charcot gave credit to Parkinson by referring to the disease as by his name Parkinson’s disease (PD) or “maladie de Parkinson”. Worldwide it is the 2nd most common neurodegenerative disease. PD is a progressive disorder of the central nervous system with both motor and non motor symptoms. Early symptoms includes anoxia, constipation, rapid eye movement (REM) sleep behavior disorder, mood disorders and orthostatic hypotension. Motor symptoms includes cardinal features of tremor, rigidity, bradykinesia and postural instability. Non motor symptoms may precede the onset of motor symptoms by years, it include altered bladder function, excessive saliva, intedumentary changes, difficulty in speaking and swallowing, cognitive problems (bradyphenia, confusion and in some cases

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dementia). Other motor symptoms includes forward flexed posture with a typical festinating gait. Postural instability is typical in later stages of disease, leading to impaired balance and frequent falls. The other symptoms includes fatigue, masked face, and greasy skin. The first clinical sign occurs when about 60% of the dopamine producing cells in the substantianigra have degenerated. The onset is insidious with slow rate of progression. The mean age of onset of PD is in the mid fifties, with increasing incidence and prevalence as age increases. When it is seen before the age of fifty, it is called young onset PD. Males are slightly more at risk than females. About 7 to 10 million people are affected worldwide. Prevalence rises from 1% with those with 60 years age to 4% in population over 80 years. Basal ganglia (BG) nuclei play a key role in mediating motor and non motor behaviour, cognition and emotion. Basal ganglia are involved in movement initiation and preparation. Any lesion in basal ganglia produces balance impairment and hypokinesia. The most consistent pathological findings are degeneration of nigrostriated tract, depletion of dopaminergic neurons, reduction in striated dopamine, acetylcholine hyperactivity.

Most of the movement related symptoms of the parkinson’s disease are caused by the lack of dopamine due to loss of dopaminergic cells in substantianigra. When the amount of dopamine is too low, communication between substantianiagra and corpus striatum becomes ineffective. Thus, movement becomes impaired. Balance is the ability to control the body mass or centre of mass or integrated sensory and musculoskeletal system and is modified with CNS in response to changing internal and external environmental conditions. Postural instability has been noted to be one of the major causes for frequent falls among the Parkinson’s disease affected persons. The Proprioceptive Neuromuscular Facilitation (PNF) is a widely used technique as an intervention for neuromuscular dysfunction. In applying PNF a therapist can enhance movement re education and expand on existing techniques already utilized for muscle strengthening and stabilization. PNF uses nervous system reflexes to help relax a muscle. The Berg Balance Scale, Unified Parkinson’s Disease Rating Scale and Hoehn and Yahr scale were used as the outcome measures in the study. Physiotherapy is often prescribed in parkinson’s disease.

Optimal management of parkinson’s disease involves both pharmacological treatment and encouragement of physical activity according to American academy of neurology (1993). There is mounting evidence for the effects of physiotherapy in all stages of the disorder, yet few well controlled prospective studies have documented the benefits of physical activities in parkinson’s disease. The present study is intended to analyse the effectiveness of PNF versus Balance exercises to improve balance in patients with Parkinson’s disease.

Materials and Method

Once the study is approved by institutional review board 30 patients both male and female were selected from clinically diagnosed parkinsonism. The study setting was in the Physiotherapy outpatient department of ACS Medical College and hospital, velappanchavadi, Chennai. The samples were fully explained about the benefits of participating in the study. They were asked to fill the consent form duly signed by the samples and therapist. Data regarding the balance were collected using berg balance scale and unified parkinsons’s disease rating scale. Subjects were selected based on the selection criteria and divided into two groups.

Group-A: Subjects were treated with PNF techniques.

Group-B: Subjects were treated with balance exercises.

PNF Techniques: Exercises includes upper trunk rotation, lower trunk rotation and chopping to lifting.

Duration: 50 minutes per session, 3 days per week for about 7 weeks.

Balance Exercises: Exercises includes tandem stance, tandem gait stance, heel raises and toe raises, modified squats repetition, balanced stand on foam pad, mambo walking.

Duration: 50 minutes per session, 3 days per week for about 7 weeks.

Data Analysis: The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find the statistical difference between the groups.
Table 1: Comparison of Berg Balance Scale (BBS) Between Group-A and Group-B in Pre and Post Test

<table>
<thead>
<tr>
<th>#BBS</th>
<th>#Group-A Mean</th>
<th>S.D.</th>
<th>#Group-B Mean</th>
<th>S.D</th>
<th>t-Test</th>
<th>df</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE TEST</td>
<td>43.66</td>
<td>1.98</td>
<td>44.40</td>
<td>2.47</td>
<td>-.895</td>
<td>28</td>
<td>.378*</td>
</tr>
<tr>
<td>POST TEST</td>
<td>51.33</td>
<td>3.47</td>
<td>47.20</td>
<td>2.45</td>
<td>3.76</td>
<td>28</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Group A – PNF, Group B – BALANCE EXERCISE, (*-P > 0.05), (***-P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value of the Berg Balance Scale between (Group A) & (Group B) in pre test and post test weeks.

This table shows that there is no significant difference in pre test values of the BBS between Group A & Group B (*P > 0.05). This table shows that statistically highly significant difference in post test values of the BBS between Group A & Group B (***-P ≤ 0.001)(Graph-I)

Both the Groups shows significant Increase in the post test Means but (Group-A) which has the Higher Mean value is more effective than (Group-B)

Table 2: Comparison Of Unified Parkinson’s Disease Rating Scale Between Group – A And Group-B In Pre And Post Test

<table>
<thead>
<tr>
<th>#UPDRS</th>
<th>#Group-A Mean</th>
<th>S.D</th>
<th>#Group-B Mean</th>
<th>S.D</th>
<th>t-Test</th>
<th>df</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE TEST</td>
<td>75.93</td>
<td>2.81</td>
<td>75.33</td>
<td>4.15</td>
<td>.463</td>
<td>28</td>
<td>.647*</td>
</tr>
<tr>
<td>POST TEST</td>
<td>66.60</td>
<td>3.01</td>
<td>73.20</td>
<td>4.27</td>
<td>-4.88</td>
<td>28</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Group A – PNF, Group B – BALANCE EXERCISE, (*-P > 0.05), (***-P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value of the Unified Parkinson’s Disease Rating Scale between (Group A) & (Group B) in pre test and post test weeks.

This table shows that there is no significant difference in pre test values of the Unified Parkinson’s Disease Rating Scale between Group A & Group B (*P > 0.05).

This table shows that statistically highly significant difference in post test values of the Unified Parkinson’s Disease Rating Scale between Group A & Group B (***-P ≤ 0.001) (Graph-II).

Both the Groups shows significant decrease in the post test Means but (Group-A) which has the Lower Mean value is more effective than (Group-B)

Table 3: Comparison Of Berg Balance Scale (BBS) Within Group – A & Group – B Between Pre & Post Test Values

<table>
<thead>
<tr>
<th># BBS</th>
<th>PRE TEST Mean</th>
<th>S.D.</th>
<th>POST TEST Mean</th>
<th>S.D.</th>
<th>t-TEST</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP-A</td>
<td>43.66</td>
<td>1.98</td>
<td>51.33</td>
<td>3.47</td>
<td>-8.91</td>
<td>.000***</td>
</tr>
<tr>
<td>GROUP-B</td>
<td>44.40</td>
<td>2.47</td>
<td>47.20</td>
<td>2.45</td>
<td>-19.34</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Group A – PNF, Group B – BALANCE EXERCISE, (***-P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the Berg Balance Scale between pre-test and post-test within Group – A & Group – B

In BBS, there is a statistically highly significant difference between the pre test and post test values within Group A and Group B(**-P ≤ 0.001), (Graph-III)
Table 4: Comparison Of Unified Parkinson’s Disease Rating Scale Within Group – A & Group – B Between Pre & Post Test Values

<table>
<thead>
<tr>
<th>#UPDRS</th>
<th>PRE TEST</th>
<th>POST TEST</th>
<th>t-Test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D</td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>GROUP-A</td>
<td>75.93</td>
<td>2.81</td>
<td>66.60</td>
<td>3.01</td>
</tr>
<tr>
<td>GROUP-B</td>
<td>75.33</td>
<td>4.15</td>
<td>73.20</td>
<td>4.27</td>
</tr>
</tbody>
</table>

Group A – PNF, # GROUP B – BALANCE EXERCISE, (***-P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the Unified Parkinson’s Disease Rating Scale between pre-test and post-test within Group – A & Group – B. In Unified Parkinson’s Disease Rating Scale, there is a statistically highly significant difference between the pre test and post test values within Group A and Group B (***-P ≤ 0.001). (Graph-IV)

Results

On comparing the Mean values of Group A & Group B on Berg Balance Scale Score, it shows significant increase in the post test Mean values but (Group A- Proprioceptive Neuromuscular Facilitation) shows (51.33) which has the higher Mean value is more effective than (Group B- Balance Exercise) (47.20) at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing the Mean values of Group A & Group B on Unified Parkinson’s Disease Rating Scale, it shows significant decrease in the post test Mean values but (Group A- Proprioceptive Neuromuscular Facilitation) shows (66.60) which has the higher Mean value is more effective than (Group B- Balance Exercise) (73.20) at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing Pre test and Post test within Group A & Group B on Berg Balance Scale & Unified Parkinson’s Disease Rating Scale shows highly significant difference in Mean values at P ≤ 0.001

Discussion

In this study, results shows statistical significance of PNF techniques and balance exercises within group analysis pre and post intervention of both the group shows the improvement in balance.

Between group analysis of post intervention shows there is more improvement in balance. According to the result PNF techniques improves balance in Parkinson’s disease patients after receiving PNF and balance exercises. But there was more improvement seen in PNF group.

Abu A Qutubuddin, et al, 2007 has showed that physiotherapy has improvement on selected outcome measures in Parkinson’s disease.

Smania, et al, 2013 Balance training is often studied in Parkinson’s disease patients, because of lack of motor control and balance that leads to falls. A study that evaluated balance training on Parkinson’s disease found that balance training improved postural stability, confidence level in performing daily activities and reduced the frequency of falls.

Sneha B.S, et al, 2016 has concluded that trunk based PNF training is beneficial in improving dynamic balance, mobility and quality of life in patients with Parkinsonism.

William DB, et al, 2001 PNF promotes strengthening, motor learning and restoration of motor control in older adults with neuromuscular deficits. It is a widely used technique as an intervention for neuromuscular dysfunction with particular emphasis on the trunk.

Table 1 shows that there is no significant difference in pre test values of the BBS between Group A & Group B (*P > 0.05). This table shows that statistically highly significant difference in post test values of the BBS between Group A & Group B (***-P ≤ 0.001) (Graph – I)

Table 3 shows that in BBS, there is a statistically highly significant difference between the pre test and post test values within Group A and Group B (***-P ≤ 0.001). (Graph – III)

Table 2 shows that statistically highly significant difference in post test values of the Unified Parkinson’s Disease Rating Scale between Group A & Group B (***-P ≤ 0.001) (Graph – II).
Table 4 shows that in Unified Parkinson’s Disease Rating Scale, there is a statistically highly significant difference between the pre test and post test values within Group A and Group B(***-P ≤ 0.001).(Graph-IV)

In between group analysis it was found that the group which underwent PNF techniques showed more increase in balance as compared to the group which received balance exercises.

Finally, PNF techniques can be used as effective treatment program in improving balance in Parkinson’s diseased patients.

Conclusion

The present study concludes that PNF technique as well as balance training are effective in improving balance in Parkinson’s Disease patients. But PNF technique is more beneficial in improving balance in Parkinson’s Disease. Hence the findings of this study suggest that the PNF technique, if added to conventional rehabilitation protocol in treatment is beneficial to improve balance and thereby quality of life in Parkinson’s Disease.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Institutional Review Board 033/PHYSIO/IRB/2017-2018

Reference

1. Kumar S, Singh AK, Singh S. The Effectiveness of Physiotherapy Approaches in Patients with Parkinsonism Disease: A Literature Review.


Life Skills: A Study on Young Girls Working in Organized Sectors in Coimbatore, Tamil Nadu

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Abstract

Introduction: One in every ten Indians is a young girl. Consequently, India hosts nearly 20% of the world’s population of young girls in age of 14 to 21 years, and each and every one of them has the potential to contribute to India’s future economy¹. Yet, work participation rates for women remain dismally low¹. Denying girls the opportunity to finish their schooling and build income-generating skills, keeps them from realizing their economic potential³. Life skills development empowers learners to observe the process involving “what to do, why to do, how to do and when to do”. It encompasses the ability to build sound, harmonious relationships with self, others and the environment, the ability to act responsibly and safely, the ability to survive under a variety of conditions, and the ability to solve problems⁴.

Aim: To measure the level of life skills in young girls working in organized sectors, Coimbatore.

Results: The statistical measure of central tendency the mean age of the respondents is 17.42 years and there is no difference between the mean median and mode. Regarding the global score of life skills, the majority (40.8%) of the respondents had average level of life skills. There is significant association between education level of the respondents and their life skills levels, between experience and of problem solving skill of the respondents, association between educational qualification and of coping with stress level of the respondents.

Conclusion: Through this study it is evident that majority of the respondents had only average level of life skills. And it is understood that majority of the respondents had average level of life skills, so this is the main reason for young girls to become vulnerable in working environment. Vulnerable in the form of low wages, over work load, verbal abuse and suffering from occupational hazards. Through the promotion of life skill education to these young girls their quality of life and quality of work environment can be improved.

Keywords: Young girls, Life skills. Organized sectors, Mental health, vulnerable.

Introduction

One in every ten Indians is a young girl. Consequently, India hosts nearly 20% of the world’s population of young girls in age of 14 to 21 years, and each and every one of them has the potential to contribute to India’s future economy¹. Yet, work participation rates for women remain dismally low. Denying girls the opportunity to finish their schooling and build income-generating skills, keeps them from realizing their economic potential³.

Life skills are a set of human skills acquired via teaching or direct experience that are used to handle problems and questions commonly encountered in daily human life. The subject varies greatly depending on societal norms and community expectations².

Life skills are those abilities that enable individuals...
to deal effectively with demands and challenges of everyday life. Life Skills help individuals to convert intangible assets like knowledge and attitude into healthy behaviors.

Life skills development empowers learners to observe the process involving “what to do, why to do, how to do and when to do”. It encompasses the ability to build sound, harmonious relationships with self, others and the environment, the ability to act responsibly and safely, the ability to survive under a variety of conditions, and the ability to solve problems.

Many mental health problems emerge in late childhood and early adolescence. Enhancing social skills, problem-solving skills and self confidence can help prevent mental health problems such as conduct disorders, anxiety, depression and eating disorders as well as other risk behaviors including those that relate to sexual behavior, substance use, and violent behavior.

Coimbatore enjoys a place of significance in the industrial map of India. The textile units at Coimbatore range from small to large scale with the specialisation in spinning. The cotton textile industries still dominate the city and provide about 50 percent of registered manufacturing employment. Since independence, the engineering and metal-working industries developed rather rapidly with the initial impetus provided by the textile mills and commercial agriculture for electric motors and pumps. Now, engineering and metal-working industries came to dominate the city of Coimbatore although textile as well as trade and commerce continue to occupy a significant space in the urban economy of Coimbatore. The dynamic industrial development of the city has been due to a variety of factors, locational as well as historical, and this has probably attracted migration of people from the vast rural hinterland contributing to a rapid increase in the population of the city. Among them women workers in organized sectors are about 65% mostly unskilled workers. The age group of the workers is predominantly in the range of 14 to 21 year are in fact a minority segment among the total workforce.

Methodology

The researcher followed descriptive research design for the study. The major goal of this descriptive research is to find out the level of life skills of young girl’s working in organized sector. There are more than 25,000 small, medium, large sale organized sectors in Coimbatore. 60 to 80% of workers in the organized sectors are temporary workers. An estimated 120,000 young girl’s are currently employed. Convenient sampling was used. The researcher selected all the organized sectors in east zone of Coimbatore. The population of the working adolescent’s girls in this zone was about 40,000 out of 2500 industries approximately. Young girl’s working in these sectors, willing to participate in the study in the age group of 14-21. The first part of the structured questionnaire consists of the socio demographic profile of the respondents.

The second part of the structured questionnaire consists of the Life skills Assessment scale constructed by RGNIYD. The multi-dimensional life skill scale consists of 100 items in the form of statements in-build with 5-point scale was used.

Young girls constitute one fifth of the female population in the world. Unmarried young girls of 14 to 21 years of age are preferred in the textile and garment industry for their efficiency in work output. The influx of female workers started in the 1970s when textile and garment manufacturers from different parts of India started relocating to Tamil Nadu in search of a more pliant workforce.

Selection of the Respondents: The organized sectors had a working population of 1204 girls in the age group of 14-21. The researcher selected 10% of the total population using simple random procedure. Thus 120 respondents were selected.

Inclusion Criteria: Young girl’s working in organized sectors in the age group of 14-21.

Exclusion Criteria: Women working in organized sectors exceeding the age of 21.

Results

Socio Demographic Data: The data of the current studies was taken from 120 young girls working in organized sectors. The socio demographic data reveals the following information. The statistical measure of central tendency the mean age of the respondents is 17.42 years and there is no difference between the mean median and mode. It’s interesting to see nobody is illiterate among them. The data indicates that school drop outs were high after primary and secondary level. Majority of the respondents belonged to Hindu religion (88.3%), and adhering to Islam (6.7%) and remaining Christianity (5%).Nearly one fourth of the respondents
(24.2%) belonged to Backward Community, 55.8% belonged to Most Backward Community and rest one fifth of the respondents (20%) belonged to Scheduled Caste and Scheduled Tribe.

**Level of life skills**

**Global Score:** Life skills: The World Health Organization has defined life skills as, “the abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life”.

<table>
<thead>
<tr>
<th>Level of Life skills</th>
<th>No of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>20</td>
<td>16.7</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>.8</td>
</tr>
<tr>
<td>Average</td>
<td>49</td>
<td>40.8</td>
</tr>
<tr>
<td>Low</td>
<td>43</td>
<td>35.8</td>
</tr>
<tr>
<td>Very low</td>
<td>7</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Less than half of the respondents (40.8%) possessed average level of life skills. Only 16.7% of respondents had very high level of life skills, 35.8% of respondents with low level of life skills and 5.8% of respondents with very low level of life skills. The researcher is of the opinion that majority of the respondents need to improve their life skills level for their betterment.

Majority of respondents (64.2%) had average level of self awareness. Only 1.7% of respondents had very high level of self awareness and 4.2% of respondents had very low level of self awareness skill. 59.2% of the respondents had average level of empathy. Only .8% of respondents had very high level and 4.2% of respondents with very low level of empathy skill. Majority of respondents (60%) had average level of effective communication skill. 17.5% of respondents had very high level of effective communication skill and 3.3% of respondents with very low level of effective communication skill. 59.2% of respondents had average level of life skills and 8.3% of respondents had very low level of interpersonal relationship skill. 51.7% respondents had average level of creative thinking skill. 1.7% of respondents had very low level of creative thinking skill and 15.8% of respondents had very high level of creative thinking skill. Majority of the respondents (65%) had average level of critical thinking skill. 42.2% of respondents had average level of decision making skill. Less than half of respondents (42.5%) had average level of problem solving skill. The majority of respondents (59.2%) had average level of coping with emotions skill. Less than half the respondents (48.8) had average level of coping with stress.

Less than half of the respondents (47.6%) from primary level of education had average level of life skills level. This indicates that there is significance association between educational status and life skills level. There is no statically significant difference between income level and life skills level. The level of life skills were low among the age group 14-16, 17-19 had average level of life skills and 20 and 21 age group has low level of life skills. This result indicates that there is no significant association between age and life skills level of the respondents. There is no statistical significant association between age and problem solving skill. The problem solving skills found to be average among all the age group. Education status had average level of critical thinking skill. Hence, it can be concluded that there is no significance association between the educational status and critical thinking. All the age group had average level of decision making and statistically it is inferred that there is no significance association between age and decision making. There is significant association between experience and problem solving skill. The primary and secondary level of education had average level of coping with stress, whereas it were found to be coping with stress were very high among the higher secondary level. This result indicates that there is no association between education status and coping with stress. The respondents from rural and urban area had average level of interpersonal relationships. Hence there is no significance association between geographical area and interpersonal relationships. All the community had average life skills level. It is statistically not significant.

There is no significant association between the educational status and decision making. Both rural and urban people had average level of decision making skill. There is no statistically significant association between area and decision making.
The association between selected socio economic variables and life skills level: There is significance association between education statuses, experience with life skills level. However it is interesting to see there is highly significant association between respondents experience and self awareness. There is significant association between education status of the respondents and empathy. Whereas no such association between age, demographic area, income level and experience of the respondents with empathy. There is highly significant association between respondent’s education status and experience with effective communication. There is no significant association between age, education status, demographic area, income and experience of the respondent’s with interpersonal relationships. There is highly association between the educational level, and experience with critical thinking. There is no significant association between the age, education level, demographic area, income and experience of the respondent’s with critical thinking. There is moderate level significant relation between the education statuses of the respondent’s with decision making. It is highly significant with income level and experience of the respondent’s. It was found that there is no significant relation between the respondent’s age and demographic area. There is highly significant relation between education statuses and experience of the respondents’ with problem solving. However it is noted that there is no significant relation between age, demographic area and income of the respondent's with problem solving. There is no significant relation between respondents’ age, education, demographic area and income with coping with emotions. It is interesting to note that there is moderate significant relation between experiences of the respondents with coping with emotions. There is highly significant relation between experience of the respondents’ with coping with stress, whereas such relations is at a moderate level with regard to the age of the respondents. However, there is no significant relation between demographic area and income of the respondents with coping with stress.

**Conclusion**

Through this study it is evident that majority of the respondents had only average level of life skills. And it is understood that majority of the respondents had average level of life skills, so this is the main reason for adolescent girls to become vulnerable in working environment. Vulnerable in the form of low wages, over work load, verbal abuse and suffering from occupational hazards. Through the promotion of life skill education to these adolescent girls their quality of life and quality of work environment can be improved.

Life skills are an essential tool for understanding one’s strength and weakness and the individual is able to discern an available opportunity is able to face the possible threats. Life skills enable oneself to explore alternatives, weigh pros and cons and make rational decision in solving each problem or issue and facilitate to establish productive interpersonal relationships with others.
Life skills are a topic largely neglected rather untouched throughout any stage of education in India, and yet is an essential part of children’s overall development. In a country nearly half of the population is in the age group of adolescence. At this point of the time the much neglected life skills education has become the need of the hour for discussion, and its implementation in our Indian educational system. Life skills education can be included in the central board of workers education scheme which will improve the ability of the young adolescent girls in all the aspect of life situations.

Life skills training are the act of increasing the knowledge and skill of an employee for doing a particular job. It is required in every industry so as to cope the employees with the emerging trends. Life skills can substantially improve the quality of life and productivity among the employees. Industries imparting life skills training are more effective than other, which reduces employee turnover. Therefore life skills training and education are the only way to resolve today’s crisis of any young girl’s facing in the day to day life situations.

**Conflict of Interest:** No

**Ethical Clearance:** All procedures performed in the study involving human participants were in accordance with the ethical standards of the institution and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The clearance for research was obtained from the Human Ethics Committee, Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India, for ethical clearance and the same was obtained.

**Source of Funding:** Self

**References**

A Descriptive Study to Assess Knowledge and Attitude towards Caesarean Section among Antenatal Mothers in a Selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India

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Abstract

A descriptive study to assess knowledge and attitude towards Caesarean section among antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India.

The objectives were to assess knowledge towards caesarean section among antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India, to assess attitude towards Caesarean section among antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India, to correlate between Knowledge and Attitude towards Caesarean section among antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India, to associate between knowledge, attitude of antenatal mothers towards Caesarean section with the selected demographic variables in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India.

The Hypothesis were: There is no significant correlation between knowledge and attitude, there is no significant association between selected demographic variables and the knowledge level towards Caesarean section among Antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India, There is no significant association between selected demographic variables and attitude towards caesarean section among Antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India.

Associate between knowledge, attitude of antenatal mothers towards Caesarean section with the selected demographic variables in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India. The hypothesis were: There is no significant correlation between knowledge and attitude, there is no significant association between selected demographic variables and the knowledge level towards Caesarean section among Antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India. There is no significant association between selected demographic variables and attitude towards caesarean section among Antenatal mothers in a selected Tertiary Care Hospital at Kelambakkam, Kanchipuram District, Tamil Nadu, India.

The convenience sampling was adopted to select 50 samples. The data collection tools were validated and reliability was established. The data was collected by self-administer questionnaire and 5 points opinionnaire attitude scale method. The collected data tabulated and analyzed. Descriptive and inferential statistics were used. The study shows that most of Antenatal mothers 28 (56%) had inadequate knowledge, 21 (42%) had moderate knowledge and only 1 (2%) mother had adequate knowledge towards Caesarean section. In terms of attitude of mothers 31 (62%) had moderately positive attitude, 17 (34%) mothers had positive attitude and 2 (4%) mothers had negative attitude towards Caesarean section. There is no significant association between knowledge, attitude towards Caesarean section with selected demographic variables and there is no correlation between knowledge and attitude of Antenatal mothers towards Caesarean section.

Keywords: Knowledge, attitude, Caesarean section.

Introduction

In developed countries, women often opt for cesarean delivery because of their improved understanding of its role and safety and increasing importance given to the right to self-decision making regarding mode of delivery. However in developing countries, women are reluctant
to accept cesarean delivery because of their traditional beliefs and socio-cultural norms. Hence they try to avoid hospital delivery and engage in the services of untrained and unskilled care providers. These women usually report to hospital with life threatening complications and in such situations most of the cesareans are performed as an emergency procedure under suboptimal circumstances. Main reason of choosing cesarean section by pregnant women is fear and lack of sufficient knowledge about normal vaginal delivery. Although in specific situations cesarean section can prevent serious morbidity and mortality of the fetus and mother, data indicates that in many cases the procedure is not indicated and vaginal delivery could have been achieved safely

The CS rate varies worldwide, from country to country and within a country. The National CS rate of Great Britain and America have been reported as 23.8% and 32.8% respectively, while 0.6% national CS rate was reported from Ethiopia. In Nigeria, CS rates ranging from 12.2% to 34.5% were reported in some tertiary health facilities and in recent times the CS rates globally have been on the rise.

Materials and Method

Research Approach: A quantitative approach was selected for the study.

Research Design: Research design is blue print for conducting a study maximizes control over factors that could interfere with the validity of the finding. Non-experimental – Descriptive design found to be the appropriate design for the study.

Research Setting: The study was conducted at OG OPD, Antenatal ward, Labour Room in Chettinad Hospital & Research Institute at Kelambakkam, Kanchipuram District, Tamilnadu, India.

Population

Target Population: The entire group of people or objects to which the researcher wishes to generalize the findings of a study.

Sample: A subset of the population that is selected to represent the entire population.

The sample of the study were Primi Antenatal mothers in second and third trimester in OG OPD, Antenatal ward, labour room in Chettinad Hospital & Research Institute at Kelambakkam, Kanchipuram District, Tamilnadu.

Sample Size: Sample size for the present study was 50 Primi Antenatal mothers who are satisfied the inclusion criteria.

Sampling Technique: Sampling is the process of selecting a representative part of the population. Convenience sampling technique was adopted for the study.

Sampling Criteria

Inclusion Criteria: Inclusion criteria are characteristics that the subjects must have if they want to be included in the study. The inclusion criteria were:

- Primi Antenatal mothers who are in 2nd and 3rd trimester from 13 to 38 weeks.
- Who visit Antenatal OPD
- Admitted in Antenatal ward
- Who were willing to participate

Exclusion Criteria: Antenatal mothers who had previous Caesarean section

- Who did not understand Tamil
- Who are in labour

Selection and Development of Study Instruments:
Self-administered questionnaire will be used to collect data regarding demographic variables and knowledge towards Cesarean section

Opinionnaire will be used to collect data regarding attitude towards Cesarean section

- Part A: Demographic variables
- Part B: Self-administered questionnaire for knowledge assessment.
- Part C: Opinionnaire

Scoring and Interpretations

- The knowledge questions were 15.
- The attitude questions were 15.
- Each correct question will be given 1 mark.
Data Collection Procedure: After getting permission questionnaire were given to the Antenatal mothers to assess the knowledge and opinionnaire scale to assess the attitude. They read the questionnaire carefully and took 15 mins time to fill the questionnaire and attitude scale.

Duration of Data Collection was 2 weeks.

Plan for Data Analysis: The descriptive statistics are the percentage, co-relation & co-efficient and the Inferential statistics is chi square test was used to analyze the data.

Results and Discussion

The Discussion is Presented as Follows

- Frequency and percentage distribution of demographic variables of Antenatal mothers.
- Frequency and percentage distribution of knowledge and attitude among Antenatal mothers towards Caesarean section.
- Association between knowledge towards Caesarean section and selected demographic variables.
- Association between attitude towards Caesarean section and selected demographic variables.
- Co-relation between knowledge and attitude towards Caesarean section.

<table>
<thead>
<tr>
<th>Knowledge Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>Inadequate</td>
</tr>
<tr>
<td>51-75%</td>
<td>Moderately Adequate</td>
</tr>
<tr>
<td>Above 75%</td>
<td>Adequate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opinionnaire Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-75%</td>
<td>Moderately positive Attitude</td>
</tr>
<tr>
<td>Above 75%</td>
<td>Positive Attitude</td>
</tr>
</tbody>
</table>

- Regarding to occupation majority 27(54%) of Antenatal mothers were unemployed whereas minority 3 (6%) mothers were Government employees.
- Regarding to monthly family income majority 29(58%) of Antenatal mothers were under above poverty line whereas minority 21(42%) were below poverty line.

1. Frequency and percentage distribution of demographic variables of Antenatal mothers:

- Regarding to age group, majority 44 (88%) of Antenatal mothers were at the age group (20-30) whereas minority 6(12%) at the age group of (31-40).
- Regarding to Gestational age, majority 30 (60%) of Antenatal mothers were including (29-38) weeks whereas minority 20 (40%) were (20-28) weeks.
- Regarding to educational status majority 28 (56%) of Antenatal mothers were undergraduates, whereas minority 3 (6%) were illiterates.
- Regarding to occupation majority 27(54%) of Antenatal mothers were unemployed whereas minority 3(6%) mothers were Government employees.
- Regarding to monthly family income majority 29(58%) of Antenatal mothers were under above poverty line whereas minority 21(42%) were below poverty line.

2. Frequency and percentage distribution of knowledge and attitude among Antenatal mothers towards Caesarean section:

Table 1: shows the frequency and percentage of knowledge of mothers regarding Caesarean section

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate Knowledge</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(Above 75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Knowledge</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>(51%-75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate Knowledge</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>(Below 50%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

In terms of Knowledge, most of the mothers 28(56%) had inadequate knowledge, 21(42%) had moderate knowledge and only 1(2%) mother had adequate knowledge towards Caesarean section.
Table 2: shows the frequency and percentage of attitude of mothers regarding Caesarean section

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Attitude (Above 75%)</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Moderately Positive Attitude (51%-75%)</td>
<td>31</td>
<td>62</td>
</tr>
<tr>
<td>Negative Attitude (Below 50%)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

In terms of attitude of mothers 31(62%) had moderately positive attitude, 17(34%) mothers had positive attitude and 2(4%) mothers had negative attitude towards Caesarean section.

3. Association between knowledge and selected demographic variables: The chi-square value shows that there is no significant association between knowledge with selected demographic variables like age, gestational age, education, occupation and family income.

4. Association between attitude and selected demographic variables: The chi-square value shows that there is no significant association between attitude with selected demographic variables like age, gestational age, education, occupation and family income.

5. Co-relation between knowledge and attitude: The co-relation co-efficient result shows that there is no co-relation between knowledge and attitude of Antenatal mothers towards Caesarean section.

Conclusion

As our study state that antenatal mothers had inadequate knowledge on Caesarean section and had moderately positive attitude towards Caesarean section. So researchers in order to create awareness on Caesarean section, were given health talk about Caesarean section.

Conflict of Interest: No

Source of Funding: Nil

Ethical Clarence: In this study the researchers have got prior permission to conduct the study and got informed consent from each participant. we ensured that no physical harm to the samples. Confidentiality maintained

References
The Issues Affecting the Correct Practice of Healthcare Waste Management in Lae’s Angau Memorial General Hospital

Keven Gaitu, Kamalakanta Muduli, Harrison Apana, Satyabrata Aich, John Pumwa

Abstract

Healthcare Waste Management (HCWM) is a vital issue not only to hospitals, but also to the environment, law enforcement agency, and the general public. It is one of the biggest challenges of the present day times since it has a direct impact on the health of the citizens, animals and the environment. Since it is hazardous in nature, its safe and proper disposal is extremely important. In the past, healthcare waste was often mixed with municipal solid waste and disposed of in residential waste landfills or improper treatment facilities (e.g. inadequately controlled incinerators). In recent years, many efforts have been made by environmental regulatory agencies to better manage the waste from healthcare facilities. This situation requires an organized system of healthcare waste management to curb public health risks as well as occupational hazards among healthcare workers as a result of poor in waste management. This paper presents an overview of the current management practices of healthcare waste in Angau Memorial General Hospital (AMGH) in Lae city, Morobe, Papua New Guinea (PNG). Data were collected via surveys, interviews, and on-site observations. Information regarding generation, segregation, transportation, and disposal of healthcare wastes is provided and discussed. The study showed that the hospital does not have a proper policy and plan in place for managing medical waste as well as an inadequate practice of handling healthcare waste from generation to disposal.

Keywords: AMGH, HCWM, Papua New Guinea (PNG), Healthcare Facilities (HCF).

Introduction

A developing country like PNG is struggling in recent years solely to meet the medical needs of its people. Much of the country’s citizens are rurally situated with inadequate supply of medical resources. Many of the HCF in the country which are government-operated are old, run-downed and are limited in resources. Due to this fact, most of these HCFs only focus on the primary objective of delivering medical supplies and to restore good health to the sick and injured. In doing so, these HCF overlook some of the medically sensitive issues like the practice of proper Healthcare Wastes management within their facility.

Healthcare Wastes means any solid, fluid, or liquid waste including its containers and any intermediate product which is generated during the diagnosis, treatment, or immunization of human beings or animals or in research activities that are considered harmful and infectious. Healthcare waste (HCW) collection and proper disposal has become a significant concern for both the medical and general community. Inadequate and inappropriate knowledge of handling of healthcare waste in the case country may have serious health consequences and a significant impact on the public health.
environment as well. However, lack of awareness has led to the hospitals becoming a hub of spreading diseases rather than working toward eradicating them.

Despite the efforts for the management of wastes, the current system of healthcare waste management in Lae’s AMGH is seen to be inadequate and risky. There is less consideration given to the final handlers of the waste by the segregation or sanitary officers. Therefore, there is a dire need of immediate attention and improvement and to develop a national policy and implement a comprehensive action plan for HCWM providing environmentally sound technological measures to improve HCWM in PNG.

The overall aim of the research is to

- Study the healthcare waste management situation in the case hospital.
- Suggest recommendations and policy implications.

Review of Healthcare facility and HCWM in Papua New Guinea: Healthcare in PNG is mainly provided by government and church health facilities, funded by a mix of government tax revenues, out-of-pocket payments and donor funds. In 2013, according to WHO, PNG spent 4.5% of its GDP on health services with approximately 20% of this coming from donors such as Australia and in the preceding year, launched a free primary healthcare program eliminating all user fees from medical centers and clinics. PNG has minimum number of healthcare physicians, with just 1 doctor per 17,068 of the population with these doctors poorly distributed geographically. Although 85% of the population live in rural areas, majority of doctors work at the national specialist hospital or nearby regional public hospitals, with just 51 physicians working outside the capital Port Moresby.

Healthcare waste is one of the major environmental health concerns for many hospitals and clinics both in rural and urban areas in PNG. A great majority of Lae’s hospitals and clinics lack proper health care waste management practices and many have gone slack in upholding the policies and regulations from the government. The present method of healthcare waste management are potentially hazardous and pose health risk to hospital workers, hospital sanitation workers, the general public, solid waste handlers and the environment. The city of Lae serves as a hub for many neighboring provinces because of its welcoming climate and the fact that it is an industrial city. For that, there is a high chance of viral, bacterial and protozoan infections to be contracted. Hence there is a great urgency to ensure effective management of biomedical waste to contain the spreading of contagious diseases.

Methodology

Study Area: Lae is the capital of Morobe Province and is the second-largest city in Papua New Guinea. It is located near the delta of the Markham River and at the start of the Highlands Highway, which is the main land transport corridor between the Highlands region and the coast. Lae is the largest cargo port of the country and is the industrial hub of Papua New Guinea.

Selected General Hospital in Lae: AMGH: Angau Memorial General Hospital is located in the central Lae area next to the old Lae Airfield. It is biggest and the main referral hospital for the general Morobe Province, as well as the other provinces connected by road link. It contains the only Radiotherapy facility in the country and thus serves as the main referral center for cancer patients. The hospital was developed to serve the people of Lae and Morobe Province and was constructed in the early 1960s and officially opened on April 17, 1964. It was named in memory of the Australia New Guinea Administrative Unit (ANGAU) whose members distinguished themselves during the Second World War in Lae and its surrounding areas.

Survey: The survey was conducted using a prepared questionnaire and all wards with all the staff (doctors, nurses, sanitary officers, and medical administrators) were involved in providing vital information. Questionnaire and field observation check list were prepared from WHO recommendation assessment tool and were used to describe the healthcare waste management practices of HCWs in healthcare facilities.

Healthcare waste is one of the major environmental health concerns for many hospitals and clinics both in rural and urban areas in PNG. A great majority of Lae’s hospitals and clinics lack proper health care waste management practices and many have gone slack in upholding the policies and regulations from the government. The present method of healthcare waste management are potentially hazardous and pose health risk to hospital workers, hospital sanitation workers, the general public, solid waste handlers and the environment. The city of Lae serves as a hub for many neighboring provinces because of its welcoming climate and the fact that it is an industrial city. For that, there is a high chance of viral, bacterial and protozoan infections to be contracted. Hence there is a great urgency to ensure effective management of biomedical waste to contain the spreading of contagious diseases.
The questionnaire used in this research contained 113 straight-forward questions requiring Yes/No and closed-end responses. They are arranged in categories of the respondent’s knowledge, attitude and practices, the awareness and the assessment of factors affecting HCWM Practices in healthcare waste management. From the filled-out questionnaires, significant results based on issues that affect HCWM will be discussed.

**Analysis of Survey Results:** The case hospital has 33 wards that include medical, surgical, labour, paediatric, psychiatric, cancer and the rest all produce medical and general wastes. The Cancer wards produce about 2 bags/day from the 10 beds available in the cancer treatment room i.e. one bag is the average size of a garbage plastic. Medical and surgical wards with 27 beds each produced waste depending on the illness and the types of medical condition of the patients. On average, the hospital produces about 5kg-7kg of waste daily. Measurement of waste was taken with respect to time, where the very ill patients were treated 3 to 6 hours in one day whereas ill patients were treated for 2 to 3 hours. In turn, the waste generated depended upon the sickness of patient in both the medical and surgical wards. AMGH only has three color coding systems for segregation of waste where, orange is used for cytotoxic waste, yellow for all medical waste excluding cytotoxic waste and green is for general non-hazardous waste.

Identified Issues that affect the proper practice of Healthcare Waste Management in AMGH

**Lack of Proper Segregation Practice:** The hospital does not follow proper color-coding for biomedical waste that differentiates the type of waste and the proper packaging for certain waste; rather, they use brown boxes for sharps, black bags for all medical waste excluding cytotoxic waste which is put in a primary bin for temporary storage in the wards and when full they store them outside in bigger-rubbish bins ready to be taken away and yellow bags for cytotoxic waste. The third party waste handlers then bring the waste to the incineration area where segregation is done again and all medical wastes are incinerated except cytotoxic waste and the general waste including the cytotoxic waste is transported to the dump site where the cytotoxic waste is burnt there. The current incinerator is not capable to fully disintegrate the cytotoxic waste.

![Figure 1: Waste Storage Practice.](image1)

Brown boxes used to store used sharps like injections

Black plastic bag in the primary storage inside the ward that is used to house all medical wastes except cytotoxic waste

![Figure 2: General and Medical Waste Storage Practice.](image2)

Green rubbish bin for general waste

Yellow rubbish bin for medical waste
No Proper Storage for the Medical Waste and General Waste before disposal: The medical waste including general waste is stored outside the incineration area where final segregation is done before incineration or disposal at the dump yard is carried out.

![Figure 3: Current improper storage area.](image)

![Figure 4: No proper storage of Wastes.](image)

Old, Unhygienic and a Potential High Risk Incinerator & a New but Disfunctional Incinerator: The Hospital currently has two incinerators out of which the new incinerator is problematic and disfunctional; therefore, the old incinerator is used to incinerate the medical wastes. Due to the inefficiency of the old incinerator to completely and effectively destroy the contents of the cytotoxic waste, the cytotoxic waste is not incinerated on-site.

![Figure 5: The Old Incinerators.](image)
Respondents Perception towards the Knowledge, Attitude and Practices of HCWM: Survey results based on the knowledge assessment, revealed that 63% of the respondents were not aware of any legislation applicable to hospital waste management whilst 19% were aware of it and 18% were not sure. These results imply that, healthcare workers practice hospital waste management without government regulated legislations or standards in place for proper healthcare waste management. Similarly, responses to questions based on attitude assessment, indicate that 63% of respondents believe that the proper management of BM waste is the sole responsibility of the government whilst the other 31% argued that BM waste was not the sole responsibility of the government. Similar results were found whereby 50% agreed that safe management efforts by hospital increases financial burden on management and safe management of biomedical waste is an extra burden on work. These results imply a general conclusion that about half the population of healthcare workers take HCWM as a personal responsibility. Responses on questions based on practices assessment, revealed that 68.7% do not maintain a register for waste disposal implying that majority of healthcare workers are not aware of a register in place for waste disposal. Furthermore, 81.2% said that they have not undergone any training program on hospital waste management and 75% said that the hospital does not provide annual education on waste management. This implies that, most healthcare workers are on not well-educated on HCWM. The results also show that, 56.3% of respondents admit that neither all waste containers are properly labelled with type of dangerous waste nor accumulation start date whilst 31.3% admit existence of proper labelling system. This would imply that, maybe some wards or sections might have or not have properly labelling. 25% said that staff who handle hazardous waste do not receive training while 43.8% said that the staff receive training. This implies that, maybe selected or specified healthcare personnel undergo or have undergone some form of HCWM training. 56.3% said that their department do not keep record of the amounts of dangerous waste generated per month while 25% said that they kept records while the other 18.7% were not sure. This implies that the waste management plan probably does not include keeping records of dangerous wastes per month or whether 25% of respondents were part of departments that kept records of monthly generation of dangerous waste.

Recommendations: The staff and waste handlers in each hospital should be well trained at the beginning of their work at hospitals and clinics, and regularly updated with pre-employment and in-house specialized training, which should provide them with a knowledge base about the process of healthcare waste management and associated health risks.

The Authorities or the Ministry of Health should put laws and regulations related to healthcare waste management within healthcare establishments. The Ministry of Health should also coordinate with the Local Level Government (LLG) and the Environmental Quality Authority to devise a mechanism for monitoring healthcare waste management outside healthcare establishments.

It should be obligatory for each healthcare facility to ensure a safe and hygienic system of medical waste handling, segregation, collection, transportation, storage, treatment and disposal, with minimal risk to handlers, public health and the environment through coordination between the respective persons in the Waste and Infection Control management according to their responsibilities.

Improve the current colour-coding practice. If more available colour-coded bins representing different medical waste categories are available in every wards, it will speed up the process of segregation. It will be less tedious for the sanitary officers to do further separation and it will minimize the wastes’ storage time or time of exposure to the environment, animals, and human beings. This will greatly reduce the risk of contracting any infectious diseases.

Posters with labelled pictorial diagrams should be made available in wards and public grounds of hospitals and clinics to provide awareness and direction on the types of waste and how they should be disposed. This is important as most of the users of these healthcare facilities come from rural areas and many are illiterate. These pictorial depictions will assist greatly in segregation and the waste handlers will go through less problem in doing separation.

Environmentally sustainable technological options for treating waste, which can be well operated and maintained, should be considered for healthcare waste management.
Conclusion

The overall findings of this study indicated that the majority of HCWs did not apply the recommended healthcare waste management practice set by WHO. Furthermore, the current healthcare waste management practice in the studied health facility was managed improperly and can pose a risk for human health and the environment. All medical wastes in all wards are disposed into a single bin which are later separated by sanitary officers after collection. The problem with this is that the wastes may not be separated well according to their risk sensitivity and the workers could get infected easily. Although there is segregation practice in place, there is still risk involved in handling wastes especially to the workers who are at the tail-end of the waste management; those who come into direct contact with the wastes before they get disposed or incinerated. Also, inadequate supply of color coded containers, lack of guideline for healthcare waste management, and low commitment of HCWs were observed. Moreover, knowledge on healthcare waste type, knowledge on diseases transmitted with contact of infectious wastes, training and availability of guideline documents were significantly associated with healthcare waste management practices of HCWs.

Source of Funding: PNGUNITECH

Ethical Clearance Obtained from: AMGH and PNG UNITECH

Conflict of Interest: Nil

References

Achondroplasia: A Case Report

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Abstract

Achondroplasia, most frequent form of dwarfism, is of special interest in the field of dentistry because of its craniofacial characteristics that includes relative macrocephaly, frontal prominence depressed nasal bridge, maxillary hypoplasia and dental malocclusion. The present paper reports a case of 30 years old male achondroplastic patient with review of the literature.

Keywords: Dwarfism, Cartilage, Gene mutation, FGFR3 and orofacial manifestation.

Introduction

Chondrodystrophias fetalis, known as achondroplasia, is a non-lethal form of chondrodysplasia. Most frequent form of short–limb dwarfism, transmitted as autosomal dominant trait with complete penetrance due to mutation in the fibroblast growth factor receptor-3 gene (FGFR3), mapped to band 4p16.3.¹,² Characterized by intrinsic disturbances in bone formation and modelling, causing disproportionate short stature affecting long bones of the body owing to defect in intra-cartilaginous ossification.

Estimated prevalence is one in 15000-40000 cases worldwide. Approximately, 80 % cases are de novo dominant mutations. It occurs as a result of mutation in one copy of the FGFR3. More than 97 % of patients have same point mutation. Common mutation causes gain of function of FGFR3 gene, resulting in decreased endochondral ossification, inhibited proliferation of chondrocytes in growth plate cartilage, decreased cellular hypertrophy and decreased cartilage matrix production with varied manifestations.³

Thoracic kyphosis (infants) gradually resolves and is replaced by a lordotic lumbar spine in adults, prominent buttocks, protuberant abdomen, rhizomelic shortening of limbs, trident hand and limitation of elbow extension. Hypotonia of limbs with delayed motor development in children usually improves and disappears in childhood. 10% of children show significant bowing of tibiae and 6% of affected children develop hydrocephalus. Cervicomedullary compression, a rare complication can occur with episodes of apnoea. In the adolescent and adult, compression of nerve roots in spinal canal may be present with numbness or weakness in legs. Recurrent middle ear infections is a common problem with a risk of conductive hearing loss.⁴ Radiological features include small cuboid vertebral bodies with progressive narrowing of the caudal interpedicular distance, lumbar lordosis, and thoracolumbar kyphosis with occasional anterior beaking of the 1st and 2nd lumbar vertebrae, small iliac wings with a narrow greater sciatic notch and short tubular bones with metaphyseal flare and cupping.⁵ Craniofacial features include enlarged calvarium with hydrocephaly, brachycephaly, midfacial hypoplasia, depressed nasal bridge, forehead prominence and dental malocclusions.

Case History: A 30 year male dwarf reported with chief complaint of stains and deposits in teeth. His paternal grandmother suffered from dwarfism. Other family members were healthy. Patient was 3 feet and 9 inches tall, weighed 43 kilograms, well built, nourished, calm, cooperative, conscious, well oriented to time and place with waddling gait. Vital parameters were normal. Lumbar lordosis, limitation of lumbar extension,
shortened limbs, trident hands, prominent buttocks and protuberant abdomen were observed. (Figure 1(a))

Extra oral examination revealed brachycephalic craniometric dimension, hypoplastic maxilla, mild hypertelorism, depressed nasal bridge and incompetent lips. (Figure 1(b))

Intra-oral examination of hard tissue revealed dental caries in 37, 47, partially edentulous area in 16, 26, attrition in 46, generalized grade (++), stains & calculus, anterior open bite, proclined maxillary anteriors, crowding in mandibular anteriors, posterior cross bite, high-narrow ‘V’ shaped maxillary arch and narrow mandibular arch. (Figure 1(c))

Complete blood count, serum alkaline phosphatase, serum calcium and serum phosphorous were within normal limits. Posteroanterior (PA) view of skull revealed widened calvaria, suggestive of brachycephalic skull. Lateral cephalogram showed presence of hypoplastic maxilla, mild mandibular proclination, anterior open bite, underdeveloped posterior nasal spine and nasal bone. Orthopantomogram (OPG) revealed restored 36, partially edentulous area in 16 and 26, narrow maxillary arch and increased vertical height of the body of the mandible with prominent antegonial notching. (Figure 2)
Hand Wrist Radiographs (right & left) (Figure 3a) showed evidence of trident shaped hands. Antero-posterior and lateral views of long bones revealed shortening and thickened radius and ulna in both forearms (Figure 3b). Shortening of humerus with prominent metaphysis (Figure 3c), gross shortening of both femurs with prominent metaphysis (Figure 3d) and shortening of tibia with long fibula and prominent metaphysis (Figure 3e).

Figure 3: Radiographic images of long bones

Discussion

Achondroplasia, the most prevalent form of dwarfism in humans and the prototype of human chondrodysplasias.\textsuperscript{6,7} It is a defect in the maturation of the cartilage growth plate of long bones. Achondroplasia has currently been shown to result from a Gly to Arg substitution in the transmembrane domain of the fibroblast growth factor receptor 3 (FGFR3).

Achondroplasia is non-lethal with normal life span and intelligence quotient. In heterozygous state, patients are at risk of cervicomedullary compression, spinal stenosis, obesity, obstructive sleep apnoea. Whereas homozygous state, is lethal in the early stages of life due to severe rib cage deformity causing respiratory insufficiency.\textsuperscript{3} Sobetzko et al. (2000) reported achondroplasia in a brother and sister with unaffected parents.\textsuperscript{8} The siblings shared the classic 1138G-A mutation (134934.0001) and a 4p haplotype derived from the unaffected father. In the present case, patient’s paternal grandmother suffered dwarfism and no other family member was affected. Achondroplastics are short at birth and show stunted growth; average maximum height of women is 126 cm and of men is 131 cm. The limbs are relatively shorter than trunk with upper arm and thigh shortened. Head is usually large with prominent forehead and flat nasal bridge. The hands and feet are small and wide with short fingers and toes.

Dental development can be delayed in achondroplastic children due to altered bone growth. Stafne (1950) reported oligodontia in permanent teeth of a 30 year old affected male.\textsuperscript{9} In the present case oligodontia was not observed. Orofacial manifestations including skeletal and dental class III malocclusion, narrow maxilla, macroglossia and open bite between the posterior teeth have been reported previously.\textsuperscript{10} Clinical and radiological examination of present case revealed presence of periodontal disease, posterior cross bite, high cum narrow maxillary arch, narrow mandibular arch, hypoplastic maxilla, mild mandibular proclination and crowding, anterior open bite, underdeveloped
posterior nasal spine and nasal bone. The present case did not suffer from any kind of hearing deficiency which has been commonly reported.  

To avoid respiratory complications, mandatory precautions in head control is essential during dental intervention, due to the possible presence of cranio-cervical instability, foramen magnum stenosis and limited neck extension.

Most achondroplastics cope up extraordinarily well with their physical difficulties and lead successful lives. With psychological support, specific medical and dental management they can lead a normal life in the society.

**Conflict of Interest:** Nil

**Ethical Clearance:** Not applicable, as this is a case report description for knowledge sharing purpose, hence ethical clearance was not mandatory.

**Funding:** Nil

**References**

Protocol for Review of “Efficiency of Probiotics”

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Abstract

Introduction: According to World Health Organization, “Gestational Diabetes Mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognized during pregnancy”. The goal of this review is to determine the efficiency of probiotics on maternal blood glucose level among patients with gestational diabetes mellitus and to analyse its effects on glycaemic control.

Method: This review will include only randomized controlled trials that are in English, published between the year 2008 to 2018. The data will be collected from the following electronic databases: namely Google Scholar, Pubmed and Cochrane. Data will be collected using some of the following medical subheading (MeSH) terms as search string: #probiotics (mesh terms)#, #probiotics# [All Fields] OR #Lactobacillus# OR #Bifidibacterium#, #Glycaemic control#, #Effects#, # gestational diabetes mellitus#, #fasting blood glucose level#, #insulin level#.

Discussion: The studies identified will be reviewed and assessed for its relevancy and quality based on the Joanna Briggs Institute (JBI) guidelines by two independent reviewers. JBI data extraction form for experimental studies from JBI Reviewer’s Manual will be used to extract the quantitative data from the included studies. Narrative analysis, qualitative synthesis and meta-analysis will be used to report the findings of the review.

Keywords: Gestational diabetes mellitus, GDM, probiotics, lactobacillus, Bifidobacterium, fasting blood glucose level, insulin.

Introduction

According to World Health Organization, “Gestational Diabetes Mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognized during pregnancy”.(1) Its prevalence varies from 2% to 22% of all pregnancies as different criteria for diagnosis is in use. The prevalence of GDM is increasing in India, and differs from area to area and socio-economic status. There are many studies reporting higher incidences of maternal and neonatal complications due to obesity, increased maternal age and hyperglycaemia resulting from GDM.(2)

Studies conducted in southern part of India shows higher burden of gestational diabetes than in the northern states.⁽³⁽⁴⁾⁽⁵⁾ This type of regional differences with regards to prevalence of GDM correlates with type 2 diabetes mellitus. The risk for development of type 2 diabetes is higher among women with gestation diabetes mellitus.(6)

A study conducted in Kerala concluded that the foremost feto-maternal outcomes of gestational diabetes are progression to type 2 diabetes, macrosomia and higher rate of in born nursery admissions for the newborns. These findings seemed to be deemed important to the existing health environment of the state where the burden

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of gestational diabetes is increasing seamlessly and increase further in the near future. Precautious attention needs to be given to identify therapeutic measures to confront the challenges of gestational diabetes. Creating awareness to achieve good glycemic control during pregnancy must be given to these women to prevent progression to type 2 diabetes. The Government should widely take up the responsibility in improving the maternal and neonatal care facilities of the state to manage the maternal neonatal outcomes of gestational diabetes. 

Recent true experiment studies shows evidences of influence of numerous interventions in preventing the progression to Type 2 diabetes in women with a history of GDM. Few studies highlight that lifestyle modifications and pharmacological therapies have been shown to reduce diabetes development by 50% or more. (8-10) Generally, the treatment includes diet with or without medication. (11) However, due to methodological heterogeneity and smaller sample sizes, comparability was complicated in these trials. Apart from these methodological limitations there were also considerable barriers to expectant women that engaged in rigorous lifestyle intervention programs. (12)

Presently, gut microbiome function on metabolic and inflammatory process is being investigated. Thus gut microbiome is amalgamated with bacterial species present in the gut. (11) Probiotics are commonly identified as good bacteria that are generally taken as capsules or drinks to complement the gut bacteria. (12) An expert panel commissioned by FAO and WHO defined probiotics as “Live microorganisms which when administered in adequate amounts confer a health benefit on the host”. (13) For long-run these probiotics has been investigated for its role on various infectious or non-infectious conditions. The potential benefits of probiotics has been evaluated for their efficiency in prevention of gestational diabetes mellitus and its effect on type 2 diabetes mellitus. It is determined to affect the user’s metabolic health. An emerging novel theory advocates that gut microbiota have a role in the maintenance of energy homeostasis and causing metabolic diseases and insulin resistance. Though many studies are demonstrating that probiotics as encouraging in prevention of GDM, the evidence for use of probiotics among those diagnosed with GDM is largely limited. (12)

This review will help me to gather that research systematically consolidating the evidences on therapeutic use of probiotics on blood glucose control on gestational diabetes mellitus. Thus, this review of evidence synthesis will further help to understand the potential benefits of probiotics on GDM and guide to identify the evidence gap with regards to health benefits. This systematic review will help me to disseminate the evidences that is build upon to the existing health care system pertaining to role of probiotics on glycemic control.

**Review question/objective:**

The objectives of this review are to:

1. Review the efficiency of probiotics supplementation on maternal blood glucose level among patients with gestational diabetes mellitus.
2. Appraise the efficiency of probiotics supplementation on other maternal outcomes among mothers with gestational diabetes mellitus.

**Method**

Systematic reviews are usually build on a protocol that delineates the rationale, hypothesis, and planned method of the review. Only few reviews report whether a protocol exists or not. A detailed, well-described protocols will facilitate good understanding of the review method. (16) The Preferred Reporting Items for Systematic reviews and Meta-Analyses for Protocols 2015 (PRISMA-P 2015) was used for developing the protocol for the present review. This protocol is presently registered with PROSPERO International Prospective register for systematic reviews (CRD 42018110754).

**Inclusion criteria:** The studies that fulfill the following eligibility criteria will be included in this review:

1. Study design: Under Quantitative studies, only randomized controlled trials will be included.
2. Population: studies that was conducted among women with gestational diabetes mellitus will be included
3. Intervention: study that involves supplementation of probiotics in th form of capsule / health drink to the intervention group as main variable.
4. Outcomes: Studies that measure blood glucose level as a primary or secondary outcome.
5. Studies that are available in electronic databases.
6. Trials that are published in peer reviewed journals.
7. Trials that are available in English language.
8. Studies published in the period from 2008-2018

**Exclusion criteria:**
1. Studies that do not include blood glucose levels as measuring outcome will be excluded.
2. Studies in books, journals, conference proceedings, unpublished data are excluded.

**Types of participants:** This review will include those randomized controlled trials that was conducted among women who were diagnosed with gestational mellitus as study participants.

**Types of intervention(s)/phenomena of interest:**
The quantitative studies that evaluate the effects of probiotics species supplementation as capsules, or food product with a placebo as a comparator will be reviewed to determine the evidences with regards to potential benefits of probiotics species on glycaemic control among GDM mothers.

**Types of outcomes:** This review will consider studies that include the following outcome measures:
1. Fasting plasma glucose levels
2. Post prandial blood glucose level
3. Insulin levels.
4. HbA1C

**Types of studies:** This review will consider studies that focus on quantitative data, but limited to, design such as randomized controlled trial.

**Search strategy:** A search strategy will be developed and utilized to identify the relevant studies. The electronic databases namely Google Scholar, Pubmed and Cochrane will be our search database for the eligible studies that were published between the year 2011 to 2018.

**Initial keywords to be used will be:** #probiotics (mesh terms)#, #probiotics# OR #Lactobacillus# OR #Bifidobacterium#, #Glycaemic control#, #Effects#, #gestational diabetes mellitus#, #fasting blood glucose level#, #insulin level#.

**Screening:** Based on the above search strategy, the studies will be searched and analysed for its relevancy. The first step is to examine the titles of the study for its appropriateness to include into the review. All identified titles will be screened for its relevancy and uploaded into the Mendeley software to examine for the duplicates. After the removal of duplicates, abstracts of relevant titles will be retrieved. The retrieved abstracts will be screened by the two reviewers by cross checking with the pre-established criteria. Subsequent to this, full-text screening of the relevant abstracts will be done by the two reviewers. This process of screening will be done by reviewers independently. During this process of screening, if any disagreements arise will be resolved by discussion and if necessary in consultation with the third reviewer.

**Assessment of methodological quality:** The screened studies will be assessed for its quality objectively. Because the aim of this review is to consolidate evidences from studies that are possessing high quality. So, such a quality assessment will be done by two independent reviewers prior to its inclusion into the review. All studies that will be included for the review are assessed whether it fulfills characteristics of true experimental design or randomized controlled trials. The other assessment criteria that were used to assess its methodological quality are, randomization, concealment of allocation, blinding of study participants and blinding of outcome data. Any discrepancies that may arise during methodological validity will be resolved through discussion to reach a consensus or with a third reviewer.

**Data collection:** Joanna Briggs Institute (JBI) data extraction form for experimental studies from JBI Reviewer’s Manual (15) was used to extract the quantitative data from the included studies. This is a standardized data extraction tool from JBI-MAStARI. This data extraction will include those details of the screened studies for review pertaining to Author of the study or trial, year of publication, Journal, Study interventions, populations of the study, method, study setting, population size, Authors’ conclusion, Reviewers’ comments an study results that are significant to the review specific objectives.

**Data synthesis:** Narrative analysis, qualitative synthesis and meta-analysis will be used to report the findings of the review. The findings of the studies will be pooled under the review objectives as ordered in the review protocol. A narrative analysis will be carried and will be presented in a tabular form following each review questions/objectives. Since meta analysis is not our objective, this data synthesis will not be merging the statistical findings of the review studies.
Discussion

Thus, worldwide there is a provocative emerging concept in the use of probiotics supplements by supplementing the human gut microbiota to alter or prevent a range of communicable and non-communicable diseases. Thus these probiotics when given during pregnancy and breastfeeding offer a unique opportunity to impact a range of important maternal and neonatal outcomes.(16)

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Nil

References


https://www.google.com/search?ei=U53tW-KYKMvpvTby6P4Ag&q=joanna+Briggs+institute+Data+extraction+form+&oq=Joanna +Briggs+institute+Data+extraction+form+&gs_l=psy-ab.3..0i22i30k1.6769.14155.0.16205.22.22.0.0.0.210.2599.0j18j1.19.0....0...1.1.64.psy-ab..3.19.2595...0j0i67k1.0.VkIeO43_XGA

Mental Health Status among Patients with Breast Cancer Attending a Tertiary Care Cancer Hospital in Mysuru, Karnataka, India

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Abstract

Introduction: Diagnosis of breast cancer by itself is a distressing event for women. The Negative emotions often makes them neglect their food intake, healthy physical and social activities. Fear of uncontrolled pain, death, family and loved ones after death leads to symptoms of anxiety. This needs to be addressed for which assessment of depression and anxiety among them is needed.

Methodology: Across-sectional study conducted among 210 women suffering from breast cancer since 6 months. Validated questionnaire Patient Health Questionnaire 9(PHQ9) and General Anxiety Disorder 7(GAD 7) questionnaires were used to assess depression and anxiety among patients respectively. Association of these symptoms with socioeconomic factors and quality of life was assessed using inferential statistics chi-square and one way ANOVAs. P value of less than 0.05 is considered as significant.

Results: Among 210 Breast cancer patients, 121(57.6%) women had depression and Anxiety was seen among 186(88.5%) of participants. Severe depression was seen more in Stage IV and women diagnosed more than 3 years back. Fatigue and Breast specific side effects were associated with depression. Nausea & vomiting, Pain, Dyspnea, Loss of Appetite and Insomnia are more in women with severe Anxiety

Conclusion: A comprehensive therapy where multi-disciplinary approaches like clinical, psychological along with physiotherapy, social support, financial support, home based nursing care.

Keywords: Depression, Anxiety, Breast Cancer, Quality of Life.

Introduction

As per GLOBACON 2018 by International agency of Research on Cancer (IARC) cancer burden has raised to 18.1 million new cases and 9.6 million cancer deaths in 2018.¹ In India 2.5 million people are living with cancer. Cancers of oral cavity and lungs in males and cervix and breast in females account for over 50% of all cancer deaths in India.² Globally among women, Age standardized rate (ASR) of breast cancer is 46.3 with cumulative risk (birth to 74 Years) 5.03% and mortality ASR 13 with cumulative risk 1.41%. Breast cancer leads to 15.1 million DALYs (Disability Adjusted Life Years) in women.³ Diagnosis of breast cancer by itself is a distressing event for women. As they pass through the lengthy treatment process, they face new problems like turmoil in personal relationships, tiredness all the time, which make them worry about symptoms, treatment and mortality. Discrimination from relatives, neighbors and employees contribute to chronic stress, anxiety and depression.⁴ It is seen that mortality is 25% higher in women with depressive symptoms and 39% higher in women with co-existing major and minor depression.⁵,⁶ The Negative emotions often makes them neglect their food intake, healthy physical and social activities. This may also lead to lack of sleep and addiction of alcohol, caffeine, sedatives. Attitude like this affect their treatment adherence and compliance. As the treatment progresses, surgery and chemotherapy leads to hair loss

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and physical disfigurement which is a challenge for a woman to face the society through her changed looks. Apart from this, difficulties in explaining their condition to their children, taking decisions about their health care, managing routine household works and controlling stress and anxiety may require external psychological support to cope with situation.

During treatment and recovery patients are fearful and anxious of diseases, treatment, doctor’s visits, tests. Fear of uncontrolled pain, death, family and loved ones after death leads to symptoms of anxiety, uncontrolled worry, trouble solving problems and focusing thoughts, muscle tension, trembling or shaking, restlessness, dry mouth, irritability or angry outbursts. If these symptoms are present most of the day, nearly every day and interfering with her life, a mental health evaluation is needed. This needs to be addressed for which assessment of depression and anxiety among them is needed. In this background the present study is conducted with the objectives to assess mental health status and the factors influencing it among Breast cancer patients.

Material and Methodology

A cross-sectional study was conducted among females with breast cancer from July 2017 to December 2017. From a purposive sampling, a total of 210 women, attending tertiary cancer care centre of Mysuru, aged more than 25 years and on any allopathic treatment for more than 6 months were included. Women with co-morbid conditions like Diabetes, Hypertension and those above 80 years were excluded. Validated questionnaire Patient Health Questionnaire 9 (PHQ-9) and General Anxiety Disorder 7 (GAD 7) questionnaires were used to assess depression and anxiety among patients respectively. Quality of life was also assessed using EORTC BR23 QLQ (breast specific European organization for Research and Treatment of Cancer). After obtaining institutional ethical clearance, Informed consent was taken from participants and clinical details regarding staging, treatment were collected from hospital records. Data was entered in Microsoft excel and analyzed by SPSS 23. Descriptive statistics like percentage and inferential statistics like chi-square tests used to analyze. A p value of less than 0.05 is considered as statistically significant

Findings: Among 210 Breast cancer patients, 121 (57.6%) women had depression and Anxiety was seen among 186 (88.5%) of participants. Depression was seen among 186 (88.5%) of participants with mild anxiety in 86 (41%) women, moderate anxiety in 83 (39.5%) and severe anxiety in 17 (8.1%) women. Severe depression was seen more in Stage IV followed by stage III, stage II. Mild and moderate depression was seen more in stage II and stage IV. Moderately severe depression was more in stage IV followed by Stage I. Severe depression was observed in women diagnosed more than 3 years back. Mild depression was noticed more in women diagnosed between 1 to 3 years. Mild depression was seen more in women on Chemotherapy. Women posted for surgery and those on supportive therapy had more moderately severe depression. Mean functional scores of QOL were poor in women with Depression compared to women with no depression. Depression was seen in women with lower emotional function scores and future perception scores. Among symptom scales Depression was associated with fatigue (OR 3.75, 95% CI 1.44-9.76, P 0.007), Breast specific side effects (OR 4.32, 95% CI 1.18-15.84, P 0.02) and Breast symptoms (OR 4.56, 95% CI 1.07-19.376, P 0.039). Anxiety is significantly more in women educated up to higher primary and puc/ diploma (χ² = 21.847, P < 0.001), women diagnosed of disease for less than 1 year (χ² = 19.22, P < 0.001) and those with good compliance (χ² = 8.029, p 0.01). It was seen that Nausea & vomiting, Pain, Dyspnea, Loss of Appetite and Insomnia are more in women with severe Anxiety. Fatigue is seen more in women with Mild and moderate anxiety. On binomial logistic regression anxiety was associated with upset due to hairloss (OR 0.22, 95% CI 0.06-0.79, P 0.02). Anxiety is less in women who are upset due to hair loss.

Discussion

Among 210 Breast cancer patients, 121 (57.6%) women had depression and Anxiety was seen among 186 (88.5%) of participants.

In a cross-sectional study done in Kerala by Debasweta Purkayastha et al, Depression is seen in 21.5% of breast cancer patients among whom moderately severe to severe depression is seen in 22%. And quality of life domains were negatively associated with depression. In a mixed –method exploration of quality of life among Chinese breast cancer survivors participants has unfavorable psychological well-being and they actively reconnected with their “self” to create a positive meaning from their cancer experience.
study among 100 patients from centre of Oncology in Bydgoszcz, after conservative surgery patients have higher average values for the mental strategies to cope with the disease and lower average in the strategy to cope up with anxiety. In present study though prevalence of depression was comparatively more, a similar association of depression with QOL was found. In present study Depression was seen more in women in stage IV, women who were diagnosed for more than 3 years and those receiving both chemotherapy and radiotherapy.

In a cohort study by Ganz et al, mental health scores declined significantly in the follow-up year. In a follow up study by Parker et al, mental health including depressive symptoms and psychosocial adjustment markedly improved by 2 years. Even in study by Inbar et al, higher levels of mental distress are seen in breast cancer survivors. In present study severe depression was seen in patients diagnosed for more than 3 years whereas mild and moderately severe depression were seen more in women diagnosed between 1 to 3 years of diagnosis than those diagnosed more than 3 years Depression was also associated with poor functional scores

Among the study of records from the 1996 to 2005 Ohio Cancer Incidence Surveillance System (OCISS) and Medicaid files, women with mental illness were less likely to be diagnosed with distant-stage cancer than those without mental illness. In present study severe depression was seen more in stage IV of breast cancer followed by stage I. Whereas mild and moderate anxiety were seen in stage II. Women diagnosed with cancer are more panic and depressed initially, as the majority of participants in the study were in stage I, depression is more seen in them.

In present study, Anxiety is significantly more in women educated up to higher primary and puc/ diploma, women diagnosed of disease for less than 1 year and those with good compliance. Anxiety was seen in women with higher functional scores than with low functional scores. Among symptom scales it was seen that Nausea & vomiting, Pain, Dyspnea, Loss of Appetite and Insomnia are more in women with severe Anxiety. Fatigue is seen more in women with Mild and moderate anxiety.

In a study done among Greek women with breast cancer, depression and anxiety are more in breast cancer women than healthy controls and women with high education level has lower anxiety. In cohort study done by konstantinos tsaras et al, Depression is seen in 38.2% and anxiety in 32.2%. Depression and anxiety are significantly seen more in rural residents, non orthodox Christians and women with high symptom burden. In a cross sectional study with explanatory sequential design by A Charalambous et al, 44% reports serious anxiety and is associated with social support. Anxiety scores are negatively co-related to quality of life scores.

Similar finding was seen in present study where women with postgraduate education had less anxiety. In present study anxiety was related only to Physical functions but among symptom scales, fatigue, nausea & vomiting, pain, dyspnea, Loss of appetite and insomnia were more in severe anxiety. But anxiety in women up set due to hair loss was less than others. This may be because of their coping with the situation. Women with anxiety experience more symptoms compared to those without anxiety.

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No depression</td>
<td>Mild</td>
<td>Moderate</td>
<td>Moderately</td>
<td>Severe</td>
<td></td>
<td>P value</td>
</tr>
<tr>
<td>Staging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>41</td>
<td>53.9%</td>
<td>9</td>
<td>11.8%</td>
<td>5</td>
<td>6.6%</td>
<td>20</td>
</tr>
<tr>
<td>Stage 2</td>
<td>24</td>
<td>39.3%</td>
<td>19</td>
<td>31.1%</td>
<td>12</td>
<td>19.7%</td>
<td>4</td>
</tr>
<tr>
<td>Stage 3</td>
<td>21</td>
<td>56.8%</td>
<td>5</td>
<td>13.5%</td>
<td>6</td>
<td>16.2%</td>
<td>2</td>
</tr>
<tr>
<td>Stage 4</td>
<td>3</td>
<td>8.3%</td>
<td>8</td>
<td>22.2%</td>
<td>6</td>
<td>16.7%</td>
<td>14</td>
</tr>
<tr>
<td>Duration of disease</td>
<td>&lt; 1year</td>
<td>85</td>
<td>50.0%</td>
<td>32</td>
<td>18.8%</td>
<td>24</td>
<td>14.1%</td>
</tr>
<tr>
<td></td>
<td>1-3 yrs</td>
<td>3</td>
<td>11.1%</td>
<td>9</td>
<td>33.3%</td>
<td>2</td>
<td>7.4%</td>
</tr>
<tr>
<td></td>
<td>&gt; 3years</td>
<td>1</td>
<td>7.7%</td>
<td>0</td>
<td>0.0%</td>
<td>3</td>
<td>23.1%</td>
</tr>
</tbody>
</table>
### Table No. 2: Quality of life scales associated with Depression

<table>
<thead>
<tr>
<th></th>
<th>Absent</th>
<th>Present</th>
<th>t</th>
<th>P value</th>
<th>Mean Difference</th>
<th>95% CI of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical function scales</td>
<td>94.3</td>
<td>75.3</td>
<td>6.155</td>
<td>&lt;0.001</td>
<td>19.0454</td>
<td>12.937 - 25.152</td>
</tr>
<tr>
<td>Role function scales</td>
<td>97.2</td>
<td>83.2</td>
<td>5.314</td>
<td>&lt;0.001</td>
<td>13.9954</td>
<td>8.796 - 19.198</td>
</tr>
<tr>
<td>Cognitive function scales</td>
<td>99.8</td>
<td>97.4</td>
<td>2.653</td>
<td>0.009</td>
<td>2.4298</td>
<td>.617 - 4.241</td>
</tr>
<tr>
<td>Social function scales</td>
<td>97.2</td>
<td>87.1</td>
<td>3.951</td>
<td>&lt;0.001</td>
<td>10.1387</td>
<td>5.077 - 15.200</td>
</tr>
<tr>
<td>Global Health scales</td>
<td>80.2</td>
<td>63.3</td>
<td>5.098</td>
<td>&lt;0.001</td>
<td>16.9511</td>
<td>10.393 - 23.505</td>
</tr>
<tr>
<td>Body image scales</td>
<td>97.0</td>
<td>92.4</td>
<td>2.177</td>
<td>0.031</td>
<td>4.5795</td>
<td>.429 - 8.730</td>
</tr>
</tbody>
</table>

### Table No. 0: Association of symptom scales with Anxiety

<table>
<thead>
<tr>
<th></th>
<th>No anxiety</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Chi square value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>Absent</td>
<td>7</td>
<td>57</td>
<td>61</td>
<td>3</td>
<td>2.3%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>17</td>
<td>29</td>
<td>22</td>
<td>14</td>
<td>17.1%</td>
</tr>
<tr>
<td>Nausea &amp; Vomiting</td>
<td>Absent</td>
<td>20</td>
<td>79</td>
<td>79</td>
<td>7</td>
<td>3.8%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>40.0%</td>
</tr>
<tr>
<td>Pain</td>
<td>Absent</td>
<td>15</td>
<td>78</td>
<td>79</td>
<td>5</td>
<td>2.8%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>12</td>
<td>36.4%</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Absent</td>
<td>21</td>
<td>81</td>
<td>78</td>
<td>11</td>
<td>5.8%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>31.6%</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>Absent</td>
<td>20</td>
<td>80</td>
<td>77</td>
<td>6</td>
<td>3.3%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>40.7%</td>
</tr>
<tr>
<td>Insomnia</td>
<td>Absent</td>
<td>17</td>
<td>79</td>
<td>76</td>
<td>11</td>
<td>3.4%</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>11</td>
<td>34.4%</td>
</tr>
</tbody>
</table>

*Fisher exact

### Conclusion

Advanced stage, duration of disease and multiple therapy had impact on depression and symptoms fatigue, nausea & vomiting, insomnia, pain dyspnea, loss of appetite were associated with anxiety. This calls for a comprehensive therapy where multi-disciplinary approaches like clinical, psychological along with physiotherapy, social support, financial support, home based nursing care.

### Conflict of Interest: None

### Source of Funding: Self

### Ethical Clearance: Taken

### Reference


Inter Arm Difference in the Blood Pressure and Pulse Rate in Young Adults

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Abstract

Introduction: There is small difference in the blood pressure in the right and left hands. If the difference is more, it indicates presence of heart diseases like congenital heart disease, aortic dissection, peripheral vascular disease, and unilateral neuromuscular abnormalities.

Aim and objectives: The present study was undertaken to observe the variation in the blood pressure variation in right and left arm in young adults.

Materials and Method: A total of 30 young adults including both males and females studying first year BDS were recruited for the study after obtaining the written informed consent. Blood pressure and pulse rate was recorded between 9-10 am in all the participants to avoid diurnal variations. JSB health care digital BP apparatus was used in the present study. All the participants are right handed individuals.

Results: Systolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Diastolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Pulse rate was lower in the left arm when compared with the right arm. However, the difference was not statistically significant.

Conclusion: Systolic, diastolic pressure and pulse rate was lower in the left arm but the difference was not significant. The study recommends need for further studies in this area to understand the variations in the blood pressure and its implications which help to develop effective diagnostic and management method for hypertension.

Keywords: Blood pressure, heart diseases, young adults.

Introduction

Blood pressure is the lateral pressure exerted on the walls of the blood vessels. It is routine and mandatory to observe the blood pressure in clinical examinations. As per the regulations of American Heart Association, blood pressure should be monitored in both the arms during first visit of the patient. There after blood pressure should be monitored only one side where higher pressure was recorded.[¹] Majority of studies where blood pressure recording was included as one of the parameter has either not specified the hand they recorded.[²] Some studies have recorded from right hand.[³] The Difference in the blood pressure of arms has an important role in the diagnosis of hypertension. It may delay to take up the steps to manage the hypertension. It is recommended to measure blood pressure in the arm where higher blood pressure is recorded. This difference is very important for the individuals applying for jobs in military or any industries. Measuring the blood pressure in both the arms is ideal as it helps to elucidate the obstructions of the blood vessels in the upper extremities. If there is
any obstruction in the aorta, there will be persistently higher difference in the inter arm difference. Though the inter arm difference is common and modest, it is associated with risk of cardiovascular diseases. Hence, it is very essential to increase the awareness in the public regarding importance of measuring the blood pressure and pulse rate in both the arms. Young adults is the age group who were not subjected to the measurement of blood pressure frequently. So the present study included this age group as any of these individuals were diagnosed with hypertension or pre-hypertension, the management can start at this age group so that severe effects of the hypertension may be prevented. The present study was undertaken to observe the variation in the blood pressure in right and left arm in young adults.

Materials and Method

Study design: Cross-sectional study

Study participants: A total of 30 young adults including both males and females studying first year BDS were recruited for the study after obtaining the written informed consent. Apparently healthy, right handed and willing participants were recruited for the study.

Study setting: The present study was conducted at Department of Physiology, Vishnu dental College, Bhimavaram.

Recording of blood pressure: Blood pressure and pulse rate was recorded using JSB fully automatic upper arm style blood pressure monitor (JSBDBP05 model). After entering the research lab in the Department of Physiology, the participants were allowed to relax for ten minutes and there after the blood pressure were recorded from right and left hands. The time gap between recording right and left arm blood pressure was 5 minutes. Three readings were obtained and the average value was recorded. Blood pressure was recorded at 2pm for the convenience of the participants. All the measurements were performed in sitting posture.

Ethical considerations: The present study was approved by the institutional research committee. Informed consent was obtained from all the participants. Confidentiality of data was maintained.

Data analysis: Data was analyzed using SPSS 20.0. Data was presented as mean and SD. Student t test was used to observe the significance of difference between the variables. Probability value less than 0.05 was considered as significant.

Results: Table no 1 presents the demographic data of the participants. Systolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Diastolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Pulse rate was lower in the left arm when compared with the right arm. However, the difference was not statistically significant.

Table no 1: Demographic data of the participants (Data was presented as mean and SD)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18.367±0.850</td>
</tr>
<tr>
<td>Height</td>
<td>164.52±9.64</td>
</tr>
<tr>
<td>Weight</td>
<td>58.99±13.327</td>
</tr>
</tbody>
</table>

Table no 2: Comparison of blood pressure in right and left arm (Data was presented as mean and SD).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Right arm</th>
<th>Left arm</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure</td>
<td>113.10±12.70</td>
<td>107±14.67</td>
<td>0.0904</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td>69.77±20.44</td>
<td>64.37±13.0</td>
<td>0.2270</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>92.07±23.83</td>
<td>90.10±16.77</td>
<td>0.7129</td>
</tr>
</tbody>
</table>

Discussion

The present study was undertaken to observe the variation in the blood pressure in right and left arm in young adults. Systolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Diastolic blood pressure was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Pulse rate was lower in the left arm when compared with the right arm. However, the difference was not statistically significant. Earlier studies reported a variation in the blood pressure in the right and
left arm with high pressure in right arm for both systolic pressure and diastolic blood pressure.\textsuperscript{[4–8]} Una Martin et al., observed inter-arm variation in the blood pressure in 710 patients and reported that there was no significant difference in the mean values of systolic and diastolic blood pressures.\textsuperscript{[9]} It was reported that various factors influence the variation like the health status of the participants like presence or absence of hypertension, age group, and timing of recording of blood pressure like weather blood pressure recorded simultaneously in both hands and one after other.\textsuperscript{[10]} Higher differences in the inter-arm blood pressure may be due to undiagnosed diseases that affects the vascular tree.\textsuperscript{[10]} It was reported that a difference in the inter-arm blood pressure more than 10 mmHg indicates risk of peripheral vascular diseases.\textsuperscript{[11,12]} The variation in the blood pressure may be due to anatomical reasons as the right brachial artery arises from axillary artery which originates from right brachiocephalic artery whereas left brachial artery which is direct continuation from aorta. Further, it was reported that the circumference of arm has no role in the inter-arm blood pressure.\textsuperscript{[13]} Another study reported that the inter-arm blood pressure less than 10 mm Hg is common and if the inter-arm difference is more than 10 the individual must be referred to the specialist for further management.\textsuperscript{[14,15]} However, there reference values may vary for Indians as there are demographical variations. Earlier study reported that there is a significant difference in the inter-arm blood pressures in hypertensive and diabetic population.\textsuperscript{[16]} However, there is no difference among right and left handed individuals.\textsuperscript{[17]} In the present study all the individuals were right handed. There was difference between arms with higher pressure in right arm when compared with left arm. These results are consistent with earlier studies.

\textbf{Conclusion}

Systolic, diastolic pressure and pulse rate was lower in the left arm but the difference was not significant. The study recommends need for further studies in this area to understand the variations in the blood pressure and its implications which helps to develop effective diagnostic and management method for hypertension.

\textbf{Conflict of Interest:} None declared

\textbf{Source of Funding:} Self-funding

\textbf{References}


Knowledge and Hygiene Practices among Mothers While Infant and Young Child Feeding in Raichur, Karnataka: A Cross Sectional Study

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Abstract

Introduction: With the adoption of the 2030 Agenda for Sustainable Development, improving infant and young child feeding practices has never been more urgent. While breastfeeding provides optimal nutrition to the child and prevent infections, the timely initiation and age appropriate complementary feeding can substantially reduce stunting and related burden of disease. Poor hygiene and subsequent diarrhea may also contribute to stunting through chronic gut inflammation.

Objective: To study the knowledge and hygiene practices among mothers during infant and young child feeding.

Methodology: A cross-sectional study was conducted in the urban field practice area of Navodaya Medical College. A study population of 375 mothers having children of less than two years age were selected by systematic random sampling method. Data was collected after informed consent regarding socio-demographic factors, knowledge and hygiene practices during child feeding from mothers. Data was analyzed using EPI Info 7 and expressed in terms of percentages, proportions.

Results: The study showed 50.1% of mothers had correct knowledge on duration of exclusive breastfeeding and 42.7% on appropriate time of initiating complementary feeding. 28.35% of mothers had the habit of washing hands with soap and water before feeding the child. Only 12.8% of mothers had given safe water for drinking to child.

Conclusion: In our study half of the mothers had the right knowledge on appropriate duration of exclusive breastfeeding while knowledge on initiation of complementary feeding is much less. Hygiene practices are very low and needs more attention.

Keywords: Infant and young child feeding; Exclusive breast feeding; Complementary feeding; Hygiene practices.

Introduction

Malnutrition is a national problem and child is the chief victim of interplay of nutrition, socio-economic and health factors that cause malnutrition. The steep rise in malnutrition in children during first two year of life is indicative of poor feeding practices¹.

Infant and young child feeding is a set of well-known and common recommendations for appropriate feeding of new-born and children under two years of age². It comprises breastfeeding and complementary feeding which directly affects the nutritional status of children under two years of age and ultimately has an impact on child³.

Breastfeeding is a beautiful process connecting
mother and child. Breastmilk acts as a potent medicine for disease prevention in children. Scientific evidence shows that early initiation of breastfeeding can reduce neonatal mortality significantly. It is one of the smartest investments to boost human capital, stimulate economic growth, giving every child the same opportunity to thrive and a key driver in achieving the SDGs. Continued breastfeeding up to age 2 years or longer can provide babies with nutrients that are unavailable in settings with limited access to a diverse range of complementary foods.

The timely initiation and age appropriate complementary feeding can substantially reduce stunting and related burden of disease. Appropriate complementary feeding can prevent 6% of the estimated under-five deaths and have larger impact to lessen morbidity and malnourishment rates. Children who are fed solid foods too early are putting them at risk of early cessation of breastfeeding and infection.

In India 26 million children are born each year where less than 50% of children are breastfed within one hour of birth and EBF for 6 months is 55%. Only 8.7% children at 6 to 8 months receive adequate diet which implies that 23 million children are not optimally fed during 6-23 months.

Proper hygiene and food preparation practices include hand washing with soap for both caregivers and children before preparing and consuming meals, as well as cleaning all kitchen utensils and cooking surfaces. Foods should be provided to children using clean hands and/or utensils and liquids using a glass or cup rather than bottles with teats, as these are more easily contaminated without proper cleaning.

Dirty or improperly cleaned hands can also be a source of food contamination. Interventions promoting hand washing with soap have consistently been shown to reduce childhood diseases. Inadequate access to safe water, sanitation and hygiene are well-established underlying causes of maternal and child undernutrition. Poor hygiene and subsequent diarrhea may also contribute to stunting. WHO estimates that 50 per cent of undernutrition is associated with infections caused by unsafe water, poor sanitation and unhygienic practices.

In spite of vast available resources and contact points for imparting knowledge, there exists a gap between knowledge and practice. Community based studies are essential to obtain a clear understanding of factors that are responsible for poor feeding practices and to develop measures to reduce such faulty practices. Hence there is a need to study the knowledge and prevailing practices and find suitable interventions.

Objective: To study the knowledge and hygiene practices among mothers during infant and young child feeding.

Materials and Method

A community based cross-sectional study was conducted in the urban field practice area of Navodaya Medical College and Hospital, Raichur during the period of January 2016 to December 2016. Data was collected using pre-tested, semi-structured questionnaire by house to house visit and personal interview method. Questionnaire was validated. Data was collected from the mothers of 0-23 months age children residing in the study area and who were willing to participate in the study. Mothers having children of less than two years but are pregnant during the time of study and those mothers not willing to participate in the study were excluded.

Sample size was calculated by using the formula, \( n = \frac{4pq}{L^2} \). According to National Family Health Survey III, Karnataka data, estimated prevalence of exclusive breastfeeding for infants was 54%; Children aged 6-9 months receiving solid and semi-solid with breast milk was 74%. So lesser of two values was chosen, which was 54%. So sample size of my study was 375. Systematic random sampling technique was used to collect the sample size. Data thus collected was further processed and analyzed using Epi Info-7 version and expressed in terms of proportions.

Results

In the present study the age of mothers ranged from 18 years to 35 years. The mean age of mothers was 23.88±2.92 years. Majority of mothers were illiterate (41.9%) and belonged to lower middle class (58.4%). The age of children in the present study ranged from 4 days to 23 months. The mean age of children was 12.28±7.02 months.

Table 1: Knowledge on initiation of breastfeeding to child

<table>
<thead>
<tr>
<th>Initiation of breastfeeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=1 HR</td>
<td>313</td>
<td>83.5</td>
</tr>
<tr>
<td>&gt;1 HR</td>
<td>62</td>
<td>16.5</td>
</tr>
<tr>
<td>Total</td>
<td>375</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table shows that 83.5% had correct knowledge about initiating breastfeeding immediately after birth within one hour while 16.5% had no correct knowledge about it.

**Table 2: Knowledge on colostrum feeding**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>166</td>
<td>44.3</td>
</tr>
<tr>
<td>NO</td>
<td>209</td>
<td>55.7</td>
</tr>
<tr>
<td>Total</td>
<td>375</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table shows that 44.3% had knowledge regarding colostrum feeding while 55.7% did not have any knowledge about colostrum importance.

**Table 3: Knowledge on pre-lacteal feeds**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given</td>
<td>94</td>
<td>25.1</td>
</tr>
<tr>
<td>Not to be Given</td>
<td>281</td>
<td>74.9</td>
</tr>
<tr>
<td>Total</td>
<td>375</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table shows that majority have knowledge that pre-lacteal feeds should not be given to new-born (74.9%) while 25.1% said that pre-lacteal feeds can be given to new-born.

The above table shows that 42.7% of mothers feel that complementary feeding should be started after 6 months of child birth or at 6 months while 25.1% of mothers said it could be started before 6 months.

**Table 5: Method of preparation of food**

<table>
<thead>
<tr>
<th>Food prepared within 2 hours</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given</td>
<td>106</td>
<td>28.3</td>
</tr>
<tr>
<td>Not Given</td>
<td>148</td>
<td>39.5</td>
</tr>
<tr>
<td>No complementary feeding started</td>
<td>121</td>
<td>32.3</td>
</tr>
<tr>
<td>Total</td>
<td>375</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table shows that 39.5% of mothers did not give any freshly prepared food while 28.3% were able to feed their child within 2 hours of its preparation.

**Table 4: Knowledge on initiation of complementary feeding in mothers**

<table>
<thead>
<tr>
<th>Initiation of complementary feeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 months</td>
<td>94</td>
<td>25.1</td>
</tr>
<tr>
<td>&gt;= 6 months</td>
<td>160</td>
<td>42.7</td>
</tr>
<tr>
<td>No complementary feeding</td>
<td>121</td>
<td>32.3</td>
</tr>
</tbody>
</table>

Table shows that 42% of mothers were not giving safe water for drinking to child while only 26% were giving safe water to the child.

**Discussion**

In the present study, 83.5% mothers had correct knowledge regarding initiation of breastfeeding. WHO and UNICEF recommend early initiation of breastfeeding within one hour of birth. The high level in our study may be due to high institutional delivery which is 83.2%.
The colostrum which is highly nutritious and contains anti-infective factors acts as the first immunization to the child after birth. In the present study 44.3% mothers had knowledge regarding colostrum. It means that more than half of mothers had no knowledge regarding importance of colostrum. In the study conducted by Premalatha et al\textsuperscript{16} 75.8% had knowledge and said it was good for baby; 18.7% considered it was not good and 5.5% had no knowledge regarding colostrum. The study conducted by Nigam et al\textsuperscript{17} found that 83% had no knowledge regarding colostrum.

In the current study 25.1% of mothers had perception that there is no harm in giving pre-lacteal feeds. These mothers believed that milk is secreted usually three days after delivery. They believe that honey, jiggery water, castor oil and pasteurized milk can be given as pre-lacteal feeds to the newborn. Caesarian delivery, local customs and inadequate lactation were the other reasons further contributing their perception on pre-lacteal feeds. In a study by Rani Jet al\textsuperscript{18} 24.7% of respondents had fed their children with pre-lacteal feeds. Study done by Das N et al\textsuperscript{19} in west Bengal showed 42.1% and study done by KhanS et al\textsuperscript{20} showed as high as 90% because of ignorance or due to belief that pre-lacteal feeds act as laxatives. An appropriate health education during peri-natal period regarding danger of pre-lacteal feeds is essential.

Knowledge of mothers on exclusive breastfeeding depends on guidelines from delivery institutions, pediatricians’ advice and moderate literacy levels of mothers which attribute to EBF practices. In our study 50.1% of mothers had a knowledge on exclusive breastfeeding. In the study conducted by Maiti A et al\textsuperscript{21}, PremalataM et al\textsuperscript{16}, Ilyasu et al\textsuperscript{22} 34.97%, 33.9%, 31% of mothers had knowledge on EBF respectively which is less than the results of our study. In contrary to it the study conducted by Aidam et al\textsuperscript{23} in Aura Ghana 98% of mothers had knowledge on EBF.

Improper complementary feeding practice is one of the main reasons for malnutrition. The current study showed that 42.7% of mothers knew that complementary feeding should be initiated at 6 months of age. The study done by Das N et al\textsuperscript{19} had shown much lower knowledge on initiation of complementary feeding i.e 28%. Our study is similar to study done by Kulkarni RN et al\textsuperscript{24} and Agarwal et al\textsuperscript{25}.

Hygiene practices are essential while feeding to children to break the vicious cycle of infection and malnutrition. In the present study only 28.3% of mothers fed the child with freshly prepared food. 19.2% of mothers had the habit of washing hands with soap and water before feeding the child and 15.2% of mothers wash child’s hand with soap and water. Majority (40.1%) of mothers did not have the habit of washing hands of their children before feeding and 20% of mothers were not washing their own hands with soap and water before feeding their child. Similar type of results is seen in the study of Saleh F et al\textsuperscript{26}. Only 25.6% of mothers were able to provide safe water to their children in the present study.

The study by Sethi V et al\textsuperscript{27} had shown that improvement in feeding practices was possible through proper utilization of existing health services, helping mothers to understand the rationale of good feeding practices.

**Conclusion**

A correct guidance by health workers during their each contact with mothers can bring changes in mothers’ knowledge and feeding practices so that the child gets optimal nutrition. They get an opportunity to guide mothers regarding exclusive breastfeeding and complementary feeding during Post-natal visits and immunization of children. At any cost this opportunity should not be missed and every attempt should be made to realize the mother about correct method of complementary feeding. Maintenance of hygiene during complementary foods preparation, using safe water (at least by boiling) will prevent the child from falling sick frequently. Awareness should be aroused regarding this.

To improve mothers’ knowledge every hospital should have IYCF practices education corner/unit in the pediatric department to demonstrate the correct method of feeding practices to mothers of children having less than two years age. There is a need of counseling services directly to the mother and family in community through gross root level workers. Only the integrated work at all levels help in optimal feeding practices.

**Acknowledgement:** The author would like to thank the health workers and Medico-social worker for their support.

**Conflict of Interest:** Nil

**Funds Support:** Nil
Ethical Clearance: Taken from Institutional Ethical Committee of Navodaya Medical College & Research Centre, Raichur.

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Internet of Things based Remote Patients Observatory System Using Biomedical Sensors

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Abstract

In modern health care environment, meliorations of the IoT based information and communication technologies are broadly utilized for the contraption of licensed medical practitioner and patients. The most difficult task is patient’s health issues keying out and unriddling. This is due to weak force and misfortunate mobility of the existing healthcare systems. We propose an IOT based Remote patient’s observatory System using Biomedical Sensor. The biomedical component is inclusive of Temperature Sensor, Heart rate sensors and BP sensors. Here in this work a more proficient machine to machine correspondence is accomplished for medicinal services data. This proposed individuals driven detecting framework is proficient in taking care of the issues looked by patients and doctor by checking human exercises and cooperating with the living condition. In this work, three parameter viz., heart beat rate, temperature and Blood Pressure are checked and transmitted. The medicinal services framework setup is mimicked utilizing Visual Studio programming, and the parameters are seen by remote wellbeing application tolerant observing screen.

Keywords: Health care system, patient remote monitoring system, IoT based healthcare system; body sensor based remote monitoring.

Introduction

Remote Healthcare system Iot is fundamentally an accumulation of lower power and light-weight biomedical sensors that are utilized to screen the human body works and encompassing condition. Subsequently biomedical sensors are utilized to gather sensitive data and may work in unfriendly conditions; likewise, they require strict security devices to forestall malicious association with the framework. The healthcare remote observing framework has turned into a key supporter of the human life quality. The market area of medicinal services remote checking frameworks has expanded altogether because of a few reasons¹. The quantity of elderly individuals is expanding over the time where today in created nations it is very ordinary that elderly individuals generally live freely in their own particular homes. Moreover, Internet of things (IoT) makes these healthcare remote observing frameworks actually plausible (IoT as the idea of a screen capable and modifiable world in which sensors and actuators over living and non-living items) and the notwithstanding diminishing expense of sensors makes it monetarily doable ².

The fundamental vision of the healthcare industry is to give better human services to every one of the general population at anyplace and whenever on the planet. This ought to be done in a more patient benevolent and financial way ³. Consequently to increase the patient care effectiveness, there is a need to enhance the patient observing gadgets. The therapeutic world today faces two issues in understanding checking; right off the bat, the need of social insurance suppliers and overseers to be available at the bedside of the patient and second is that the patient is confined to informal lodging wired to vast machines ⁴. So as to accomplish adaptable and agreeable patient care, the previously mentioned issues ought to be unraveled and as the bioinstrumentation and media communications advances are propelling, it has turned out to be more practical to plan a remote checking framework to accumulate, show, record and transmit the physiological information from a human body to any area ⁵.

The biomedical sensor innovation is a standout amongst the most basic advances utilized as a part of IoT-based current Healthcare framework. It is fundamentally
an accumulation of low-power and lightweight remote sensor hubs that are utilized to screen the human body works and encompassing condition. Since biomedical segments are utilized to gather touchy (life-basic) data and may work in antagonistic conditions, in like manner, they require strict security instruments to counteract pernicious association with the framework.

In this article, at first we address few security necessities in remote checking based present day medicinal services framework. At that point, we propose a protected IoT based healthcare framework utilizing biomedical sensors which can ensure to achieve those prerequisites. Subsequently, whatever is left of the article is sorted out as takes after. In Section 2, we portray a portion of the related works in IoT based human services framework utilizing biomedical sensors. In Section 3, we display our remote patient’s observatory framework and along these lines, in this area, we likewise demonstrate to authorize security in our IOT which accomplishes all the basic security properties. In Section 4, we had demonstrated the exploratory outcomes. At last, a finishing up comment is given in Section 5.

Related Work: As featured in past area IoT innovation, with the utilization of sensors, gives a vital favorable position in the medical field. Numerous related works has been done as of now which are dissected based on their application space, security and effectiveness in this segment. Shrewd health administrations help in observing the patient remotely, some application includes additionally expands the insightfulness and effectiveness of IoT based smart healthcare framework.

A proficient recovery framework proposed by Fan et al is likewise an enhanced framework. Their proposed framework oversees assets by giving semantic data. Philosophy based framework make fast and proficient reconciliation of assets conceivable. Different savvy and remote gadgets impart in the brilliant recovery of framework by utilizing TCP/IP convention suite. Framework can be overseen in three levels chain of command. This includes Management level, improvement level and PC human connection level that builds the productivity of keen wellbeing framework.

Social insurance framework is exhibited by Basanta et al. Creators give the fundamental system to observing of elderly individuals and patients. Typically specialists can’t screen the patient all the time thus; there is a need to screen individual’s particularly elderly patients at their home. Help to you human services framework interfaces heterogeneous sort of processing gadgets together. As elderly patients require constant observing, an extensive variety of sensors can be associated with the collection of patient.

Security Needs in IoT Based Remote Patient Monitoring Systems: Security is a standout amongst the most basic parts of any biomedical framework. Individuals have alternate point of view with respect to security and henceforth it characterized in a few techniques. By and large, security is an idea like Healthcare of the framework as complete data. Particularly medicinal services are for the most part remote in nature.

Authentication: It is a standout amongst the most critical necessities in any IoT based Healthcare framework utilizing biomedical parts, which can proficiently manage the mimicking assaults. In sensor based social insurance framework, all the sensor hubs send their information to a facilitator. At that point the facilitator sends occasional updates of the patient to a server.

Data Privacy: Information protection is thought to be most essential issue in remote medicinal services frameworks. Data ought not to release patient’s vital subtle elements to outer or neighboring systems. In IoT-based human services application, the sensor hubs gather and advances touchy information to an organizer. An enemy can listen in on the correspondence, and can catch basic data. This listening may cause extreme harm to the patient since the foe can utilize the procured information for some, illicit purposes.

Data Integrity: Holding information classified does not shield it from outside alterations. An opponent can simply modify the information by including a few shreds or by controlling the information within a packet. This modified information can be sent to the facilitator. Absence of trustworthiness instrument is now and then exceptionally unsafe particularly if there should be an occurrence of life-basic (when crisis information is adjusted). Information misfortune can likewise happen because of the awful correspondence condition.

Remote Patient Observatory System Using Biomedical Sensor: The solidification of the wise low-price sensor hubs are kept in or close by the human body to screen the body capacities and its condition. The correspondence procedure held in-body organization.
involves embedded gadgets and base station. Conflictingly, the correspondence procedure in on-body arrange contains wearable gadgets and a facilitator. Our proposed system remote care comprises of wearable and implantable sensors. The sensor hubs are related with biomedical gadgets like Temperature, Heart rate Monitoring and Blood Pressure.

**System Implementation:** The microcontroller is fixed with present Threshold value with a specific end goal to recognize the event of the anomalies. At the point when the remote Care server gets information of a man from small scale controller, it bolsters the remote information into its database and breaks down that information. Consequently, in light of the level of variations from the norm, it might associate with the relatives of the individual, neighborhood doctor, or even crisis unit of an adjacent social insurance focus. Unequivocally, considering a man wearing a few bio sensors on his body and the IoT Servers get a periodical updates from these sensors through Microcontroller.

**PIC 16F877A Microcontroller:** The microcontroller is a gadget that can play out a particular capacity as indicated by the coding/program consumed into its program memory. The PIC16F887 is one of the most recent items from Microchip. It includes every one of the segments which current microcontrollers typically have. At its minimal effort, extensive variety of use, high caliber and simple accessibility, it is a perfect arrangement in applications. For example, the control of various procedures in industry, machine control gadgets, estimation of various esteems and so on. Some of its principle highlights are recorded underneath. The 16F877A is a proficient microcontroller that can do numerous errands since it has a sufficiently huge programming memory 8k words and 368 Bytes of RAM.

The 40 pins make it less demanding to utilize the peripherals as the capacities are spread out finished the pins. This makes it less demanding to choose what outside gadgets to join without stressing excessively if there are sufficient pins to carry out the activity. One of the principle preferences is that each stick is just shared between a few capacities so it’s less demanding to choose what the stick work.

**Heart Rate Sensor:** The heartbeat sensor depends on the guideline of plethysmography. It gauges the adjustment in blood volume via any organ of the body which causes an adjustment in the light power through that organ (a vascular locale). If there should be an occurrence of utilizations where heart beat rate is to be observed, the planning of the beats is more vital. The blood stream volume is chosen by the heart beats rate and since light is consumed by blood, the flag beats are comparable to the heart beat beats.

The task of the board is extremely straightforward. Subsequent power of the board is given as a 3-5.5V supply; the Enable (EN) stick must be pulled high to initiate the IR sensor. Next, put the tip of your index finger tenderly around the sensor. Your finger ought to be still and ought not to press too hard on the sensor. Inside a few seconds the circuit balances out and you will see the LED blazing synchronously with your heart beat. You can encourage the yield flag either to an advanced I/O or an ADC input stick of the microcontroller for estimation of the heart beat rate in BPM. The oscilloscope is used to view the waveform of the output voltage.

![Fig. 1. PIC 16F877A IC](image1)

![Fig. 2. Heart rate sensors](image2)
Heart beat sensor deals with an exceptionally fundamental standard of optoelectronics. All it takes to quantify your heart rate in a couple of LED and LDR and a microcontroller. IR LED transmits infrared radiation and surface mirrors the infrared light. Contingent upon reflectivity of the surface, measure of light reflected shifts. This reflected light is made episode on invert one-sided IR sensor which brings about turn around spillage current. Measure of electron-opening sets created relies upon power of episode IR radiation. More exceptional radiation brings about more switch spillage current. This current can be gone through a resistor to get relative voltage.

Temperature Sensor: A temperature sensor is a gadget, ordinarily, a thermocouple or RTD that accommodates temperature estimation via an electrical signal. A thermocouple (T/C) is produced using two different metals that create electrical voltage in guide extent to changes in temperature. The LM35 gadget has preference over direct temperature sensors aligned in Kelvin, as the client isn’t required to subtract an expansive consistent voltage from the output for acquiring helpful scaling of Centigrade.

LM35 is an accuracy IC temperature sensor with its output proportional to the temperature (in °C). The sensor hardware is connected and in this way it isn’t submitted to oxidation and different procedures. With LM35, temperature can be estimated more precisely than with a thermistor. It likewise has low self-warming and does not cause in extra of 0.1 °C temperature ascend in still air. The gadget is utilized with single power supplies, or with in addition to and short supplies. As the LM35 gadget draws just 60 µA from the supply, it has low self-warming of under 0.1°C in still air.

Blood Pressure Sensor: The Blood pressure level Sensor is a non-intrusive sensor intended to gauge human
blood pressure. It gauges systolic, mean blood vessel weight and diastolic with the help of the oscillometric method. Heartbeat rate is additionally revealed. A sphygmomanometer is a gadget that measures pulse. It is made out of an inflatable elastic sleeve, which is cloaked around the arm.

**Proposed Algorithm:**

1. Microcontroller board is connected with the sensors that are connected with the patient.
2. The array form values are obtained and stored.
3. A PC is connected with the Microcontroller by using a Serial to USB Converter.
4. The values that are received are read with the help of Communication Port that is displayed on the Windows PC and the Values are Monitored by Creating a GUI
5. Restoring the sensor values are done by typecasting from ASCII to normal.
6. The abnormal condition is indicated by comparing the values with threshold values.
7. The front panel displays the vital parameters.
8. A file stores the obtained values and also for further assistance in the patient treatment.
9. Using web publishing tools created in Visual studio 2010 the front panel can be seen remotely.

The different sensors are placed at the respective locations on the body of human and are connected to the microcontroller board. The output of the temperature sensor from LM35 is converted to digital form with the help of ADC pins of microcontroller board. For the pulse rate sensor when the heart pumps blood through the blood vessels, the finger becomes slightly opaque and so less light reaches the detector. With each heart beat the detector signal varies and this variation is converted into electrical pulse. The pulse is also indicated by an LED which blinks on each heartbeat.

**Experimental Results**

This part has the description of the results obtained from testing the device.

![Fig. 5. Results displayed on LCD](image)

**Table 1. Test case-1 (Healthy)**

<table>
<thead>
<tr>
<th>Test_ID</th>
<th>Sample Input</th>
<th>Expected Outcome</th>
<th>Actual Outcome</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hms_1.1</td>
<td>Healthy persons temperature</td>
<td>Healthy temperature ranging between 32°C-35°C   L</td>
<td>34°C</td>
<td>Passed</td>
</tr>
<tr>
<td>Hms_1.2</td>
<td>Healthy adult’s heart rate</td>
<td>Healthy adult’s heart rate ranging between 60 to 100 beats Per minute</td>
<td>80</td>
<td>Passed</td>
</tr>
<tr>
<td>Hms_1.3</td>
<td>Healthy person’s Blood-Pressure</td>
<td>Healthy person’s Blood-Pressure ranging around 135/85</td>
<td>120/88</td>
<td>Passed</td>
</tr>
</tbody>
</table>
Table 2. Test case-1 (Unhealthy)

<table>
<thead>
<tr>
<th>Test_ID</th>
<th>Sample Input</th>
<th>Expected Outcome</th>
<th>Actual Outcome</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hms_2.1</td>
<td>Un-Healthy persons temperature</td>
<td>Temperature does not range between 32°C-35°C.</td>
<td>39°C</td>
<td>Passed</td>
</tr>
<tr>
<td>Hms_2.2</td>
<td>Un-Healthy adult’s Heart-Rate</td>
<td>Heart-Rate is not in range of 60 to 100 beats per minute.</td>
<td>43 beats per minute</td>
<td>Passed</td>
</tr>
<tr>
<td>Hms_2.3</td>
<td>Un-Healthy person’s Blood-Pressure</td>
<td>Blood-Pressure is not around 135/85.</td>
<td>188/62</td>
<td>Passed</td>
</tr>
</tbody>
</table>

**Conclusion and Future Work:** In this article, remote checking application is introduced which enables the specialist to see the patient’s biomedical parameters remotely and powerfully in a Web page continuously and doesn’t need any exceptional prerequisite on the PC. All he needs is an Internet to go. For the patient side, a locally established VB application which is inserted in home PC is required. Finally it is concluded that we have implemented Remote patient monitoring system utilizing the propel advancements and sensors which screens the biomedical parameters. This model was done and tried on single individual’s information accumulation and in future this can be reached out to different individuals.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Ethical Clearance:** Authors followed the procedures in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5).

**References**


Methicillin Resistant Staphylococcus Aureus (MRSA) Infection: Knowledge, Preventive Practices and Colonisation among Healthcare Professionals of Surgical Units

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Abstract

*Staphylococcus aureus* is the most prevalent pathogen in hospitals and Methicillin Resistant *Staphylococcus aureus* (MRSA) is one of the major drug resistant strain. The severity may range from a minor skin infection to major life threatening septic shock. The objective of the study were to assess the knowledge of healthcare professionals (HCPs) on MRSA infection, to observe and to screen HCPs to detect MRSA colonization and decolonize them appropriately.

**Method:** A cross sectional descriptive survey was conducted in surgical units of a tertiary care hospital, Southern India among 101 HCPs. The concealed observation of the infection control practices was done using observational checklist followed by which the HCPs were screened (anterior nares, throat and axilla or web spaces) to detect MRSA carrier status. Knowledge on MRSA infection and prevention was assessed through structured knowledge questionnaire.

**Results:** Among 101 HCPs, 42% had excellent knowledge on transmission and prevention of MRSA. Observation of infection control practices revealed that there was good compliance in waste disposal and specimen collection but the compliance was low in hand hygiene, use of personal protective equipment and dressing. Out of 101 HCPs, 2.97% were found to be the carriers.

**Conclusion:** Increase in the compliance towards hand hygiene and infection control practices would reduce the infection rate and also motivating the HCPs to follow standard precautions would contribute towards prevention of hospital acquired infections.

**Keywords:** Carrier status, Methicillin Resistant *Staphylococcus aureus* (MRSA), Infection control practices, Healthcare Professionals, Surgical units, Hand hygiene.

Introduction

*Staphylococcus aureus* is one of the prevalent and clinically significant hospital acquired pathogens worldwide¹. The incidence of *staphylococcus aureus* infections is been raising. Infections caused by MRSA are associated with worse outcomes leading to prolonged hospital stays, increasing cost of treatment and poor prognosis¹. Healthcare workers are traditionally considered to be the vectors of nosocomial infections.
including MRSA\textsuperscript{2}. The screening and decolonising the healthcare workers is reflected to be the important component in controlling spread of MRSA infection in health care setting\textsuperscript{3}. Studies reported that 33\% people carry \textit{Staphylococcus} in their nose, usually without any illness whereas two in 100 people were found to be the carriers of MRSA with manifestations of illness\textsuperscript{4}.

Healthcare workers may transmit MRSA infection to the patients and others through their daily patient care activities. Screening the HCPs identifies the carriers and decolonizing them reduces the risk of transmission. Knowledge of MRSA can reduce the infection rate in the hospital\textsuperscript{5}. There is scarce of evidence on assessing the knowledge of MRSA infection in India. Hence, we aimed at observing the infection control practices, assessing the knowledge of HCPs on MRSA infection, identifying the MRSA carrier and recommending the HCPs for the decolonization with the aim to reduce MRSA infection in the hospital.

**Method**

The cross – sectional descriptive survey design was used with quantitative approach. The study was conducted in the surgical units of a tertiary care, multispecialty teaching hospital, Southern India. The hospital has more than 2000 beds with 240 beds for surgery department. Data were collected by total enumerative sampling for detecting MRSA carrier status and to assess their knowledge and event sampling for observation of infection control practices. The data were collected by using demographic proforma, structured knowledge questionnaire on MRSA infection and its prevention and observation checklist on infection control practices.

Knowledge on MRSA infection and prevention: Structured knowledge questionnaire consisted of 28 multiple choice questions. The items in the questionnaire was based on the diagnosis, management and preventive aspects of MRSA infection. It was validated by seven experts. The reliability was found by split half method \((r = 0.80)\). The questionnaire was administered to HCPs after obtaining written consent from them.

Concealed Observation of Practices: The infection control practices were observed using observation checklist during patient care activities and the participants were not aware of being observed. The observation checklist had infection control practices distributed under different domains namely hand hygiene, use of personal protective equipment (PPE), personal factors and dressing. The reliability was found by inter-rater method. Tool was found to be reliable \((r = 0.9)\). The numbers of events to be observed were calculated using ‘estimate of proportion’. The calculated event size for hand hygiene was 200 observations, use of PPE was 80, personal factors was 70 and dressing was 74. Consent was taken from the participants after the observations.

Screening for MRSA carrier status: Pre-moistened swabs were collected from anterior nares, throat and axilla of HCPs. Different swabs were used for different location. Swabs were sent for microbiology department immediately after collection for further analysis. A total of 303 swabs were collected from 101 participants and analysed according to guidelines of Clinical and Laboratory Standards Institute (CLSI) using Cefoxitin \((30 \mu g)\) disc diffusion method\textsuperscript{5}.

The data collected was coded and analysed using a software, Statistical Package for the Social Sciences (SPSS16.0).

**Ethical Consideration:** Permission was obtained from Institutional Research Committee and Institutional Ethical Committee (IEC No: 754/2016). The project was registered in Clinical Trials Registry-India (CTRI/2017/05/008706). Participant consent was obtained.

**Findings**

Sample characteristics: The demographic data was collected from 101 HCPs working surgery ward. The sample consisted of 21 doctors and 80 nurses working in the surgical units. Majority of the study participants were female (94.1\%) and the 50\% of participant were ranging from 20-24 years of age. Majority of the participants (51.5\%) had 2-5 years of experience. Most of them had multiple source of information (40\%) on MRSA infection and its prevention.

Distribution of knowledge scores: The knowledge on MRSA infection and its prevention was collected using a structured knowledge questionnaire. Participants who scored less than 50\% were categorized as needs improvement, between 51\%-64\% as satisfactory, between 65\%-75\% as good and 75\% and above as having excellent knowledge. Out of the 101 sample, 43\% of the participants had excellent knowledge. The description is represented in figure 1.
Description of infection control practices:
Infection control practices were observed using observation checklist on different domains. The result is given in table 1.

Table 1: Representation of infection control practices followed by healthcare professionals in the surgical wards

<table>
<thead>
<tr>
<th>Domains of infection control practices</th>
<th>Frequency performed</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hand hygiene (n=200)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands are washed before the activity</td>
<td>148</td>
<td>74</td>
</tr>
<tr>
<td>Hands are washed after the care activity</td>
<td>142</td>
<td>71</td>
</tr>
<tr>
<td>Wets hands under running water before applying soap</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>Washes palm to palm</td>
<td>140</td>
<td>70.2</td>
</tr>
<tr>
<td>Right palm over left dorsum and vice versa</td>
<td>157</td>
<td>78.5</td>
</tr>
<tr>
<td>Fingers interlaced</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>Fingers interlocked</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Rotational rubbing of thumb</td>
<td>13</td>
<td>6.5</td>
</tr>
<tr>
<td>Rotational rubbing with clasped fingers</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Rub each hand with opposite hands</td>
<td>75</td>
<td>37.5</td>
</tr>
<tr>
<td>Rinse under running water</td>
<td>176</td>
<td>88</td>
</tr>
<tr>
<td>Dry hands thoroughly</td>
<td>154</td>
<td>77</td>
</tr>
<tr>
<td>Dispose paper towel in waste bin</td>
<td>190</td>
<td>95</td>
</tr>
<tr>
<td><strong>Use of personal protective equipment (n=80)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wears disposable gloves</td>
<td>53</td>
<td>66.2</td>
</tr>
<tr>
<td>Discards gloves properly</td>
<td>65</td>
<td>81.2</td>
</tr>
<tr>
<td>Do not carry gloves in their pockets</td>
<td>78</td>
<td>97.5</td>
</tr>
<tr>
<td>Changes gloves when moving from contaminated area to a clean area of the body</td>
<td>21</td>
<td>26.2</td>
</tr>
<tr>
<td>Wears masks as appropriate</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td>Disposable aprons are worn when needed</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Personal factors (n=70)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wears clean clothing &amp; maintains good personal hygiene</td>
<td>67</td>
<td>95.7</td>
</tr>
<tr>
<td>Finger nails are trimmed and clean</td>
<td>61</td>
<td>87.5</td>
</tr>
<tr>
<td>Hair is neat and off the collar</td>
<td>57</td>
<td>81.4</td>
</tr>
<tr>
<td>Follows strict aseptic technique</td>
<td>40</td>
<td>57.1</td>
</tr>
<tr>
<td>Disposable gloves worn when handling contaminated items</td>
<td>32</td>
<td>45.7</td>
</tr>
<tr>
<td><strong>Dressing (n=74)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washes hands before the procedure</td>
<td>51</td>
<td>68.9</td>
</tr>
<tr>
<td>Follows aseptic technique while dressing</td>
<td>56</td>
<td>75.7</td>
</tr>
<tr>
<td>Discards soiled dressing into the appropriate bin</td>
<td>72</td>
<td>96.3</td>
</tr>
<tr>
<td>Wears sterile gloves while dressing</td>
<td>66</td>
<td>89.2</td>
</tr>
<tr>
<td>Wash hands after the procedure</td>
<td>49</td>
<td>66.2</td>
</tr>
</tbody>
</table>
Out of 200 observations on hand hygiene, 74% of the participants washed hands before the activity and 71% washed hands after the care activity. In 80 events observed for use of PPE, 53% used gloves during the procedures. Only 6.2% of the participants wore masks when changing linen.

Among the events observed for personal factors, 95.7% of the participants wore clean clothing, majority (95%) of the participant maintained good personal hygiene. Observations on wound dressing showed, 68.9% had washed their hands before the dressings. The soiled dressing was discarded into the appropriate bin was in 96.3% event and 89.2% of times dressing was done using sterile gloves.

**Screening of MRSA carrier status:** Out of 101 HCPs screened for MRSA carrier status, 2.97% (three HCPs) were found to be the MRSA nasal carriers and one among the three nasal carrier (0.9%) was found to be carrier in the throat also. No colonization was detected in axilla of screened HCPs.

**Discussion and Conclusion**

Hospital acquired infections are threat to the patients and also to the employees. Healthcare professionals are considered to be the vectors in transmitting the infections in the hospital\(^2\). Attention to certain preventive aspects such as hand hygiene, proper waste disposal must be practices, use of gloves, gown and masks play a vital role in prevention of transmission.

In the present study, most of the participants were in the age group of 20 to 24 years and 72.3% were staff nurses with two to five years of experience. The study findings revealed that out of 101 participants, the mean knowledge score was 20.29 ± 4.08 and 42% of the participants had excellent knowledge and 29% of the participants had good knowledge on MRSA infection. A similar cross sectional survey was conducted in Albania among 251 HCPS. The results demonstrated a moderate knowledge of nosocomial infection and isolation precautions among HCPs\(^6\). A study from Palestine supports the present study where knowledge of 331 healthcare workers was assessed in which 85% of the participants had good knowledge on MRSA infection and transmission\(^7\).

Awareness on infection prevention is essential to reduce hospital related infection. Compliance to infection control practices is equally important. The present study states that the good practice of hand hygiene was found in 54.7% event. The appropriate use of PPE is seen in 43.25% of events. In 80.4% of events wound dressing were done by following all the infection control practices. Self-reported compliance to infection control is higher (89%) than actual observation (77%)\(^8\), indicating that periodic observation of infection practices of HCP assist them in understanding the compliance level and improve the practices.

Educating HCPs and patient care givers on safe and clean environment, decontaminating equipment and importance of decolonization also play a vital role. It was reported that suitably sited wash basins and rubs motivate the healthcare workers to wash hands at the appropriate time\(^9\).

The study also found that 2.97% of the healthcare professionals in the surgical unit were the nasal carriers of MRSA, and 0.9% were the throat carriers. However, none had positive culture in the sample obtained from axilla. The rate of MRSA carrier is not homogenous across the globe\(^10,11,12,13,14\). The rate of MRSA colonisation in Iran shows 32.8% (95% CI: 26.0-40.4), in Egypt 58.8% *Staphylococcus aureus* was MRSA, in Ethiopia 44% was MRSA, in China 4.7% of *Staphylococcus aureus* was MRSA, in Ireland 8.9% and in Europe and the United States the lowest, 1.8% are reported\(^14\). However, the global prevalence was 4.6% in 2008\(^2\).

The causes for the low compliance to infection control practices must be researched. The carrier status was comparatively low among healthcare professions and use of barrier precautions could be the factor leading towards low carrier rates. Continuous nursing education and training programs on hospital infection and prevention in the present setting must have been effective as majority of the healthcare professionals had good knowledge on MRSA infection and prevention of transmission.

The study concludes that educating the professionals on prevention strategies create awareness among the healthcare professionals. In this study majority of the participants had adequate knowledge on MRSA infection and the prevention strategies but the compliance to practice was comparatively low. This provided a base towards assessing the compliance of the healthcare professionals and also the carrier status of MRSA. The study recommends screening of the healthcare workers in high risk and critical units. Further recommendations.
includes creating awareness among staffs towards importance of adherence to infection control practices.

**Conflict of Interest:** None declared

**Source of Funding:** Partially funded by Dr. T M A Pai Endowment Chair on Antimicrobial Stewardship, Manipal Academy of Higher Education, Manipal.

**References**


A Study on Epidemiological Factors and its Association with Pathological Findings for Precancerous Symptoms of Cervical Cancer

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Abstract

The study of cervical cancer epidemiology is an ongoing crucial research as the disease is region dependent. Attempt at awareness measures have curbed the disease to an extent but more regional studies are required to explain the association of pathologic findings with region-dependent risk factors. This study attempts to study the prevalence of cervical dysplasia amongst women in Guwahati, Assam and to interpret the associated risk factors. Data is collected from the Out Patient Department (OPD) of the Obstetrics & Gynaecology (O & G) Department of Guwahati Medical College and Hospital, the most prominent super-specialty public hospital of the region. The sampling procedure was systematic random sampling with patients being selected as and when they arrive. Out of 496 women who visited the hospital over a period of eighteen months the study is conducted with 366, based on successful reports from Pap smears evaluated using Liquid Based Cytology technology(LBC). Chi-square test is used for statistical analysis of association. 11.7% of the respondents had precancerous symptoms. Eleven factors showed significant association with the smear status of the respondents.

Keywords: Cervical cancer; Epidemiology; Pathological findings; Precancerous.

Introduction

Cervical cancer is a common cancer among women after breast cancer. There has been regular campaign against cervical cancer for the last 30 years in India, but this has had little impact on the morbidity and mortality of the disease, with India now ranking fourth worldwide⁶,¹³. Government of India has undertaken several cancer control programs, but these measures have not been much effective for women of poor to modest background due to untrained manpower, lack of infrastructure and lack of awareness¹⁰. The growing risk of cervical cancer in women (aged 15-64 years) is 2.4% in India compared to 1.3% for the world⁷. So, early detection of cervical cancer may take a very precious role in preventing this disease. Pap smear screening test is a painless screening test for early detection of cervical cancer and has made cervical cancer one of the most preventable cancer⁵.

In order to achieve success in this fight against cervical cancer it is very important to know the risk factors the women of the region are most exposed to. Several regional, national and worldwide studies have been made on the study of epidemiology and risk factors of the disease to understand the entire range of risk factors¹¹,¹⁷,²⁰,²². It is well known that cervical cancer presents very little early symptoms¹⁶,²³ and hence the disease remains in dormant stage for a long time until it manifests itself. Early detection of the disease would entail recognizing its onstage from Pap smear tests¹⁴. Cervical cells may be observed to be in several states
of dysplasia before progressing to carcinoma. Even inflammatory cells, although considered as normal, signify a difference since it is part of a response of the biological system to harmful stimuli, one of which may be carcinogen. The evaluation of cervical specimen to categorize dysplasia into mild, moderate, severe or cancer in-situ is performed by The Bethesda System (TBS)\textsuperscript{15} of classification. These minor changes in the states of dysplasia may well be affected by risk factors associated with the disease.

**With this motivation the present study was conducted to:**

1. To make a complete epidemiological study of the women of the region and
2. To identify the risk factors of the women with dysplasia.

**Materials and Method**

**Study setting and study design:** The study was conducted over a period of 18 months from December 2016 to June 2017 in the OPD of the O & G Department of Guwahati Medical College and Hospital (GMCH), the most prominent super-specialty public hospital of the region. The patients were checked by the clinician and enrolled to take part in the survey, following consent norms. The survey consisted of two parts: answering the questionnaire and taking the LBC Pap smear test.

**Study questionnaire:** A well laid out questionnaire was prepared and tested on 15 patients as a pilot study for clarity, suitability and completion of the study being conducted\textsuperscript{21}. The questionnaire consisted of 44 questions, ranging from socio-economic and demographic background of the patients to different questions related to sexual and childbirth (age, place) activities. The questionnaire also included family history of cancer, inflicting medical conditions, dietary habits, etc. **Figure 1** gives a glimpse of the respondents answering the questions of the questionnaire.

**Cervical Sample collection & slide preparation using LBC Unit:** The method of Pap smears taken for the study was LBC technique as it provides several advantages over conventional smears\textsuperscript{19}. The collection was done by trained technician of GMCH who also interviewed each patient and filled the questionnaire. The stained slides, ready for microscopic diagnosis by pathologist, were then sent to the Department of Pathology of the same hospital for diagnosis. **Figure 2** shows the collection of the samples and their subsequent analysis on the LBC unit.
Sample size determination and sampling procedure: The hospital faces a heavy footfall of patients from inside and outside the state, due to the fact it is freely run and due to its geographic location. Hence, it was not possible to include all patients who visit the O & G department. Moreover, it is not viable to estimate the population size of women due to multi-state involvement. When the population is unknown and unlimited, the sample size can be derived by computing the minimum sample size required for accuracy in estimating proportions by considering the formula:

\[ n = \frac{z^2(p)(1-p)}{c^2} \]  \hspace{1cm} (1)

Where: \( z \) = standard normal deviation set at 95% confidence level, \( p \) = percentage picking a choice or response, \( c \) = confidence interval

Setting standard normal deviation at 95% confidence level (1.96), percentage picking a choice or response (50% = 0.5) and the confidence interval (0.044 = ±4.4), a sample size of 496 was decided on. The sampling procedure was systematic random sampling with patients being selected as and when the previous one gets over. SPSS software is used to calculate the number and percentages, and also to find out the contingency tables and degree of association between the factors vide chi-square analysis.

Exclusion criteria of objective 2: Out of the 496 slides sent to the Department of Pathology, 130 slides were found to be inadequate or unsatisfactory due to several reasons like low cell count etc. These slides would not give conclusive result for association of pathological status with risk factors and were excluded from the analysis. Hence 366 slides were considered for analysis of the objective 2.

Findings: The study revealed that respondents were largely normal. Out of the 366 cases for which smears could be taken adequately 280(77%) were normal and the remaining 86(23%) were in precancerous states. Figure 3 illustrates the same pictorially.

Figure 3: Pathological findings of the study (figures in percent)

India has populations divided by many caste and tribes\(^9\). It was revealed in this study that maximum respondents were General caste (73.19%) and 93.15% were of local mother tongue (assamese). 57.1% respondents had family members 2-5 (i.e. medium size family) and that almost all (96.8%) were homemakers and married (97.4%). 72.6% and 24.4% of the women reported nil and single abortion(s) respectively and maximum women had two children (41.7%). The ages at childbirth were mostly 20-25 for first two births, with normal delivery in hospitals leading the location of delivery. 82.66% said they did not use any contraceptive method for birth control and 64.11% had regular menstruation. Of the remaining, 21.17% had irregular menses and 14.7% fluctuated between the two statuses. It was found that almost all(94.35%) women did not use pills to postpone menstrual cycle. 45.77% were betel nut chewers. For the next objective we conducted chi-square test for analysis of association of pathological findings with different risk factor. Eleven factors showed significant association with smear status of the respondents. The results of the same are given below (Table 1).
Table 1: Significant factors of the study and association of the factors with pathological findings

<table>
<thead>
<tr>
<th>Factors</th>
<th>Chi value</th>
<th>p value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Residence (last 3 years)</td>
<td>18.375</td>
<td>0.05</td>
<td>Moderately associated</td>
</tr>
<tr>
<td>Mother tongue</td>
<td>34.097</td>
<td>.005</td>
<td>Highly significantly associated</td>
</tr>
<tr>
<td>Type of occupation of family</td>
<td>29.693</td>
<td>.10</td>
<td>Mildly associated</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>8.105</td>
<td>0.038</td>
<td>Highly associated</td>
</tr>
<tr>
<td>Type of 3rd delivery</td>
<td>12.104</td>
<td>0.097</td>
<td>Mildly associated</td>
</tr>
<tr>
<td>Name of contraceptive method, if any</td>
<td>10.461</td>
<td>.10</td>
<td>Mildly associated</td>
</tr>
<tr>
<td>Age at menopause</td>
<td>13.425</td>
<td>.048</td>
<td>Highly associated</td>
</tr>
<tr>
<td>source of drinking water</td>
<td>6.265</td>
<td>0.10</td>
<td>Mildly associated</td>
</tr>
<tr>
<td>eat vegetables by own plantation</td>
<td>7.945</td>
<td>0.044</td>
<td>Highly associated</td>
</tr>
<tr>
<td>Family history of cancer</td>
<td>20.553</td>
<td>.000</td>
<td>Very highly associated</td>
</tr>
<tr>
<td>Pain in abdomen</td>
<td>21.221</td>
<td>.000</td>
<td>Very highly associated</td>
</tr>
</tbody>
</table>

Mother tongue (highly associated with p < .01) reflects the race and ethnicity of the population. A previous study too reported association of cervical cancer with this socio-demographic feature\textsuperscript{12}. North-East India has at all times been a hotspot for population geneticists owing to the existence of linguistically, culturally and demographically varied population\textsuperscript{1}. Hence, this finding indicates the need for a detailed study in this direction. Type of occupation of the family is mildly associated\textsuperscript{(p<.1)} with the occurrence of the disease. Although the highest reported occupation is business (55.7%), it does not provide adequate stability to economic and lifestyle status. Socio-economic status reflects a high degree of association\textsuperscript{(p<.05)} in our study\textsuperscript{8}.

It is revealed that all the patients belong either to poor or middle class, which is understandable as this hospital is a public one. But what is revealing is that most patients with dysplastic symptoms were found to belong to middle class. A look at their education profiles show that most of them were educated up to primary level (35.7%), followed by uneducated (25.8%). Further the highest number of occurrence of ASCUS (17 each) were from these two categories. In fact the 4 numbers of LSIL patients and 1 HSIL patient also belonged to Primary educated category.

So we can conclude that, in this region, economic wellness, as well as education, is not an awareness factor.

Further, type of delivery of third child has a mild association (p<0.1) with the occurrence of the disease. So, although the number of children or parity, which is a common risk factor, did not reveal any risk factor, women who gave normal delivery for their third child in hospitals (16.8%) were found to be more affected by ASCUS and LSIL than women who gave normal birth at homes (11.1%). Previously no study had been conducted for considering type of delivery as a risk factor for cervix cancer. However, since in India there are numerous pockets where health care system is very weak and traditional belief system still rampant, it is felt that it is an important factor to be considered.

Again, contraceptive method displayed a mild association\textsuperscript{(p<.1)}. Previous studies have revealed that oral contraceptives is a risk factor for the disease\textsuperscript{4,24} although the exact reason for so is yet to be defined.

An important risk factor, age at menopause was found to be highly associated (p<0.05) in our study. 25.5% and 47.4% of menopausal women were affected with ASCUS and inflammatory cell conditions respectively while 13.11% and 8.2% non-menopausal(either premenopausal or post-menopausal) women reported the same respectively. Here all the patients with LSIL cells belonged to non-menopausal group and the lone HSIL patient was menopausal.

Further, family history of cancer and pain in abdomen were revealed to be very highly associated (p<0.01) with the pathological status of the respondents. 15.8% and 14.5% of patients who had pain were found to have ASCUS and inflammatory cells present as compared to 13.6% and 2.34% women with the same status respectively, who did not report of any pain.

Few studies\textsuperscript{6,7} have reported that manifestation age of the disease is after 40 years. In our study maximum number of patients were found to have ASCUS, i.e.
precancerous, symptoms for both the age groups 21-40 and 41-60. Further, out of 53, 27, 4 and 1 patient(s) showing ASCUS, inflammatory, LSIL and HSIL status 34(64%), 14(52%), 1(25%) and 1(100%) patient belonged to the age group 16-20 for ‘Age at marriage’. It is clear from the bar graph that maximum patients belonged to this group not only for ‘Age at marriage’ but ‘Age at menarche’, ‘Age at first sexual intercourse’ and ‘Age at first pregnancy’ too. Early menarche(at age <=12) is significantly prevalent in this region\cite{18,23}. Hence marriage, sexual life and child birth at tender age is common, particularly amongst the economically weak, as the sooner a girl child is wed off, the better. Although the association of this factor with pre-cancerous symptoms are not significant in this study the high percentage of occurrence is not a good sign. In consistence with the correlation between chance of occurrence of carcinoma cervix and the age of marriage, similar relation was also observed with the age at first pregnancy by J.T. Boyd\cite{3} and co-workers who showed similar result with increased risk of developing carcinoma cervix in women who got pregnant before the age of 18 years\cite{2}.

Poor genital hygiene is a risk factor of the disease\cite{6}. Non-use of sanitary napkins is one amongst them. 56.9% patients in the study reported non-use of napkins. Although higher than the proportion of users, it is satisfactory trend considering the economic status of the women. Also, since a larger number of women reported of white discharge(258 out of 366), out of them 196 were having normal status. Hence this factor was not indicative of any risk in our study.

The nutrition intake of women has been reported\cite{6} as an important risk factor for cervical cancer. Here it was observed that intake of vegetables grown in own garden or plantation and source of drinking water were found to have high and mild significant association respectively, with the cervical status of the women.

**Conclusion**

The fight against cervical cancer is an ongoing vital public health problem. In order to arrest the disease it is important to know the regional factors contributing to the cause of dysplasia. The significant factors revealed are location of residence(last 3 years), mother tongue, type of occupation of family, socio-economic status, type of 3rd delivery, type of contraceptive method, age at menopause, source of drinking water, consumption of vegetables from own plantation, family history of cancer and pain in abdomen. Residence indicates there may be some environmental(air, water and soil) factors contributing to the cause. All the manipulatable factors are important for sensitizing women of the region for better prevention of the disease.

**Ethical Clearance:** Taken from Institutional Ethical Committee for Human Studies of IASST (No. IEC. IEC(HS)/IASST/1082/2014-15/1)

**Source of Funding:** Funded by Department of Biotechnology (DBT), Govt. of India

**Conflict of Interest:** None

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Trends and Evolution of Telemedicine Research: A Bibliometric Approach

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Abstract

Objective: Examine the trends and evolution of telemedicine research based on a bibliometric approach.

Materials and Method: A bibliometric study was developed taking into account the SCOPUS database. For the analysis of results, a search equation was previously developed and quantity, quality and structure indicators were analyzed.

Results: There has been a significant increase in telemedicine research in recent years. The institutions with the highest production are Medical Center and University of Washington, and the main countries where production is concentrated in the United States, the United Kingdom and Australia.

Conclusions: The academic production is concentrated in high income countries, dividing itself into several sub-areas such as medicine, psychology and engineering.

Keywords: Bibliometrics, Telemedicine, Health Care Delivery, Bibliometric Approach.

Introduction

The Telemedicine1 is conceived as a remote delivery of services such as medical care and clinical information, used through the Information and Communication Technologies (ICT) like internet, satellite, telephone, among others. This tries to improve a patient’s health; in fact, this is one of the most important branches of telehealth. However, Darkins & Ann Cary2 choose to use the term telehealth since it encompasses telemedicine and additionally it is not associated only with direct contact between doctor and patient.

The acceptance of telemedicine is also observed from the perspective of technological adoption, understood as the acceptance and incorporation of technology in people’s daily lives3. To this end, some technology adoption models have also been defined, such as the Unified Theory of Acceptance and Use of Technology (UTAUT)4. For the specific case of telemedicine, social influence and ease of use are key factors for adoption5, 6.

Currently, telemedicine has led to great advances in terms of efficiency and improvement of patient quality7. Studies have found that teleconsultations are a benefit for people who are in the last stages of the Human Immunodeficiency Virus (HIV), due to social stigma, the severity of the disease and the fact that it supposes little physical contact8.

However, telemedicine must deal with challenges, in fact, a study reported in Nigeria, carried out with health personnel (doctors and nurses), showed that health service providers perceive it as a double responsibility that requires a great effort9. However, it should be borne in mind that there are also limitations for patients. One of them is the one associated with the socioeconomic stratum, because lower strata have less access to these
This is how telemedicine, recognized as such from the formal point of view in the processes of health care, has been accepted by communities and by those who should guarantee care to patients. However, there are still challenges and fears in the execution of this type of strategies, which is why it was intended to examine the trends and evolution of research based on a bibliometric approach in order to strengthen knowledge in this type of care and that allows to generate bases for the planning and improvement in this type of care in health.

**Methodology**

A bibliometric study was carried out in which necessary information was obtained by means of a database and the search equation was also structured. Then, bibliometric indicators were calculated. Carrying out these studies requires carefully choosing the database records that represent the studies. Criteria of coverage, accessibility and flexibility of the search engines were taken into account. The databases favored were ISI, SCOPUS and Google Scholar. In this sense, SCOPUS was chosen since it offers access to interdisciplinary databases, provides tools to manage the information and for its quantity of citations.

Then, the search equation was defined taking into account the best journals in the area of telemedicine, according to SCIMAGO indicators and verifying that by publishing policies they had direct affinity with telemedicine, resulting in the following: (TITLE ((telemedicine OR telehealth*) AND (patient* OR user) AND (accept*))) OR KEY ((telemedicine OR telehealth*) AND (patient* OR user) AND (accept*))

When the definitive matrix was obtained, it was found that the results referred to the subject of study and proceeded to make a database to analyze the variables required for the treatment of the information, and later calculate and study the bibliometric indicators of quantity, quality and structure.

**Findings**

**Annual Productivity:** In Figure 1, it can be seen that there has been a growing trend in the research of the subject, reaching its point of greatest productivity in the year 2017 with 79 publications, followed by 2016 with 78. This shows a representative increase if compared to the amount of production in previous years, meaning that telemedicine has become a topic of interest in research by the academic community.

![Fig 1. Number of publications in the field per year. Source: Authors, based on Scopus information.](image)

**Productivity of Institutions:** Publications on this topic have been carried out by 160 institutions, where the first 10 participate in 18% of the publications. VA Medical Center leads the list with 22 publications, followed by the University of Washington with 16 publications (see Figure 2). Of these 10 institutions, 5 are in the United States, 3 in Australia, 1 in England and 1 in Canada.
Productivity by countries: The countries responsible for the contributions in the field are 57, of which the 10 that produce the most contribute with more than 75% of the publications. The country that stands out the most is the United States with 216 (46%) publications, followed by the United Kingdom with 67 (14%) and Australia with 62 (13%). 26% of the remaining publications are distributed among the countries Germany, Netherlands, Canada, Spain, Italy, China and Denmark. This shows that academic production is reflected in countries with a high level of development and even though they have different health systems models, they have promoted telemedicine as a way to shorten access barriers to health services, from which experiences for implementation in countries that are delving into this new model of care can be seen.

Cross-cutting research areas: There is a great interest in a sub-area of telemedicine. Medicine is the one about which 60% of the research has been published, while Health and Nursing Professions correspond to 10% and 7% of publications, respectively. Engineering (6%), Psychology (5%), Computer Science (4%), Biochemistry, Genetics and Molecular Biology (3%), Social Sciences (3%), Chemical Engineering (1%) and Neuroscience (1%), are other relevant sub-areas of interest. This shows that telemedicine is not an activity of exclusive interest for health care, but that other areas can also support this process, such as engineering and computational sciences, which are important disciplines for the design of this strategy.

Magazines with publications on the subject: Referring to the journals that have been published on the subject, it was found that Journal of Telemedicine and Telecare is the main one with 44 publications, followed by Telemedicine and E-Health with 25, and Studies in Health Technology and Informatics with 21 (see Figure 3).
**Discussion of topics emerging from the study of telemedicine:** When analyzing the trend of the topics in the area since their research began, it can be shown that Telemedicine is the most researched topic with 90 publications, followed by Telehealth and mHealth with 51 and 31 publications respectively, eHealth is in the same order with 24 publications, Systems thinking (24), Technology acceptance, Acceptance, Internet with 16 publications respectively and mobile health (14).

Over the last few years, there has been a significant change in the topics researched while others are emerging (see Figure 4). Thus, it is observed that telemedicine is the most researched topic with an increasing tendency in the consulted periods, that is, the studied field turns out to be the one of greater interest of researchers, dealing with topics such as the use of mobile applications in diseases like diabetes, which according to Torbjörnsen, Smastuen, Jenum, Arsand & Ribu, telemedicine through mobile applications can improve the quality of life of these patients and help control and monitor the process.

Telehealth is the second topic of greatest interest among researchers, also with a growing trend, defined as the system that makes use of ICT to provide health services, medical care and information, regardless of distance, focusing on prevention. It is a great tool for the dissemination of information on the care and prevention of chronic diseases such as cardiovascular, respiratory and also epidemics.

Emerging themes such as mHealth, mobile health and eHealth have been of significant relevance in recent years, with mobile devices being increasingly used for the prevention, control and monitoring of different common chronic pathologies.

Technological acceptance, Systemic Thinking and Internet have been themes that have been constant in the research production of the area.

**Fig. 4. Emerging and growing issues in Telemedicine. Source: Authors, based on information by Scopus.**

**Discussion**

Below are the keywords that have shown greater growth in the period of time analyzed, of which the most relevant will be discussed.

**Telehealth:** As observed in this study, although telehealth services improve the health outcomes of patients with heart failure or other chronic diseases, patients’ acceptance of this service is low. In this regard, some authors find that the factors that can affect the adoption of telehealth include concerns about equipment or technology, the change of service, ignorance of the benefits of telehealth, limited access to care, cost and privacy. On the other hand, the study conducted by Shen, and Naeim to small groups of adult populations in the United States, shows promising results in the implementation of telehealth tools. However, it shows that for implementation on a larger scale, it is necessary for older adults to accept and adapt them to routine medical care and that smart homes are formed for the
interaction between patients and professionals since this service is favorable, for example by avoiding the transfer to care centers, which is reflected in less stress and more comfortable interactions for patients\textsuperscript{18}.

**Mobile health (mHealth):** MHealth, or the use of mobile technology in healthcare, is becoming more common\textsuperscript{19}. An example of this is what was done by Jonathan, Pivaral and Ben-Zeev\textsuperscript{20}, where the activities of two mHealth specialists are described, who endorsed a mobile phone application for people with severe mental illness and find that it offers different opportunities for the treatment of these patients. On the other hand, other authors investigate the use of mHealth in the prevention of HIV, for which they study a population with a high level of exposure, finding that participants expressed interest in using mHealth for medication reminders, evaluating its effects and receiving information on HIV\textsuperscript{21}.

**Technology acceptance:** Technological acceptance in telemedicine is associated with how viable a person sees the use of electronic services in aspects related to their health. Over time, different approaches have been given to this topic, which are based on the Technological Acceptance Model (TAM). This can be seen in the study carried out by Campbell where, in the search to implement mHealth in limited resources environments, technological acceptance is resorted to, in which the creation of a Model in Limited Resources Environments (TAM-RLS) is proposed. Part of the characteristics established in the TAM, such as perceived ease of use, perceived utility and new factors, affect the use in this environment\textsuperscript{22}.

**Conclusions**

Telemedicine is a subject of great interest that has been positioned in the field of academic production. Its tendency is to grow, for knowledge is required to improve the experience and the satisfaction of users in this modality of care because it allows the system to reach all places, which is a priority for the States. Its good implementation will require conceptual bases, resources, demystification by the community and continuous evaluation.

On the other hand, the concentration of academic production in high-income countries was observed, which implies a great challenge for researchers from low and middle income countries to begin to strengthen the generation of knowledge in this new area, so that it provides the necessary tools to the health authorities for construction and planning this new form of care.

**Conflict of Interest:** The study does not present conflicts of interest with other authors or entities, it is an original production and it is approved by the authors of the article.

**Source of Funding:** Northern Catholic University Foundation, University institution Escolme, Metropolitan Technological Institute

**Ethical Clearance:** Not required as it is a review article.

**References**


Human Development in India with Special Reference to Health

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Abstract

Human resource development has been acknowledged to be a key factor in the process of economic growth, as the character and pace of economic and social development of any country are ultimately determined not by its capital of its material resources but by human resources. The abundant physical resources alone cannot benefit the growth of the country without human resources component, which transforms physical resources into productive resources. Human resource should also be looked after properly and continuously regarding various aspects like development and economic, social and psychological aspects. Public health facilities are allocated on the basis of primary health centers dispensaries through which preventive and primitive care is provided. India spends about 4.9 per cent of its GDP on health with the share of public expenditure fixed at 0.9 per cent compared to private is 4 per cent of private expenditure. The private healthcare is much larger and widespread than public health services. The improvement people in the health status been one of the major thrust areas for the social development programs of the country. Over the last five decades, India has built up vast health infrastructure and manpower at primary, secondary and tertiary care in government, voluntary and private sectors.

Keywords: Human Development, Health Care, Communicable Diseases, health status, Life Expectancy, Nutrition and Health Expenditures.

Introduction

Human resource development has been acknowledged to be a key factor in the process of economic growth, as the character and pace of economic and social development of any country are ultimately determined not by its capital of its material resources but by human resources. The abundant physical resources alone cannot benefit the growth of the country without human resources component, which transforms physical resources into productive resources. Human resource should also be looked after properly and continuously regarding various aspects like development and economic, social and psychological aspects. Public health facilities are allocated on the basis of primary health centers dispensaries through which preventive and primitive care is provided. India spends about 4.9 per cent of its GDP on health with the share of public expenditure fixed at 0.9 per cent compared to private is 4 per cent of private expenditure. The private healthcare is much larger and widespread than public health services. The private sector is dominant sector with 50 per cent of people seeking indoor care and 50 per cent seeking ambulatory care (out-patient care) from private health facilities. All functions and facilities necessary to diagnose and treat patients aim at reducing margin of errors as well as the patient’s stress levels. Although the urban areas provide ample economic opportunities, they, however, grossly fail in providing a basic minimum standard of living, especially to the poor. Over the last six decades, India has built up vast health infrastructure and manpower at primary, secondary and tertiary care in Government, Private and Voluntary sectors. The people keep abreast of the myriad benefits of health-related technologies for prevention, early diagnosis, and effective treatment as well as rehabilitation for a wide variety of illnesses. On one side, there are communicable diseases, which have become more difficult to combat. While on the other increasing longevity and the changes in life style have resulted in the widespread prevalence of non-communicable diseases. The obvious conundrum is that the improvement of health care system has not kept pace with the needs of a vast majority of people.
Importance of Health: The improvement in the health status has been one of the major thrust areas for the social development programs of the country. Over the last five decades, India has built up vast health infrastructure and manpower at primary, secondary and tertiary care in government, voluntary and private sectors. The population has become aware of the benefits of health-related technologies for prevention, early diagnosis, and effective treatment as well as rehabilitation for a wide variety of illnesses. The extent of access and utilization of health care varied substantially between states, districts and different segments of society.

Dimensions of Human Development: Human development is broadly defined as a process of enlarging people’s choices, as well as raising the level of their well-being. Among these, the choice to acquire knowledge and to be educated; and to have access to resources needed for a decent level of living are identified as three most critical and socially valuable indicators (Human Development Reports, UNDP and National Human Development Report 2001. Government of India). Therefore, the development process is being viewed in terms of efficiency with which it uses an economy’s productive capacities, involving both physical and human resources, as a means to attain the desired social ends and not just material attainments and, on the other hand, to see the extent to which the outcome to this process generates a buildup of the economy’s productive potential so as to put development on a path of sustainable improvement in well-being. With the broadening in the conceptualization of well-being of individuals and societies, there has been, in recent times, a renewed focus on the importance of development of social service sector followed by the economic service sectors, more particularly the need to obtain desirable socio-economic outcomes in the course of development. Development is potentially a powerful instrument for fighting poverty, improving the health conditions, promoting literacy and quality education among masses.

Human development (HD) that encompasses quality of life, the level of well-being and access to basic social services, is an input as well as a key ingredient in the development process. Human Development is development that not only generates economic growth but, distributes its benefits equitably; regenerates the environment rather than destroying it; empowers people rather than marginalizing them (UNDP, 1994. Thus, the basic objective of the development process is to enlarge the range of choices available to the people who should include in addition to income and employment aspects such as health, education, physical environment, human dignity and freedom.

The principal indicators of human development may be identified as; Average Life Expectancy, which in turn is the resultant of general availability of and access to subsistence, nutritional food, medical and health facilities, and of immunity from internal disorders, wars, environmental, natural and other hazards to life. Educational status of population broadly related to by the proportion of literate adult population above fifteen and the man-years of schooling of children (below fifteen) Capacity to purchase consumption goods and services.

Selected Health Indicators of Human Development for Major States: The Table 2 represents the selected health indicators of human development for major states of India. The major components are Life expectancy at birth, infant mortality rate, Birth rate and death rate. The most vital component of human development the health of a population it envisages nation’s economic growth and stability. Good health result in disease control and nutrition, and an efficient medical care in turn leads to better health. In fact, while health is a state subject, population stabilisation and control are on the Concurrent List. The following table clearly explain the indicators of human development in different states.

<table>
<thead>
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<td></td>
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<td>Female</td>
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<td>64.1</td>
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### Major States Life Expectancy at Birth (2012-2016) and Infant Mortality Rate (per 1000 live births) (2016)

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<thead>
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<th>Female</th>
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<th>Female</th>
<th>Total</th>
<th>Birth rate (per 1000) (2016)</th>
<th>Death rate (per 1000) (2016)</th>
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<td>Haryana</td>
<td>65.9</td>
<td>66.3</td>
<td>66.2</td>
<td>55.0</td>
<td>56.0</td>
<td>55.0</td>
<td>23.0</td>
<td>6.9</td>
</tr>
<tr>
<td>Karnataka</td>
<td>63.9</td>
<td>67.1</td>
<td>65.3</td>
<td>46.0</td>
<td>47.0</td>
<td>47.0</td>
<td>19.8</td>
<td>7.4</td>
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<tr>
<td>Kerala</td>
<td>71.4</td>
<td>76.3</td>
<td>74.0</td>
<td>12.0</td>
<td>13.0</td>
<td>13.0</td>
<td>14.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>58.1</td>
<td>57.9</td>
<td>58.0</td>
<td>72.0</td>
<td>72.0</td>
<td>72.0</td>
<td>28.0</td>
<td>8.6</td>
</tr>
<tr>
<td>Maharastra</td>
<td>66.0</td>
<td>68.4</td>
<td>67.2</td>
<td>33.0</td>
<td>35.0</td>
<td>34.0</td>
<td>17.9</td>
<td>6.6</td>
</tr>
<tr>
<td>Orissa</td>
<td>59.5</td>
<td>59.6</td>
<td>59.6</td>
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<td>72.0</td>
<td>71.0</td>
<td>21.4</td>
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<tr>
<td>Punjab</td>
<td>68.4</td>
<td>70.4</td>
<td>69.4</td>
<td>42.0</td>
<td>45.0</td>
<td>43.0</td>
<td>17.3</td>
<td>7.2</td>
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<td>Rajasthan</td>
<td>61.5</td>
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<td>62.0</td>
<td>63.0</td>
<td>67.0</td>
<td>65.0</td>
<td>27.5</td>
<td>6.8</td>
</tr>
<tr>
<td>Tamilnadu</td>
<td>65.0</td>
<td>67.4</td>
<td>66.2</td>
<td>34.0</td>
<td>36.0</td>
<td>35.0</td>
<td>16.0</td>
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<td>Uttar Pradesh</td>
<td>60.3</td>
<td>59.5</td>
<td>60.0</td>
<td>67.0</td>
<td>70.0</td>
<td>69.0</td>
<td>29.1</td>
<td>8.4</td>
</tr>
<tr>
<td>West Bengal</td>
<td>64.1</td>
<td>65.8</td>
<td>64.9</td>
<td>36.0</td>
<td>37.0</td>
<td>37.0</td>
<td>17.5</td>
<td>6.2</td>
</tr>
<tr>
<td>India</td>
<td>62.6</td>
<td>64.2</td>
<td>63.5</td>
<td>55.0</td>
<td>56.0</td>
<td>55.0</td>
<td>22.8</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Source: Panorama of Indian Economy, 2016

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**The Structure of Health Care System:** The health care system in any society can be separated into two components: the disease theory system and the service delivery system. The disease theory system involves the underlying explanatory framework that provides meaning to the system. This component is unique to each society and reflects the particular society’s worldview. The disease theory system addresses such issues as the nature of health and illness, the meaning of life and death, the appropriateness of intervening in the face of sickness, and/or the prolongation of life for the terminally ill. In effect, it encompasses the assumptions that underlie the system and provides the basis for the creation of health care delivery mechanisms. It should be noted that the underlying paradigm is both a consequence and a determinant of the demographic attributes of the population. Most observers, in fact, argue that the US health care system has experienced a paradigm shift involving the disease theory system during the last years of the twentieth century. The second component, the health care delivery system itself, is our main concern. The delivery system is the mechanism through which society discharges its responsibility for providing for the health and welfare of its members. As such, it involves both structural aspects such as facilities, organizational arrangements, and role relationships and functional aspects such as treatment, research, and education. Hence, the responsibilities entrusted upon good governance is much more in terms of providing quality health care services to its citizen. In fact, in India, several policy initiatives have been taken up from time to time in this direction to deal with various aspects of delivery of health care and family welfare.

**Investment on Health Under Five Year Plans:** Table 3 illustrates the pattern of investment on health, family welfare and Indian system of medicine and homeopathy/AYUSH in different plan period in India.

---

**Table 2: Pattern of investment of Health, Family Welfare and Indian system of Medicine and Homeopathy/AYUSH (plan out lays) in different plan periods in India (Rs. Crores)**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Period</th>
<th>Health</th>
<th>Family welfare</th>
<th>ISM &amp; H AYUSH</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First plan</td>
<td>6502</td>
<td>0.1</td>
<td>–</td>
<td>65.3</td>
</tr>
<tr>
<td></td>
<td>(1951-56)</td>
<td>(3.3)</td>
<td>(0.1)</td>
<td>(3.3)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Second plan</td>
<td>140.8</td>
<td>5.0</td>
<td>–</td>
<td>145.8</td>
</tr>
<tr>
<td></td>
<td>(1956-61)</td>
<td>(3.0)</td>
<td>(0.1)</td>
<td>(3.1)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Third plan</td>
<td>225.9</td>
<td>24.9</td>
<td>–</td>
<td>250.8</td>
</tr>
<tr>
<td></td>
<td>(1961-66)</td>
<td>(2.6)</td>
<td>(0.3)</td>
<td>(2.9)</td>
<td></td>
</tr>
<tr>
<td>S.No</td>
<td>Period</td>
<td>Health</td>
<td>Family welfare</td>
<td>ISM &amp; H Ayush</td>
<td>Sub Total</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>4</td>
<td>Annual plans</td>
<td>140.2</td>
<td>70.4</td>
<td></td>
<td>210.6</td>
</tr>
<tr>
<td></td>
<td>(1966-69)</td>
<td>(2.1)</td>
<td>(1.1)</td>
<td></td>
<td>(3.2)</td>
</tr>
<tr>
<td>5</td>
<td>Fourth plan</td>
<td>335.5</td>
<td>278.0</td>
<td></td>
<td>613.5</td>
</tr>
<tr>
<td></td>
<td>(1969-74)</td>
<td>(2.1)</td>
<td>(1.8)</td>
<td></td>
<td>(3.9)</td>
</tr>
<tr>
<td>6</td>
<td>Fifth plan</td>
<td>760.8</td>
<td>491.8</td>
<td></td>
<td>1252.6</td>
</tr>
<tr>
<td></td>
<td>(1974-79)</td>
<td>(1.9)</td>
<td>(1.2)</td>
<td></td>
<td>(3.2)</td>
</tr>
<tr>
<td>7</td>
<td>Annual plan</td>
<td>223.4</td>
<td>118.5</td>
<td></td>
<td>341.6</td>
</tr>
<tr>
<td></td>
<td>(1979-80)</td>
<td>(1.8)</td>
<td>(1.0)</td>
<td></td>
<td>(2.8)</td>
</tr>
<tr>
<td>8</td>
<td>Sixth plan</td>
<td>2025.2</td>
<td>1387.0</td>
<td></td>
<td>3412.2</td>
</tr>
<tr>
<td></td>
<td>(1980-85)</td>
<td>(1.8)</td>
<td>(1.3)</td>
<td></td>
<td>(3.1)</td>
</tr>
<tr>
<td>9</td>
<td>Seventh plan</td>
<td>3688.6</td>
<td>3120.8</td>
<td></td>
<td>6809.4</td>
</tr>
<tr>
<td></td>
<td>(1985-90)</td>
<td>(1.7)</td>
<td>(1.4)</td>
<td></td>
<td>(3.1)</td>
</tr>
<tr>
<td>10</td>
<td>Annual plan</td>
<td>960.9</td>
<td>784.9</td>
<td></td>
<td>1745.8</td>
</tr>
<tr>
<td></td>
<td>(1990-91)</td>
<td>(1.6)</td>
<td>(1.3)</td>
<td></td>
<td>(2.9)</td>
</tr>
<tr>
<td>11</td>
<td>Annual plan</td>
<td>1042.2</td>
<td>856.6</td>
<td></td>
<td>1898.8</td>
</tr>
<tr>
<td></td>
<td>(1991-92)</td>
<td>(1.6)</td>
<td>(1.3)</td>
<td></td>
<td>(2.9)</td>
</tr>
<tr>
<td>12</td>
<td>Eight plan</td>
<td>7494.2</td>
<td>6500.0</td>
<td>108.0</td>
<td>14102.2</td>
</tr>
<tr>
<td></td>
<td>(1992-97)</td>
<td>(1.7)</td>
<td>(1.5)</td>
<td>(0.02)</td>
<td>(3.2)</td>
</tr>
<tr>
<td>13</td>
<td>Ninth plan</td>
<td>19818.4</td>
<td>15120.2</td>
<td>266.35</td>
<td>35204.95</td>
</tr>
<tr>
<td></td>
<td>(1997-02)</td>
<td>(2.31)</td>
<td>(1.76)</td>
<td>(0.03)</td>
<td>(4.09)</td>
</tr>
<tr>
<td>14</td>
<td>Tenth plan</td>
<td>31020.3</td>
<td>27125.0</td>
<td>775.0</td>
<td>58920.3</td>
</tr>
<tr>
<td></td>
<td>(2002-07)</td>
<td>(2.09)</td>
<td>(1.83)</td>
<td>(0.05)</td>
<td>(3.97)</td>
</tr>
</tbody>
</table>


**Health Care Planning in India:** A drastic change and a major transformation in health was witnessed with the improvement in the health indices showing major achievements in disease control. Once planning process commenced in India, special emphasis in the preventive, promotive and rehabilitation health services were laid with the formal adoption of the National Health Policy by the Indian Parliament in the year 1983.

Thereafter comprehensive network of primary health center services creation of an army of health volunteers and effective community participation have also been some of the highlights. Moreover, training facilities for medical and paramedical personal in various system have been increased which all laid a solid foundation for making an intensive medical research in formulating new alternative drugs for dreadful diseases. In India, doctors are produced in plenty but their services do not reach people who really deserve them. The concentration of doctors is more in the urban areas. And the “goal” of a doctor is considered more to be a business, than a service as the parents spend much money in the training and they expect to get ransom money while practicing medicine.

**Health Status in Tamil Nadu:** Social security assumes special importance on account of the recent economic reforms which insists on fiscal compression. Social provisions such as health care, education, housing and old age security have nowhere in the world been able to make an effective contribution without the active participation of the state. The need for enhancing such support has been compelling in the context of India where a substantial proportion of the population lives below the poverty line.

Tamil Nadu has been in the forefront in formulating and implementing a wide range of welfare measures to the old, infirm and destitute sections of the population. The nutrition programmes implemented by the state have provided an additional layer of support to the malnutritional and weak. In Tamil Nadu the social security schemes have shifted in favour of nutrition schemes towards the welfare of children and expectant and nursing mothers. These schemes have an important role to play in ensuring minimum security for the rural poor; however, no single measure can fully ameliorate...
the living conditions of the rural poor. The need of hour is a package of measures.

**Conclusion**

Health is a multi-dimensional and multi-causal variable. Health transition is a complex process involving cumulative institutional shifts requiring fundamental changes in the configuration of population’s health profile. One of the unsolved conundrums in our country is the inability to provide for universal health care coverage, despite economic growth and development. Any policy that aims at providing basic, affordable health care requires the integration of provision and payment of primary and preventive health care calling for a lead role by governments and an institutionally separate agency in our country.

Residents of Madurai city enjoy easy and better access to private health care service providers thanks to the inter-play of intervening variables such as education, income, employment, housing, nutrition and health expenditures, though the poor and the unskilled still depend on the enviable position of public health care providers in the form of referrals and statutory requirements. Health care contains a component of prevention in its very conception. Care and attention should be focused on leading a healthy life style in terms of physical activities pattern and dietary modifications. Health policy makers must put in place better-developed, spatially-spread and people-friendly health care services.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**

A Study on Welfare Measure of LIC Employees with Special Reference to Salem Division of Tamilnadu

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\textsuperscript{1}Assistant Professor, Department of Commerce, \textsuperscript{2}Professor & Head, Department of Commerce, \textsuperscript{3}Assistant Professor, Department of Economics, VELS Institute of Science, Technology and Advanced Studies, (Deemed to be University) Chennai

Abstract

The present research is an inquiry into the welfare facilities provided and the job satisfaction experienced in LIC Corporation Salem Division. The study seeks to find out which dimensions in the welfare Measure inventory significantly influence the level of job satisfaction in LIC employees of the Salem Division. This article undertaken 300 samples and adopted disproportionate random sampling method & reviews the meaning of Welfare Measure, various determinant of Welfare measure. It is an important feature of industrial relations and is a vital ingredient in smooth employer-employee relations. The research will analyses the influence of personal variables such as age, education and experience on the job satisfaction of employees in LIC. The main objectives of the study are to evaluate the welfare activity practices in the public sector organization. Employers offer extra incentives in the form of employee welfare schemes on order to increase employee welfare and to make it possible to persuade workers to accept mechanization.

Keywords: Employee welfare, Fringe Benefits, Organizational Performance, Welfare Measures Adequate Infrastructure.

Introduction

Employee welfare is a dynamic concept. Welfare measures relating to employees are also known as fringe benefits and services.\textsuperscript{1} Welfare measures help to improve the goodwill, public image of the enterprise and to improve industrial relations as well. It also improves the employee productivity. Welfare of labour definitely augment the physical and mental conditions of employees.\textsuperscript{2} Labour welfare consist of better housing, improved medical facilities, educational, rest rooms, canteen, sports club facilities, adequate wages, insurance etc. increase the efficiency of employees considerably. These facilities create confidence in the worker; he feels happy and thus takes more interest in the work. Its main objective is to acquire a better standard of living for the employees, which have the effects on the workers psychology and it leads to an increase in their productive capacities. Welfare basically means wellness, health, happiness, cordial relations, prosperity, which are prerequisite for the physical, mental, moral and emotional stability.\textsuperscript{3} The welfare of the labour must be a voluntary effort made by the management in all the institution.

Statement of the Problem: Service organizations play a crucial role in any economy. In our country, it is backbone in terms of creation of employment potential and contribution to the National Income. The study of Welfare measure was considered to be important and critical area in management and organizational performance for past several years especially in the LIC. Work as an integral part of our everyday life, in our livelihood or career or business. On an average the time spends around twelve hours daily in the work place i.e., one third of our entire life. This study was undertaken in order to find out the perception of the employees about influence the overall welfare measure.

Objectives:

1. To study the socio-economic and organizational profile of the employees in LIC of India, Salem Division.
2. To analyze the factors influencing Welfare measure among the employees in the study area.

Research design: The research design is the basic framework or a plan for a study that guides the collection
of data and analysis of data. Employee satisfaction and opinion about this study was used Descriptive Research Design in nature.

Method of Data Collection

Primary data: Primary data are those which are collected afresh and for the first time, and thus happen to be original in character. For collecting primary data OBSERVATION and QUESTIONNAIRE method are used.

Sampling Unit: The respondents of the study are part of population of employees of Life Insurance Corporation of India, Salem Division. Each employee is considered to be the sampling unit. For this purpose of study was conducted with 300 sample respondents of Life Insurance Corporation of India, Salem Division.

Sampling Method: Disproportionate Stratified random sampling is adopted to get insight about the study.

Descriptive analysis: Descriptive analysis also termed as percentage analysis were performed for each question contained in the interview schedule mainly to ascertain the distribution of respondents in the Life Insurance Corporation of India, Salem Division under each category.

Factor analysis: Factor analysis is an increasingly popular tool of the practicing business and research. It is two primary applications are (i) Simplifying a set of data by reducing the number of variables, and (ii) Identifying the underlying structure of dimensionality of the data.

Table 1: Age of the Respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 30 years</td>
<td>16</td>
<td>5.3</td>
</tr>
<tr>
<td>30-40 years</td>
<td>62</td>
<td>20.7</td>
</tr>
<tr>
<td>41-50 years</td>
<td>139</td>
<td>46.3</td>
</tr>
<tr>
<td>Above 50 years</td>
<td>83</td>
<td>27.7</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Primary Data

It is clear from the table that 5.3 percent of them belong to the age group of Below 30 years, 20.7 percent of them belong to the age group of 30-40 years, 46.3 percent of the respondents belong to the age group of 41-50 years, and 27.7 percent of them belong to the age group of Above 50 years.

Table 2: Gender of the Respondents

<table>
<thead>
<tr>
<th>Training program</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>256</td>
<td>85.3</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>14.7</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Primary Data

It consists of seven variables. These variables are listed in below table.

Table 3: Welfare Measures

<table>
<thead>
<tr>
<th>Statement</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education facilities are available.</td>
<td>.716</td>
</tr>
<tr>
<td>Sanitary facilities are satisfied.</td>
<td>.620</td>
</tr>
<tr>
<td>Drinking water facilities are satisfied.</td>
<td>.596</td>
</tr>
<tr>
<td>Recreational facilities are available</td>
<td>.578</td>
</tr>
<tr>
<td>Canteen facilities are available.</td>
<td>.466</td>
</tr>
<tr>
<td>Housing facilities are provided.</td>
<td>.400</td>
</tr>
<tr>
<td>Medical facilities are satisfied.</td>
<td>.400</td>
</tr>
</tbody>
</table>

Source: Primary Data

Welfare measures help to improve the Good will and public image of the LIC employees. It helps to improve employee productivity. Labor welfare includes various facilities, services and amenities provided to workers for improving their health, efficiency, economic betterment and social status.

Findings: In any institutions or organization, it was first and foremost to see the Welfare Measures taken. This factor when put forth among the selected respondents they revealed that they were satisfied with the welfare measures like satisfaction of education facilities, sanitary facilities, Drinking water facilities, recreational facilities, Canteen facilities, Housing facilities and Medical facilities. Sufficient and adequate infrastructure and work space should be provided to the employees in various branches in Salem Division. Improve the welfare measure & working environment in the LIC which in turn would increase the productivity among the employees.

Conclusion

Human Resource Management function today is much integrated and strategically involved. The most important task of the Human Resources Department is to make sure that the people working in the organization.
There are three basic needs of a man i.e. food, clothing and shelter. In order to fulfil their basic needs man has to work. Food, clothing and shelter could only be purchased by money and money could be earned by doing work. It improves the moral and mental conditions of the workers by providing facilities like games, cultural activities and recreation etc. By providing all these facilities, workers feel happy and become enthusiastic. Thus, worker starts taking much interest in his work, which leads to greater efficiency. To increase efficiency and productivity among workers. To earn goodwill and enhance public image.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


A Study on Quality of Work of Life Practice in Chemical Industrial Units Sipcot in Cuddalore

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Abstract

This study examines the relation between employees perceived Quality of Work Life (QWL) with life domains using spillover theory. For this study the subjects were employees from chemical industries at Cuddalore (SIPCOT). The QWL was measured using need satisfaction variables. The questionnaire was developed as to capture the needed information of the study variables. The sample size for this study was 227. The questionnaire was administered and reliability test was used to validate it. The regression analysis was done to find the level of influence on the dependent variables. The results showed that the employees who sensing higher level of QWL were sensing high level of job satisfaction, life satisfaction and general well-being. Fulfilling the needs of the employees by the organization can achieve higher level of QWL and organizational commitment from the employees.

Keywords: Quality of work Life (QWL), Job Satisfaction, Life Satisfaction, General Well-being, spill over.

Introduction

In the fast changing global market, all organizations have to face challenges and able to grab the opportunities; the dynamic organizations are surviving in the competition by making necessary changes in the working environment and policies.¹ The organizations need to have competent work force for constant improvement for achieving higher productivity. For any organization the success depends upon recruitment of individual, motivating and retaining of current workforce to maintain the organizational status in the competitive environment. Quality of Work Life (QWL) is the favorable working conditions and workplace environment that enhance employee satisfaction by providing growth opportunity, job security and with rewards.² QWL can be defined as the process of employees needs were addressed by an organization and the employees were included in the decision making process.

QWL can be expressed as the degree to which organizational members able to satisfy their important needs through with their experiences in the organization. QWL emphasizes to identify and to improve the quality of professional and personal life of the employees. QWL can be viewed as an individual’s evaluation of working life. When the employees has positive feelings towards the job and his prospects, is motivated and performs well. Many researchers experienced and demonstrated that improvement in quality of work life will increase in productivity and overall organizational effectiveness as also reducing absenteeism, grievances and industrial accidents.³

Research Methodology: In this study Spill Over theory was adopted and the Research Hypothesis were.

Hypothesis 1: Perceived high level of QWL is higher the job satisfaction level

Hypothesis 2: Perceived high level of QWL is higher the life satisfaction.

Hypothesis 3: Perceived high level of QWL is higher the well-being.

Hypothesis 4: Perceived high level of QWL is higher level of organizational commitment.

The six major contributing needs towards QWL was taken in to this study to measure QWL. The six needs were health & safety, family need, social need, esteem need, actualization need and knowledge need.⁴ The employees were requested to respond each item by 5 point Likert scale ranging 1 be the strongly disagree to
The employees were requested to respond each item by 5 point Likert scale ranging 1 be the strongly disagree to 5 be the strongly agree. The employees were requested to respond which they experienced during the previous two months by 5 point Likert scale ranging 1 be the strongly disagree to 5 be the strongly agree. The employees were requested to respond each item by 5 point Likert scale ranging 1 be the strongly disagree to 5 be the strongly agree. A total of 227 subjects from chemical industries SIPCOT from cuddalore were participated in this study.

A covering letter was attached with the questionnaire stating the confidentiality of their response and mentioned the objectives of the study. The participation in this study was made as voluntary. The questionnaire were distributed and collected personally.

**Data Analysis and Interpretations:** There were 18 percent of respondents age were less than 25 years, 22 percent of respondents belong to 25-30 age groups, 32 percent of respondents belong to 31-40 age groups, 17 percent of respondents belong to 41-50 age groups and 11 percent of respondents belong to 51 years and above. 13 percent of respondent’s education was ITI, 34 percent of respondents were Diploma holders, 32 percent of respondents were Undergraduates and 21 percent of respondents were Master’s degree holders. The sample respondents were considered as fairly educated. 15 percent of the respondents were working in the current organization for less than one year, 31 percent of respondents were working in the current organization for the period of 1-3 years, 23 percent of respondents were working in the current organization for the period of 4-6 years, 13 percent of respondents were working in the current organization for the period of 7-9 years, 18 percent of respondents were working in the current organization for 10 years and above.

Table 1 presents the mean value, standard deviation and the reliability alpha value for the study variables. Among the six needs, Health and Safety need was highest on 5 point scale. Knowledge need was at the second position and Social need was at the third position. The standardized alpha values showing that the questionnaire was reliable and it has the ability to capture data for the study. The mean values for Job Satisfaction, Life satisfaction and General well-being are showing that all the companies were providing similar facilities and maintaining above average. It is a positive sign for the human resource practices in the industries.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs Satisf (average)</td>
<td>2.83</td>
<td>0.42</td>
<td>0.81</td>
</tr>
<tr>
<td>Health and Safety need</td>
<td>2.96</td>
<td>0.53</td>
<td>0.86</td>
</tr>
<tr>
<td>Family need</td>
<td>2.61</td>
<td>0.47</td>
<td>0.84</td>
</tr>
<tr>
<td>Social need</td>
<td>2.82</td>
<td>0.62</td>
<td>0.89</td>
</tr>
<tr>
<td>Esteem need</td>
<td>2.64</td>
<td>0.67</td>
<td>0.84</td>
</tr>
<tr>
<td>Actualization need</td>
<td>2.71</td>
<td>0.64</td>
<td>0.81</td>
</tr>
<tr>
<td>Knowledge need</td>
<td>2.87</td>
<td>0.58</td>
<td>0.83</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>2.53</td>
<td>0.74</td>
<td>0.78</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>2.64</td>
<td>0.76</td>
<td>0.83</td>
</tr>
<tr>
<td>General well-being</td>
<td>2.61</td>
<td>0.79</td>
<td>0.81</td>
</tr>
<tr>
<td>Organizational commitment</td>
<td>2.41</td>
<td>0.61</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Table 2: Correlation Matrix of the Study Variables

<table>
<thead>
<tr>
<th></th>
<th>QWL</th>
<th>Job Satisfaction</th>
<th>Life Satisfactions</th>
<th>General Well-Being</th>
<th>Organizational Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWL</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>0.671</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>0.483</td>
<td>0.736</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General well-being</td>
<td>0.362</td>
<td>0.532</td>
<td>0.432</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Organizational commitment</td>
<td>0.381</td>
<td>0.421</td>
<td>0.374</td>
<td>0.286</td>
<td>1</td>
</tr>
</tbody>
</table>

*correlation is significant at 0.05 level (2-tailed) N = 227
The table 2 shows that all the four variables were positive correlated with QWL. Job satisfaction is highly correlated with QWL and life satisfaction is second highest correlated with QWL. Job satisfaction and life satisfaction were showing strong positive correlation.

### Table 3: Multiple Regression Analysis Results

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Job Satisfaction</th>
<th>Life Satisfactions</th>
<th>General Well-Being</th>
<th>Organizational Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>R square value</td>
<td>0.63</td>
<td>0.58</td>
<td>0.67</td>
<td>0.52</td>
</tr>
<tr>
<td>F value</td>
<td>23.43</td>
<td>19.87</td>
<td>22.85</td>
<td>18.34</td>
</tr>
<tr>
<td>Sig., (P-Value)</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.00**</td>
</tr>
<tr>
<td>Betavalues of independent variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health &amp; safety need</td>
<td>0.36</td>
<td>0.28</td>
<td>0.37</td>
<td>0.29</td>
</tr>
<tr>
<td>Family need</td>
<td>0.43</td>
<td>0.23</td>
<td>-0.29</td>
<td>0.16</td>
</tr>
<tr>
<td>Social need</td>
<td>-0.07</td>
<td>0.13</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>Esteem need</td>
<td>0.08</td>
<td>0.42</td>
<td>0.63</td>
<td>0.07</td>
</tr>
<tr>
<td>Actualization need</td>
<td>0.05</td>
<td>-0.16</td>
<td>-0.32</td>
<td>0.03</td>
</tr>
<tr>
<td>Knowledge need</td>
<td>0.31</td>
<td>0.06</td>
<td>0.17</td>
<td>0.37</td>
</tr>
</tbody>
</table>

** Significant at 0.01 Level (2-tailed) N=227

The multiple regression analysis were present in the table 3. The six need as measures of QWL were taken as dependent variables, job satisfaction, general well-being and organization commitment were taken as dependent variables.

From the regression analysis, the significant predictors for job satisfaction were family need, health and safety need and knowledge need. A high level of satisfaction on known need was a strong predictor for job satisfaction. The ability to develop professional skills is an important elements for employees to feel the job satisfaction. Job security, higher level of wages and family needs were strongly related to job satisfaction. The results was showing that the stated relationship, perceived higher level of quality of work life is higher the job satisfaction level is significant.

From the table 3 using spillover theories the hypothesis was stated as perceived higher level of quality of work life higher the life satisfaction. This hypothesis was accepted and the individual who perceiving higher QWL tend to experience life satisfaction. The results shows that esteem need was the prime predictor for life satisfaction.

Result from the regression analyses support the stated hypothesis, perceived high level of QWL is higher the well-being. The satisfaction on needs spill over in to employees sense of well-being. The major predictor’s health and safety need is positively associated with general well-being. But the two major predictors, family need and actualization need are negatively associated with general well-being. This negative relationship is explained by equity theory.

The regression result supports the hypothesis of perceived high level of quality of work life is higher level of organizational commitment. From the table 3 knowledge need predicts most of the variance in the organization commitment. The organization has to fill the learning and knowledge needs to get higher level of organization commitment.

### Conclusion

The analyses were supporting the stated hypothesis. It supports the spill over theory as employees satisfaction in one life domain is positively influence in other life domains. The needs are major contributor in quality of work life, sensing of QWL leads to sense job satisfaction, the satisfaction and general well-being.\(^5\) Fulfilling the needs of the employees by the organization can achieve higher level of quality of work life and organizational commitment the employees.

**Ethical Clearance:** Completed (Annamalai University, Vels University)

**Source of Funding:** Self

**Conflict of Interest:** Nil
References


A Study on Role of Industrialization for Sustainable Development and Poverty Eradication

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Abstract

This study is a role of industrialization for sustainable development and poverty eradication, this study is related for how to promote the organizational performance from the lower level to higher level. The level of promotion is based on human resources and also the efforts of organizational authority. The authorized persons has the ideas for long term growth with the sustainable development, the developmental process must to eradicate the poverty form the society. Initially, a pilot study was conducted among few respondents and changes were brought in the questionnaire. Analysis and Interpretation is done using Chi-square method. It was found out that people gives his opinion about the industrialization is for sustainable development and poverty eradication are from the personal thoughts. Based on the findings, appropriate suggestions have been made for increasing the number of users.

Keywords: Industrialization, Poverty Eradication, Growth of Economic.

Introduction

Indian country is an industrially developing one; so many industries are working on the basis of human resources only. The human resources are incomparable and also unbeatable one. Which country is giving priority to the industries they are developed easy to the world level? The industrially developing country concentrates for sustainable development and also eradication of poverty to the general people.¹ The emerging development of job opportunities is given only by the reason of industrialization. The industrially developed countries are ready to compete with globally. The global level competition is basically related for the knowing factors of promotion. The educational motivation has to give a good result of the industries development. This type of development is concentrating the reduction of poverty of the people.²

Industrialization for Sustainable Development:

Industrialization enables mankind to do more with less. Instead of one man taking days to plow his field with one horse, he can do it in a couple of hours with the help a tractor that has the power of hundreds of horses. That frees up his time to do more work around the farm, and maybe even take a vacation, and it frees up his family so his kids can go to college and work in professions that require less backbreaking work than he had to do. sustainable development’ Its definition of “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” still provides the broad underpinning for current thinking and practice, based on balancing people’s economic and social needs with the preservation and enhancement of natural resources and ecosystems.³

Institutional Change and Technology:

The main institution for industrialization is GATT (General Agreement on Tariffs and Trade) was a legal overall purpose was to promote international trade by reducing or eliminating trade barriers such as tariffs or quotas. According to its preamble, its purpose was the “sustainable reduction of tariffs and other barriers and the elimination of preference on a reciprocal and mutually advantageous basis.”³ The TRIMs (Trade-
Related Investment Measures) and TRIPS (Trade-Related Aspects of Intellectual Property Rights) are participating higher level of industrialization. The technological development in India is also a reason for promotion industries and also the eradication poverty. The industrial technology is the use of faster production, simple and efficient. The technological advancement helps a company achieve efficient and profitable productivity. The modernization of technology, machine and tools also going to give good result of industrialization.5

**How to Eradicate the Poverty:** This year’s theme for the International Day for the Eradication of Poverty, “Answering the Call to End Poverty: A path toward peaceful and inclusive societies”, celebrates the 25 year anniversary of the creation of this international day and the idea behind it: that hunger, lack of education, and violence are not inevitable. That extreme poverty must be something we all strive to eradicate. The first and foremost step of the industrialization is eradication of poverty in the society.6 The recent development of employment opportunities all are to be followed by the family situation and also personal like. The earning of individual income or per capita income is basic for economic development of the nation. The national income is basically fix a target for removed poverty from the society.7

**Challenges of Future Industrialization:** In the modern society technology advancement is a developing one because of number of industries are followed a recent technology in his business. The financially developed organisation are utilized a technology in a perfect way. But most of the organisation not having a enough money to modernization of technology. Most of the organisation are ready to adopt an upgradation technology in future days. So all the organisation must try to know about what are the updated technology available in the society and also the how to handle the technology8. The human efficiency about the handling of technology without wasting of time and also the energy. The energy saving actions also gives a good result about the upgradation of organisation. The challenges of future are fully based on the effective utilization full resources into his organisation.

**Objectives of the Study:**

- The main theme of the study is updating of recently developed technology.
- The organisation development is to give priority to the eradication of poverty.
- To find out the kinds of human resources and technical source are to be needed in the organisation.

**Sampling Method:** Since the population is large in number, the researcher undertook a sample survey. Convenient sampling method has been adopted to collect data from customers. The sample size 500 respondents.

**Scope of the Study:**

- The promotional activities are never to disturb the other organisational activities.
- The industrial development is only based adoptability of the individual capability.
- The promotional activities are to be concentrated for the growth of organisation not for the individual growth.

**Limitations of the Study**

- To frame certain rules and regulations are followed effectively not for namely.
- To convey the real result into the society, so we are observe the daily activity of the organisation.
- The organisation should be implemented by assessing the training and development requirements of employees
- The organisation needs implementation of programmes by the way of gradually not for suddenly.

**Table No. 1: Quality of the Work Versus Literacy Level of the Employees**

<table>
<thead>
<tr>
<th>O</th>
<th>E</th>
<th>(O-E)</th>
<th>(O-E)²</th>
<th>(O-E)² /E</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>-1</td>
<td>1</td>
<td>0.090909</td>
</tr>
<tr>
<td>25</td>
<td>17</td>
<td>8</td>
<td>64</td>
<td>3.764706</td>
</tr>
<tr>
<td>30</td>
<td>24</td>
<td>6</td>
<td>36</td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>-7</td>
<td>49</td>
<td>4.083333</td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td>-6</td>
<td>36</td>
<td>2.25</td>
</tr>
<tr>
<td>20</td>
<td>28</td>
<td>-8</td>
<td>64</td>
<td>2.285714</td>
</tr>
<tr>
<td>15</td>
<td>15.40</td>
<td>-0.40</td>
<td>0.1600</td>
<td>0.01039</td>
</tr>
<tr>
<td>10</td>
<td>23.80</td>
<td>-13.80</td>
<td>190.400</td>
<td>8.001681</td>
</tr>
<tr>
<td>40</td>
<td>33.60</td>
<td>6.40</td>
<td>40.9600</td>
<td>1.219048</td>
</tr>
<tr>
<td>25</td>
<td>16.80</td>
<td>8.20</td>
<td>67.2400</td>
<td>4.002381</td>
</tr>
<tr>
<td>30</td>
<td>22.40</td>
<td>7.60</td>
<td>57.7600</td>
<td>2.578571</td>
</tr>
<tr>
<td>30</td>
<td>24</td>
<td>6</td>
<td>36</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Since the calculated value of Chi Square is greater than the table value of $X^2$, $H_0$ is rejected. So the employees’ age group is influenced by the package system in the form of industrialization. Hence there is evidence of association between age group of the respondent and Salary package system in the form of industrialisation.

Findings:

- Most of the respondents are too participated in the newly adopted rules and regulation related for upgradation.
- The study is finding a real result of salary and also wage is reasonable in the present situation.
- Most of them need for eradicate the poverty in his life with the satisfied working conditions.
- Most of the employees are in the age group of middle, because of all are understand the importance industrial development in the society.

Suggestions:
The human resources are effectively utilised for the industrial development with the available nature of working areas. Most of the people want to introduce a newly developed technology without delay. The duration of time period is no longer for changing of ownership, because of the changes of ownership is create a zero percentage of interest from the working people. This type of study is creating a favor about the technology development and also the sustainable growth of the organisation. The training and developmental process are too framed in correct manner and utilized in time, it gives a role model of the followed organisation. The organisation must have a rights to coordinate the people and also discuss with them getting further movement by the management. The further step of the management is give part and partial portion of their employees because of this industrialisation is to eliminate the poverty. The organisation must to create an employment opportunities to general public and the awareness about the industrialization.
Conclusion

Finally the sustainable growth of the organisation gives a way of globalization of the organisation. The organisational performance in the hands of human empowerment. The human efforts give a result of the industrial growth, these kinds of activity is based on transfer a business from one stage to next stage. The stages of organizational development must to provide a suitable way for modernisation. The poverty of the general public can be eliminated very easily with help of industrialisation.

Ethical Clearance: Completed (VELS University)

Source of Funding: Self

Conflict of Interest: Nil

Reference

A Study on Occupational Health Hazards among IT Sector Women Employees in Tamil Nadu

R. Lakshmi¹, M. Vetrivel¹, R.V. Suganya²

¹Associate Professor, ²Assistant Professor, Department of Commerce, School of Management Studies & Commerce, VELS University, Chennai

Abstract

In view of this healthcare importance, the real economic growth rate depends on the quality of human life especially in improving the women’s standard of living around the world. At present, a large number of women are working in all sectors viz., primary sector, secondary sector and service sector in both the rural and urban areas. Further, they are actively participating in each and every job and express their knowledge and capacity to the society. However, most of the women are dominated by men and are affected psychologically and are under pressure in their work places. The term occupational hazards refer to a risk accepted as a consequence of a particular occupation. Regarding the occupational problems, the women employees in IT sector are facing health hazards like eye fatigue, headache, thyroid problem and others. It could be seen that over a past decade, a large number of women employees in IT sector suffer from heart related diseases. Moreover, the Poor health creates huge strain on physical and mental pressure in working places. At present, the large numbers of women employees also face many social, cultural and economic challenges. Hence, this study is an attempt to identify and analyse the reasons that affects the health of IT sector women employee respondents and give suitable measures to reduce the work related stress in IT sector among women employee respondents. Further, this study focused on primary data and the tools of analyses with using statistical techniques like percentages, t-test and rank value method. As a result found that, the urban area women respondents are highly affected as compared to that of rural area women respondents among the IT sector field. By and large, the study suggested that spiritual meditation is a way to help the reducing stress in psychologically and work related stress reduced through improving communication and technical skill.

Keywords: Women empowerment, health, IT sector, stress, economic development, communication skill, spiritual meditation.

Introduction

In view of this healthcare importance, the real economic growth rate is based on to develop the quality of human life and especially to improve the women’s standard of living around the world. The human development report (1995) stated that the basic capability for human development are living a long and healthy life, being educated and better standard of living in a society.¹ At present, a large number of women are working in all sectors like primary sector, secondary sector and service sector in which both rural and urban areas. Further, they are actively participating in each and every job and exposure their knowledge and capacity to the society. However, most of them women are conquered by men and they are affected in both psychology and mental pressure in working places.² The term occupational hazards refers to the stress related to the works require to be addressed without any delay. Regarding the occupational problems, the software women employees are facing continuously like eye fatigue, headache, thyroid problem and others. It could be seen that over a past decade, a huge number of software women employees are suffered due to heart diseases. Moreover, the Poor health creates huge strain on physical and mental pressure in working places. The term occupational hazards refer to a risk accepted as a consequence of a particular occupation. Regarding the occupational problems, the software women employees are facing health hazards like eye fatigue, headache, thyroid problem and others. It could be seen that over a past decade, a large number of software women employees suffer from heart related diseases. Moreover, the Poor health creates huge strain on physical and mental pressure in working places. At present, the large numbers of software employees also face many social, cultural and economic challenges. Hence, this study is an attempt to identify and analyse the reasons that affects the health of software women employee respondents and give suitable measures to reduce the work related stress in software sector among software employee respondents. Further, this study focused on primary data and the tools of analyses with using statistical techniques like percentages, t-test and rank value method. As a result found that, the urban area software respondents are highly affected as compared to that of rural area software respondents among the software sector field. By and large, the study suggested that spiritual meditation is a way to help the reducing stress in psychologically and work related stress reduced through improving communication and technical skill.

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Mobile: 9688602879
mental pressure in working places. At present, the large numbers of women employees are facing many problems from different directions like social problems, cultural problems, and economic problems. More specifically, women are not only facing problems in working places and from her homes also. But some of them are actively participated in domestic work like cooking, washing, drawing water, preparing food and so on. Additionally, the physical health was majorly suffered due to that insufficient sleep as regularly. Meantime, without yoga activity may be disturbed their psychological feelings also. The adverse impact of health is one of the major problems to makes gender equities in the society. In view of these all problems, maintaining health nutrition, and yoga and exercises, proper training and improving knowledge, good sleeping, and air conditioner facilities are the major solution to reduce their stress in software industries. Hence, the present study makes an attempt to analyze the health hazards among IT sector women employees in Tamil Nadu.

Objectives:
1. To analyse the reasons for health affect in IT sector women employee respondents in selected region.
2. To suggest the suitable measures to prevent the work related stress in IT sector.

Hypothesis: Rural area women employees are majorly affected as compared to urban area women employees in IT sector.

Methodology

Drawn from the present study has been focused on primary data and it involves a multi-stage sampling method. Further, the present study is covered four stages and the accurate information is derived from the field of inquiry in IT sector, Chennai city, Tamil Nadu: (i) Selection of Chennai district in Tamil Nadu, (ii) Selection of major towns’ viz., Ambattur, Thiyagarayanagar, Kodambakkam and Nungambakkam in Chennai district (iii) Selection of few software industries in selected areas, (iv) Selection of rural area and urban area women employee respondents according to Tamil Nadu state and Other States in software sector. Among these four stages of investigation, 115 sample respondents are selected for the present study. In which, 63 respondents are collected from Tamil Nadu state and the remaining 52 respondents are collected from other states viz., Kerala, Bangalore, Sikkim, etc. Out of these 63 women respondents in Tamil Nadu, 27 respondents belonging to rural areas and the remaining 36 respondents are belonging to urban areas. On the other hand, out of 52 respondents in other states women respondents, 23 respondents are belonging to rural areas and the remaining 29 respondents are belonging to urban areas. In whole, 50 respondents are from rural area respondents and the remaining 65 respondents are from urban area respondents. Moreover, the present study is used by the convenient sampling method and the period covers from 2017-2018.

Tools for Data Analysis:
1. To analyse the reasons for health affect in IT sector women employee respondents, rank analysis and t-test analysis have been applied.
2. To identify the major factors to prevent the work related stress in IT sector, the percentage analysis has been employed.

Table 1: Causes of Work Related Stress

<table>
<thead>
<tr>
<th>Dimension on job stresses</th>
<th>Rural Area (Mean Value)</th>
<th>Rank</th>
<th>Urban Area (Mean Value)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Discrimination</td>
<td>7.23</td>
<td>7</td>
<td>6.80</td>
<td>10</td>
</tr>
<tr>
<td>Wage Discrimination</td>
<td>6.92</td>
<td>10</td>
<td>6.94</td>
<td>8</td>
</tr>
<tr>
<td>Heavy Workload</td>
<td>7.64</td>
<td>6</td>
<td>7.23</td>
<td>6</td>
</tr>
<tr>
<td>Gender Discrimination</td>
<td>7.70</td>
<td>5</td>
<td>6.89</td>
<td>9</td>
</tr>
<tr>
<td>Unable to achieve their Target</td>
<td>5.78</td>
<td>12</td>
<td>7.20</td>
<td>7</td>
</tr>
<tr>
<td>Family Problems</td>
<td>7.98</td>
<td>4</td>
<td>8.90</td>
<td>2</td>
</tr>
<tr>
<td>Health Issues</td>
<td>8.98</td>
<td>1</td>
<td>9.94</td>
<td>1</td>
</tr>
<tr>
<td>Problem with Co-workers</td>
<td>8.23</td>
<td>3</td>
<td>8.89</td>
<td>3</td>
</tr>
<tr>
<td>Could not provide maternity Leave</td>
<td>7.18</td>
<td>8</td>
<td>6.78</td>
<td>11</td>
</tr>
<tr>
<td>Poor working place</td>
<td>8.30</td>
<td>2</td>
<td>7.80</td>
<td>5</td>
</tr>
<tr>
<td>Sexual Harassment</td>
<td>6.99</td>
<td>9</td>
<td>6.21</td>
<td>12</td>
</tr>
<tr>
<td>Nightshift Work</td>
<td>6.78</td>
<td>11</td>
<td>8.01</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Computed
Table 1 analyzes the causes of work related stress with the help of utilizing the rank analysis method. Among the ranking method and estimating the mean value in rural area, most of the respondents are highly suffered by health issues under working in software sector which constitute the mean value at 8.98, followed by poor working places (8.30), problems with co-workers (8.23), family issues (7.98), gender discrimination (7.70), Heavy workload (7.64), age discrimination (7.23), could not provide maternity leave (7.18), sexual harassment (6.99), wage discrimination (6.92), working in night shift (6.78), and the remaining unable to achieve their target (5.78). In the case of urban area by using the mean value with the help of ranking method, the mean value is highly recorded in health issues (9.94), followed by the family issues (8.90), problem with co-workers (8.89), working in night shift (8.01), poor working places (7.80), heavy workload pressure (7.23), unable to achieve their target (7.20), wage discrimination (6.94), gender discrimination (6.89), age discrimination (6.80), could not provide maternity leave (6.78) and the remaining sexual harassment (6.21). As a result found that both rural and urban areas women respondents, health issues and health problems are mainly dominated the job related stress in the study area.

**Table 2: Causes of Work Related Stress with Using T-Test Method**

<table>
<thead>
<tr>
<th>Dimension on job stresses</th>
<th>Rural Area (Mean Value)</th>
<th>Urban Area (Mean Value)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Discrimination</td>
<td>7.23</td>
<td>6.80</td>
<td>-2.019</td>
<td>.002*</td>
</tr>
<tr>
<td>Wage Discrimination</td>
<td>6.92</td>
<td>6.94</td>
<td>-1.090</td>
<td>.078(NS)</td>
</tr>
<tr>
<td>Heavy Workload</td>
<td>7.64</td>
<td>7.23</td>
<td>0.989</td>
<td>.049**</td>
</tr>
<tr>
<td>Gender Discrimination</td>
<td>7.70</td>
<td>6.89</td>
<td>-2.109</td>
<td>.067(NS)</td>
</tr>
<tr>
<td>Unable to achieve their Target</td>
<td>5.78</td>
<td>7.20</td>
<td>2.009</td>
<td>.093(NS)</td>
</tr>
<tr>
<td>Family Problems</td>
<td>7.98</td>
<td>8.90</td>
<td>-1.897</td>
<td>.003**</td>
</tr>
<tr>
<td>Health Issues</td>
<td>8.98</td>
<td>9.94</td>
<td>-3.478</td>
<td>.042**</td>
</tr>
<tr>
<td>Problem with Co-workers</td>
<td>8.23</td>
<td>8.89</td>
<td>-2.870</td>
<td>.021**</td>
</tr>
<tr>
<td>Could not provide maternity Leave</td>
<td>7.18</td>
<td>6.78</td>
<td>-3.092</td>
<td>.088(NS)</td>
</tr>
<tr>
<td>Poor working place</td>
<td>8.30</td>
<td>7.80</td>
<td>0.678</td>
<td>.097(NS)</td>
</tr>
<tr>
<td>Sexual Harassment</td>
<td>6.99</td>
<td>6.21</td>
<td>-0.110</td>
<td>.027**</td>
</tr>
<tr>
<td>Nightshift Work</td>
<td>6.78</td>
<td>8.01</td>
<td>1.201</td>
<td>.044**</td>
</tr>
</tbody>
</table>

Source: Computed, *1% level of significant, **5% level of significant, NS-Not significant

Table 2 examines the job related stress with testing of t-test analysis. The null hypothesis is based on “rural area women respondents are highly affected in work related stress with compared to urban area women respondents”. The following results are mentioned the rural area respondents are highly suffered in job related stress with compared to urban area respondents. Age discrimination is found to statistically significant at 1% level, and the remaining factors are statistically significant at 5% level viz., heavy workload pressure, family issues, health problems, problem with co-worker, sexual harassment and working in night shift are found to be highly affected in rural area as compared to urban area respondents. Hence, accept the null hypothesis for the above mentioned factors. Rests of them, wage discrimination, gender discrimination, unable to achieve their target, could not provide maternity leave and the remaining poor working places are not significant. As a result found that, the urban area respondents are highly affected in these mentioned factors as compared to that of rural area women respondents. Hence, reject the null hypothesis for above the mentioned factors and accepted alternative hypothesis.

**Table 3: Impact on Personal Stress Using Anova**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Groups Variable</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Care</td>
<td>Between Groups</td>
<td>.106</td>
<td>1</td>
<td>.106</td>
<td>.112</td>
<td>.739</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>258.450</td>
<td>113</td>
<td>.954</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>258.557</td>
<td>114</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Factors | Groups Variable | Sum of Squares | df | Mean Square | F  | Sig.  
--- | --- | --- | --- | --- | --- | ---  
Family Issues | Between Groups | .802 | 1 | .802 | 1.014 | .315  
Within Groups | 214.260 | 113 | .791 |  
Total | 215.062 | 114 |  
Personal Financial Burden | Between Groups | 1.265 | 1 | 1.265 | 1.378 | .241  
Within Groups | 248.874 | 113 | .918 |  
Total | 250.139 | 114 |  
Source: Computed  
Table 3 interprets the impact on personal stress among IT sector women employees. It is seen that the rural area women respondents are highly affected due to the personal stress as compared to urban area respondents. The personal stress factors such as child care, family issues, and personal financial burden are statistically not significant at 5% or 1% level. Thus it leads to accept the alternative hypothesis i.e., urban area women respondents are highly affected in personal stress as compared to rural area respondents.

Table 4: Prevention of Work Related Stress

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Discussion with Other Employees</td>
<td>96 (83.5)</td>
<td>19 (16.5)</td>
<td>115 (100)</td>
</tr>
<tr>
<td>Improve Communication and Technical Skill</td>
<td>82 (71.3)</td>
<td>33 (28.7)</td>
<td>115 (100)</td>
</tr>
<tr>
<td>Proper Training</td>
<td>78 (67.8)</td>
<td>37 (32.2)</td>
<td>115 (100)</td>
</tr>
<tr>
<td>Spiritual Meditation</td>
<td>99 (86.1)</td>
<td>16 (13.9)</td>
<td>115 (100)</td>
</tr>
<tr>
<td>Yoga and/or Exercises</td>
<td>83 (72.2)</td>
<td>32 (27.8)</td>
<td>115 (100)</td>
</tr>
</tbody>
</table>
Source: Computed; Figures in Parentheses denote percentages

Table 4 exhibits the factors attributing to prevent the work related stress among IT sector women employees in selected region. It is seen that more than three fourth of the respondents are stated that agree with spiritual meditation may reduce the work related stress which constitute 86.1 percent, followed by 83.5 percent of them where recorded group discussion with other employees, nearly three fourth of the respondents (72.2 %) are agree with yoga and/or exercises may reduce the work related stress, 71.3 percent of them recorded that improving communication and technical skills and the least recorded by the proper training method at 67.8 percent in selected region. It is noticed that on the table, spiritual meditation and group discussion may reduce the work related stress among IT sector women employees.

Policy Suggestions:

1. Protecting the women employees for the long hours of work in the software sector. Because the long hours of work due to increase the physical stresses and psychological stresses. Hence, all the software institutional should banned the long hours of work.
2. Improve the gender sensitive related and monitor progress about regulatory framework, software technologies and labour policies, and create infrastructural facilities are drawn it by the regulatory information as follow the ICT policies.
3. Improve the software mechanisms monitor the progress and to encourage gender development in IT field.
4. All the software institutions should strengthen their capacity through technical support, gender equality and ICT.
5. All the software institutions should provide the training facilities to the employees for improving the technical and communication skills and create more employment opportunities.
6. Government should promote software technologies, because it gives more taxation to the central and state Governments.
7. Government should collaborate with ICT sector. Because recently number of people depend on the software technologies. If the Government...
undertakes the ICT, it will helpful to increase the most employment opportunities.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


Verrucous Carcinoma: A Case Report

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Sree Balaji Dental College & Hospital, Bharath Institute of Higher Education and Research

Abstract

Verrucous carcinoma is a variant of squamous cell carcinoma. It most typically affects the mouth with buccal mucous membrane being the most typical site affected. Clinically its proliferative finger like projections or a cauliflower like growth could be a typical feature towards diagnosis. It’s more common in tobacco user and more predilection in males. The histopathological diagnosis of verrucous carcinoma is quite difficult and need immense expertise to report a case of verrucous carcinoma. Though verrucous carcinoma is a benign lesion with minimum aggressive potential however long standing cases shows transformation into squamous cell carcinoma. Here in we discuss the clinical and histopathological finding of the case of 80 year old male patient with oral verrucous carcinoma on buccal sulcus as a differential diagnosis with possible etiology, management of the lesion.

Keywords: Verrucous carcinoma, buccal mucosa, incisional biopsy, cauliflower like growth.

Introduction

Oral Verrucous carcinoma is a variant of squamous cell carcinomawhich was 1st delineated by Lauren V Ackermann in 1948 therefore it was called ‘Verrucous malignant neoplastic disease of Ackermann” or “Ackermann’s Tumor”1. Different names utilized in literature are Buschke-Loewenstein tumour, florid oral papillomatosis, epitheliomacuniculatum, and carcinoma cuniculatum2. Common site of incidence is mouth, other sites being pyriform sinus, larynx, nasal cavity, esophagus, external auditory canal, paranasal sinuses, legs, scrotum, skin, perineum, penis, vulva, vagina, and uterine cervix3, 4. Oral verrucous carcinoma features a predilection for male in sixth decade with a slow growing rate and becomes regionally invasive if not treated properly. But, there is a rare distant metastasis6. Clinically, it is featured as a plaque like lesion with finger like projections resembling cauliflower5. Any type of Tobacco as smoking and smokeless type, alcohol and opportunist infective agent, infections are the foremost associated etiologies with Oral Verrucous Carcinoma6, 7. So early diagnosis and surgical excision of the lesion is the most appropriate treatment modality of verrucous carcinoma.

Case Report: An 80 year old male patient reported with a painful growth in the right buccal mucosa for the past 3 months. Patient had a habit of betel nut chewing since 40 years, 5-6 times/day. On general examination patient had normal gait posture, well oriented, moderately built and conscious. No evidence of icterus, pallor, cyanosis, clubbing was present. Single left submandibular lymph node was palpable and was firm, mobile and tender on palpation. Clinical intra oral examination revealed a soft growth of 2x1.5 cm in size, well defined with irregular margins pedunculated, irregular surface with finger like projections in the center, color was erythematous in the periphery and white in the center. On palpation, the growth was elevated from adjacent mucosa and tender. Based on the clinical examination a provisional diagnosis of erythroleukoplakia and verrucous leukoplakia was given and Differential diagnosis of verrucous hyperplasia and verrucous carcinoma, was considered. To confirm the diagnosis, an incisional biopsy was taken, The histological cut was performed

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and stained in hematoxylin and eosin. The hematoxylin and eosin stained histopathological section of the given specimen showed hyperplastic parakeratinized stratified squamous epithelium with underlying connective tissue stroma. Wide elongated reteridges are seen with pushing margins. Parakeratin plugging was seen (fig-1). Pseudoepitheliomatous hyperplasia was noticed (fig-2). The fibrous connective shows moderate cellularity and diffuse mild chronic inflammatory cell infiltrate with increased vascularity. Therefore, the histopathology diagnosis confirmed the diagnosis of verrucous carcinoma.

Fig 1: Histopathology image showing parakeratin plugging

Fig 2: Histopathology image showing pseudoepitheliomatous hyperplasia

Discussion

Verrucous carcinoma, as mentioned most typically affects older male with adverse habits of tobacco and alcohol6. Lesions usually develop at the location wherever the tobacco is placed habitually8. In Ackerman’s study, eleven out of eighteen patients (61%) with squamous cell carcinoma of buccal mucosa were tobacco chewers. Other etiologic factors like poor dental hygiene, ill-fitting dentures, low socioeconomic status, tobacco chew, snuff, alcohol use, and smoking also causes verrucous carcinoma6,8,10. Some of the similar factors that predispose people to the event of premalignant lesions like, submucous fibrosis (SMF), erythroplakia and leukoplakia1. Untreated long standing leukoplakia has been reported to transform into Verrucous Carcinoma12. Oral verrucous carcinoma are largely massive, exophytic, soft, and fungating growth with pebbly surface having regionally aggressive nature, Enlarge lymph nodes are typically palpable.9 Diagnosis of verrucous carcinoma histopathologically is quite difficult and needs expertise to diagnose.

The term “ verrucous” was applied for lesions showing a exophytic keratotic surface composed of blunt or sharp epithelial projections with keratin-filled invaginations (plugging). The microscopic anatomy of Verrucous Carcinoma, for instance, verrucous surface and “elephant feet” like down growth superficial to compress the underlying connective tissue and usually showing least or absent cytologic atypia is seen12. By flow cytometry, Verrucous Carcinoma could be a diploid lesion; on the contrary, the traditional squamous cell cancer typically shows genomic instability and aneuploidy16. As a result of its benign cytological features, besides the focal basal cell nuclear hyperchromatism, distinction from Verrucous carcinoma and verrucous hyperplasia (VH) can’t be primarily based solely on microscopic anatomy features17,18. Differential diagnosis of verrucous carcinoma includes: (i) Proliferative verrucous leukoplakia, (ii) squamous cell carcinoma showing verrucoid feature (iii) verruca vulgaris (iv) keratoacanthoma. (v) Pseudoepitheliomatous hyperplasia19. The simplest treatment modality of Verrucous Carcinoma is surgical resection20. So, the patient is additionally suggested for surgical removal of the lesion and regular follow up. Although Verrucous Carcinoma doesn’t show distant metastasis, supra omohyoid neck dissection is usually considered20. Recurrence of lesion is because of improper section, false negative frozen section report and generally as a result of the slow growth pattern surgical margins are compromised9,13,22. The presence of carcinoma in place of clinically improper resections will lead to the development of recurrence of invasive cancer in apparently traditional epithelial tissue or previous excision sites21. Radiation therapy is contraindicated in treatment of Verrucous Carcinoma as radiation induced anaplastic transformation.
Conclusion

In most of the cases verrucous hyperplasia, verrucous carcinoma, verrucous keratosis are clinically indistinguishable from each other. Thus histopathological proof is important to allow an acceptable diagnosis. Verrucous carcinoma presents as thick verrucous keratotic lesion that is additional common in males and is typically painless. Verrucous Carcinoma related to leukoplakia or submucous fibrosis is also a sign of “field cancerization” and might cause multiple recurrences, therefore it’s extremely suggestive, that such patients should be kept under regular follow up.

Conflict of Interest: Nil
Source of Funding: Self
Ethical Clearance: Not required

References

Evaluation of Degree of Relationship of Insulin to LH, Testosterone and SHBG in Various PCOS Groups Categorized on the Basis of Altered LH: FSH Ratios

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Abstract

Context: Polycystic ovary syndrome (PCOS) is a highly prevalent cause of female infertility.

Objective: This study aimed to detect effect of insulin on LH, testosterone and SHBG of various PCOS groups. Experimental design: A total of 745 women who were subjected to infertility treatment at infertility clinics were selected. About 50 healthy females with regular menstrual cycles were considered as control. The data were collected from hospital records using subject’s written informed consent.

Results: Relationship of insulin to LH and testosterone was positive and significant only in (p<0.05) in entire PCOD group and PCO subgroups with LH: FSH ratios 1.1-1.5, 1.6-2.5, 2.6-3.5, 3.6-4.5 and 4.6-5.5. The degree of relationship was strong and showed a gradation from lower to higher ranges of LH: FSH ratios. Correlation between insulin and SHBG was inverse and significant (p<0.05) in all PCOD subgroups except in subgroups with LH: FSH ratios <1 and 1. A strong positive relationship was observed between insulin and SHBG in control group. The degree of inverse relationship was strong in PCOD subgroups with higher ranges of LH: FSH ratios.

Conclusion: This study concluded effect of insulin on LH, testosterone and SHBG of various PCOS groups in terms of degree of relationship.

Keywords: Insulin resistance; hyperinsulinemia; hyperandrogenism; body mass index; SHBG.

Introduction

Polycystic ovary syndrome (PCOS) is one of the most common causes of female infertility affecting 6-8% of reproductive age women and is represented by hyperandrogenism, oligo-anovulation, and polycystic ovarian morphology on ultra sound1,2. This syndrome is also associated with insulin resistance, obesity, hyperinsulinemia, diabetes mellitus and cardio vascular disease.

Severe insulin resistance depicts up to 90% of women with PCOS further than that expected by their body mass index (BMI)3. In fact, even lean women with PCOS have increased insulin resistance in comparison to BMI-matched controls4. Regarding insulin secretion, numerous studies have assessed β-cell function in PCOS, yet the results are ambiguous. Researchers reported that there is a defect in the glucose-stimulated insulin secretion5, but other studies have found that insulin response is increased in PCOS women, probable as a compensation for the peripheral insulin resistance6. The present study aimed to evaluate the degree of relationship of insulin to LH, testosterone and SHBG in control and various PCOS groups.

Study design: It was a hospital data-based cross-sectional study done in specialist infertility clinics in central Travancore region of Kerala. A total of 745
consecutive subjects (aged 28.11 ± 0.2) with complaints and symptoms suggestive of PCOS participated in the study. They were categorized into seven subgroups on the basis of different ranges of LH: FSH ratios. The control subjects (Group I) consisted of 50 healthy volunteer females with regular menstrual cycles aged 27.58 ± 0.4. The subgroups of PCOD were PCOD with LH: FSH ratio 1 (Group II), PCOD with LH: FSH ratio < 1 (Group III), PCOD with LH: FSH ratio 1.1-1.5 (Group IV), PCOD with LH: FSH ratio 1.6-2.5 (Group V), PCOD with LH: FSH ratio 2.6-3.5 (Group VI), PCOD with LH: FSH ratio 3.6-4.5 (Group VII) and PCOD with LH: FSH ratio 4.6-5.5 (Group-VIII). Control subjects had regular ovulatory cycles and no signs of polycystic ovaries on ultrasound. All women participated in the study provided written informed consent for collecting their reports from medical records. The data regarding endocrine parameters of PCOS subjects and control were collected.

**Statistical Analysis:** The statistical Package for Social Sciences (SPSS 16.0 version for windows) was used for all data analysis. Pearson correlation and Fisher’s Z transformation test were conducted to interpret the effect of insulin on LH, testosterone and SHBG in various PCOS subgroups and control subjects. Statistical significance was accepted at p<0.05.

**Results**

Table 1: Relationship of insulin to LH, testosterone and SHBG in control and PCOS groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Relationship between insulin and LH : (r)</th>
<th>Relationship between insulin and testosterone : (r)</th>
<th>Relationship between insulin and SHBG : (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Group I)</td>
<td>.059</td>
<td>-.146</td>
<td>.827*</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 1 (Group II)</td>
<td>-.066</td>
<td>-.218</td>
<td>-.437</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio &lt; 1 (Group III)</td>
<td>-.043</td>
<td>-.337</td>
<td>.183</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 1.1-1.5 (Group IV)</td>
<td>.547*</td>
<td>.664*</td>
<td>-.553*</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 1.6-2.5 (Group V)</td>
<td>.594*</td>
<td>.767*</td>
<td>-.529*</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 2.6-3.5 (Group VI)</td>
<td>.602*</td>
<td>.805*</td>
<td>-.658*</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 3.6-4.5 (Group VII)</td>
<td>.626*</td>
<td>.808*</td>
<td>-.747*</td>
</tr>
<tr>
<td>PCOD with LH:FSH ratio 4.6-5.5 (Group VIII)</td>
<td>.695*</td>
<td>.830*</td>
<td>-.830*</td>
</tr>
<tr>
<td>Whole PCOS</td>
<td>.481*</td>
<td>.668*</td>
<td>-.444*</td>
</tr>
</tbody>
</table>

*significant (p<0.05)

The relationship between insulin and LH was not significant in control (Group I) and two PCOS sub groups namely PCOD with LH: FSH ratio 1 (Group II) and PCOD with LH: FSH ratio < 1 (Group III). Conversely a significant (p<0.05) positive correlation was observed between insulin and LH in PCOD with LH:FSH ratio 1.1-1.5 (Group IV), PCOD with LH:FSH ratio 1.6-2.5 (Group V), PCOD with LH:FSH ratio 2.6-3.5 (Group VI), PCOD with LH:FSH ratio 3.6-4.5 (Group VII), PCOD with LH:FSH ratio 4.6-5.5 (Group VIII) and whole PCOS groups. Moreover, the degree of positive relationship between insulin and LH showed a gradation pattern from group IV to group VIII (.547, .594, .602, .626 and .695) of these PCOS subgroups with increase in LH: FSH ratio (Table 1). Similarly, the relationship of insulin to testosterone and SHBG was not significant in control (Group I) and PCO subgroups including PCOD with LH: FSH ratio 1 (Group II) and PCOD with LH: FSH ratio < 1 (Group III) and significant in the remaining PCOD sub groups and whole PCOS group (Table1). Also, the correlation between insulin and testosterone was positive and showed the similar increasing pattern (.664, .767, .805, .808 and .830) from group IV to group VIII as in the case of correlation between insulin and LH. However, the relationship between insulin and SHBG was inverse in PCO subgroups except in PCOD with LH: FSH ratio < 1 (Group III). The degree of inverse relationship also exhibited a progression (-.658, -.747, and -.830) from group VI to group VIII (Table 1).
Table 2. Comparison of significance of difference between control and various PCOS groups with respect to correlation coefficients (regarding insulin to LH, testosterone and SHBG) using Fisher’s Z transformation test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Relationship between insulin and LH [Test statistic (z)]</th>
<th>Relationship between insulin and testosterone [Test statistic (z)]</th>
<th>Relationship between insulin and SHBG [Test statistic (z)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 1 (Gp II)</td>
<td>0.37</td>
<td>0.2</td>
<td>1.55</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio &lt; 1 (Gp III)</td>
<td>0.5</td>
<td>0.54</td>
<td>2.43*</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 1.1-1.5 (Gp IV)</td>
<td>-2.69*</td>
<td>-2.29*</td>
<td>4.54*</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 1.6-2.5 (Gp V)</td>
<td>-3.22*</td>
<td>-3.92*</td>
<td>4.99*</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 2.6-3.5 (Gp VI)</td>
<td>-2.43*</td>
<td>-3.77*</td>
<td>4.79*</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 3.6-4.5 (Gp VII)</td>
<td>-2.02*</td>
<td>-3.39*</td>
<td>4.15*</td>
</tr>
<tr>
<td>Control (Gp I) vs. PCOD with LH:FSH ratio 4.6-5.5 (Gp VIII)</td>
<td>-2.09*</td>
<td>-3.41*</td>
<td>4.58*</td>
</tr>
<tr>
<td>Control vs. whole PCOS</td>
<td>-2.9*</td>
<td>-4.78*</td>
<td>5.9*</td>
</tr>
</tbody>
</table>

*significant (p<0.05)

The effect of insulin on LH and testosterone was significantly (p<0.05) higher in PCO sub groups comprising PCOD with LH: FSH ratio 1.1-1.5 (Gp IV), PCOD with LH: FSH ratio 1.6-2.5 (Gp V), PCOD with LH: FSH ratio 2.6-3.5 (Gp VI), PCOD with LH: FSH ratio 3.6-4.5 (Gp VII), PCOD with LH: FSH ratio 4.6-5.5 (Gp VIII) and whole PCOS group (Table 2) when compared to control. However, the effect of insulin on SHBG was significant (p<0.05) in all PCO subgroups except Gp II comprises PCOD with LH: FSH ratio 1, when compared to control. The effect was also significant (p<0.05) in whole PCOS group in comparison to control.

**Discussion**

The aim of this prospective study was to assess the influence of insulin on LH, testosterone and SHBG in various PCOS groups differentiated on the basis of LH: FSH ratios, which were not done in earlier studies. We hypothesized that elevated insulin levels exert their effect on other hormones to develop hormonal imbalances in PCOS. In our study insulin influences LH and testosterone levels which are markedly higher in these PCOS subgroups with elevated LH: FSH ratios. LH and testosterone levels increase with increase in the level of insulin in PCOS subjects when compared to control. Moreover, the degree of positive relationship of insulin to LH and testosterone showed a gradation from group IV to group VIII of PCO subgroups i.e. this study showed that higher the LH: FSH ratio, higher will be the degree of relationship. Also degree of relationship was feeble in PCO sub groups having LH: FSH ratios 1 and <1 i.e. lower the LH: FSH ratio lower will be the degree of relationship. The amount of relationship is associated with increase in the range of LH: FSH ratios and PCO subgroups were categorized on that basis. When considering PCOS as a heterogeneous group, the degree of relationship was not higher as in PCO subgroups with identical and elevated LH: FSH ratios.

Insulin and intraovarian insulin-like growth factor type I (IGF-I) may enhance the activities of both follicle stimulating hormone (FSH) and luteinizing hormone (LH) in triggering biochemical luteinization and enhancing steroidogenesis. Insulin may act a role in the occurrence of the usual augmented amplitude and frequency of GnRH and LH pulse secretion found in PCOS. Undoubtedly, increase of LH and GnRH secretion as a consequence of insulin infusion has been detected in vitro, together in dose dependent and time-dependent modes. This influence may be intervened by insulin in GnRH-secreting cells of the hypothalamus, by stimulating GnRH gene transcription through the MAPK pathway. Accordingly, elevated GnRH synthesis and secretion bring about later increase of LH levels. This constant stimulation would decipher into amplified synthesis of ovarian steroid hormones, mainly androgens. Likewise, insulin enhances testosterone levels of PCOS subjects in this study. Thus increase in the level of testosterone is associated with increasing insulin levels and consequent increase in LH levels observed in this study. In this case also, the amount of relationship between insulin and testosterone was higher in groups consisting of PCOD with LH: FSH ratios 1.6-2.5, 2.6-3.5, 3.6-4.5 and 4.6-5.5 than the entire PCOD group.
Researchers\textsuperscript{10} reported a steady increase in the mean levels of insulin and testosterone with the corresponding increase in LH: FSH ratios in various PCO subgroups. This study has prompted our conclusion that insulin definitely played a putative role in generating gonadotropin dysfunction and steroid hormone imbalance in PCOS. Insulin seems to play in collaboration with LH to raise intracellular concentration of cAMP, which triggers steroidogenic acute regulatory (STAR) protein, stimulating steroidogenic action. Though this influence may be straight via the PI3K pathway, the demand of cAMP for this process implies deviation from the normal insulin cascade; however the discrepancies in molecular interactions are unidentified\textsuperscript{11}. Likewise, the combined action of insulin and LH elevate transcription of LDL-C receptors in GC by means of the PKA, PI3K, and MAPK pathways. Conversely, insulin may also increase steroid synthesis through aromatase up regulation in GC, which would serve as substrates for theca cells for further conversion into androgens\textsuperscript{12}.

In accord with earlier findings we observed an inverse relationship between insulin and SHBG concentration\textsuperscript{13}. Also the degree of negative relationship is very higher in PCO subgroups consisting of subjects with same and elevated ranges of LH: FSH ratios than the entire PCOD group with different ranges of LH: FSH ratios. However, a moderate inverse relationship (-.437) was observed in PCOD with LH: FSH ratio 1 and very lower positive relationship was established in PCOS subgroup with LH: FSH ratio<1. Strong positive relationship between insulin and SHBG was detected in control subjects.

The decrease in the level of SHBG can be attributed to increased insulin levels and the resultant increase in LH and testosterone levels. Insulin seems to suppress sex hormone binding globulin (SHBG) levels of PCOS subjects. Lower SHBG concentration was observed in PCOS with elevated insulin, in comparison to the control subjects. Correlations between lower SHBG concentrations and hyperinsulinemia have reported mutually in health and hyperinsulinemic conditions such as PCOS and type 2 diabetes\textsuperscript{14}. This strong relationship has incited inferences that a low level of SHBG could be used as an indicator to recognize individuals with insulin resistance\textsuperscript{15}.

**Conclusion**

The present study concluded that insulin may influence LH, testosterone and SHBG levels in PCOS subjects of this study. The effect of insulin on these hormones in terms of degree of relationship was more noticeable and higher in PCO subgroups having identical increased ranges of LH: FSH ratios than the heterogeneous whole PCO group with diverse ranges of LH: FSH ratios.

**Funding Sources:** Nil

**Conflict of Interest:** Nil

**Ethical Statement:** Animals are not involved in this study. Human subjects are not subjected to experimentation instead their medical reports are collected from medical records with the permission of hospital authorities and subjects with a condition that their names are not shown in any of our research work and only tabulated data (subjected to statistical analysis) of their reports of whole participants are shown.

**Acknowledgement:** The authors thank Fertility specialist, Dr. S. Pappachan, (Lifeline Hospital, Adoor, Kerala), Dr. Raju Rajashekharan Nair (Matha Hospital, Kottayam, Kerala) and Dr. Sam P. Abraham (Abraham’s Infertility Clinic, Changanacherry, Kerala) for their help and co-operation in collecting data regarding infertility cases.

**Reference**


Study on Non-communicable Diseases (NCDs) and Risk Factors with Special Focus on Diabetes and Cardiovascular Diseases among the Employees of Aviation Sector at NSCBI Airport, Kolkata

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Abstract

Non-communicable diseases (NCDs) are defined as diseases of long duration, and are generally slow in progression. NCDs kill more than 36 million people each year. Nearly 80% of NCD deaths-29 million-occur in low-and middle-income countries. They share four risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets. This study aims on NCDs and its risk factors with special focus on CVDs and Diabetes among the employees of aviation sector at NSCBI Airport, Kolkata. Obesity, Hypertension, Diabetes and Metabolic syndrome are predominant among the employees in the age group of 35 and above. Four risk factors such as tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diet were found predominant among the employees. There is an urgent need of health awareness and health promotion activities at employee level and workplace level with special focus on health diet, physical activities and behavioural risk factors.

Keywords: Non-communicable diseases, Obesity, Hypertension, Diabetes, Metabolic syndrome.

Introduction

Non-communicable diseases (NCDs) are defined as diseases of long duration, and are generally slow in progression. NCDs kill more than 36 million people each year. Nearly 80% of NCD deaths-29 million-occur in low-and middle-income countries. More than nine million of all deaths attributed to NCDs occur before the age of 60; 90% of these “premature” deaths occurred in low-and middle-income countries. Cardiovascular diseases account for most NCD deaths, or 17.3 million people annually, followed by cancers (7.6 million), respiratory diseases (4.2 million), and diabetes (1.3 million). These four groups of diseases account for around 80% of all NCD deaths. They share four risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets.

- Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally.
- Each year, 15 million people die from a NCD between the ages of 30 and 69 years; over 85% of these “premature” deaths occur in low-and middle-income countries.
- Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.0 million), respiratory diseases (3.9 million), and diabetes (1.6 million).
- These 4 groups of diseases account for over 80% of all premature NCD deaths.
- Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of
dying from a NCD.

- Detection, screening and treatment of NCDs, as well as palliative care, are key components of the response to NCDs.2

The prevalence of NCDs is showing an upward trend in most countries and for several reason this trend is likely to increase. Of the 57 million global deaths in 2008, 36 million, or 63%, were due to NCDs, principally cardiovascular diseases, diabetes, cancers and chronic respiratory diseases.3 An epidemiological transition is taking place in most of the states in India with a decline in communicable diseases and an increase in chronic NCDs that has resulted in more than 50 per cent of total deaths in India in 2005 due to chronic diseases.4 The four leading chronic diseases in India, as measured by their prevalence, are in descending order: cardiovascular diseases (CVDs), diabetes mellitus, chronic obstructive pulmonary disease (COPD) and cancer. All four of these diseases are projected to continue to increase in prevalence in the near future. The projected cumulative loss of national income for India due to non-communicable disease mortality for 2006–2015 is expected to be USD237 billion. By 2030, this productivity loss is expected to double to 17.9 million years lost.5 India is the first country to develop specific national targets and indicators aimed at reducing the number of global premature deaths from NCDs by 25% by 2025. The Central Govt. proposes to supplement their efforts by providing technical and financial support through National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS). The NPCDCS program has two components viz. (i) Cancer and (ii) Diabetes, CVDs and Stroke. These two components have been integrated at different levels as far as possible for optimal utilization of the resources. The activities at State, Districts, CHC and Sub Centre level have been planned under the programme and will be closely monitored through NCD cell at different levels. 6 New scientific strategies, alternate systems of medicine, holistic life sciences, etc. (which are exceptionally cost-effective also), may be considered seriously for control and prevention of diabetes and other NCDs. The impact of NCDs will rapidly increase in countries in view of the rapid health and demographic transition. Public health experts have predicted a global epidemic of cardiovascular and other chronic diseases in the developing world by 2020.7 With the enormous number of diabetes cases, India is considered as the ‘Diabetes Capital’ of the world.8 Evidence from clinical practice and literature suggests that approximately half of most chronic diseases are undetected, and that half of that detected are not treated, and that half of those treated are not controlled. The primary care work load would increase if all the common and important chronic disorders were fully detected, treated and followed up.9 The World Health Organization has stressed on this imperative surveillance mechanism, focusing on the collection of data and statistics on key NCD risk factors continuously in order to design community based interventions targeted at the reduction of these risk factors and for monitoring the effectiveness of such interventions and its sequential phases and results.10 In macroeconomic term, most of the estimates suggest that the NCDs in India account for an economic burden in the range of 5–10% of GDP, which is significant and slowing down GDP thus hampering development. Since health sector alone cannot deal with the “chronic emergency” of NCDs, a multi-sectoral action addressing the social determinants and strengthening of health systems for universal coverage to population and individual services is required.11

**Objectives of the Study**

a) To study the distribution Non Communicable Diseases (NCDs) and its risk factors with special focus on CVDs and Diabetes among the employees of aviation sector at NSCBI Airport, Kolkata.

b) To study the socio-demographic correlates associated with NCDs and its risk factors in the study population.

c) To suggest appropriate recommendations regarding modifiable risk factors of NCDs in the study population.

**Material and Method**

This is an institution based cross-sectional study carried in NSCBI Airport, Kolkata. After fixing the objective of NCDs and risk factors among the employee of NSCBI Airport, Kolkata this study was conducted. Pre-designed questionnaire, Weighing machine, Stethoscope, measuring tapes were used for necessary measurement to obtain data with special focus on Hypertension, Obesity, Diabetes, Dyslipidemia, Metabolic Syndrome, Coronary Artery Diseases.

**Sample size:** was calculated by the formula: \(Z^2(p) (q) / d^2\), where \(Z=\) statistic for a level of confidence. For the level of confidence of 95%, the conventional \(Z\) value
is 1.96 \{2 SD\}, p= prevalence or proportion of the aspect being studied in the population, q= (100-p) d= relative error of the estimated prevalence.

**Study subjects:** 750 employees were selected on systematic random basis in various categories of employees of Kolkata Airport for the study. Persons who were working in the study area for more than 6 months and give their voluntary consent to participate were included in the study. Critically ill patients, pregnant women, and patients with as cites, not willing o give consent or not available even after three visits, were excluded from the study.

**Sampling technique:** Systematic random sampling technique was used. Study Tools: Pre-structured and pre-tested questionnaire: was adopted based on STEPS instrument for NCD risk factor surveillance. Modifications to suit the local requirements were done to generate data, Sphygmomanometer, Stethoscope, Weighing machine and measuring tape etc. Standard Operational Definitions were used in the study.

**Results and Discussion**

This is an Observational study conducted on employees of NSCBI Airport, Kolkata. We have collected data from 750 employees. We have tried to find out association of the factors such Obesity, Diabetes, Hypertension, Dyslipidemia, Metabolic Syndrome, Coronary Arterial Diseases with other variables like age, sex, marital status, job status, physical activity, drinking, smoking and other addiction habits.

| Table 1: Distribution of General Obesity (as per BMI) among Employees (n= 750) |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Age Group (Yrs) | Obese | % | Over-weight | % | Normal | % | Under-weight | % | Total |
| 20-24 | 4 | 10.26 | 13 | 33.33 | 21 | 53.85 | 1 | 2.56 | 39 |
| 25-29 | 27 | 12.68 | 72 | 33.80 | 107 | 50.23 | 7 | 3.29 | 213 |
| 30-34 | 35 | 16.43 | 73 | 34.27 | 99 | 46.48 | 6 | 2.82 | 213 |
| 35-39 | 30 | 19.74 | 56 | 36.84 | 56 | 36.84 | 10 | 6.58 | 152 |
| 40 & above | 22 | 16.54 | 49 | 36.84 | 53 | 39.85 | 9 | 6.77 | 133 |
| Total | 118 | 15.73 | 263 | 35.07 | 336 | 44.80 | 33 | 4.40 | 750 |

This study shows that the distribution of Obesity is maximum in the age group of 35-39 years (19.74%). It is observed that 15.73 % of the populations are obese, while 35.07% & 4.40% are overweight and underweight, respectively.

This study also shows that the percentage of Abdominal Obesity is maximum (59.87%) in the age group of 35-39. It is also observed that 54.8 % of the populations are having abdominal obesity.

| Table 2: Distribution of Abdominal obesity (WC ≥90cm in males and ≥80cm in females) among employees |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Age Group (Yrs) | Abdominal obesity | % among specific age group | Total |
| 20-24 | 20 | 51.28 | 39 |
| 25-29 | 111 | 52.11 | 213 |
| 30-34 | 112 | 52.58 | 213 |
| 35-39 | 91 | 59.87 | 152 |
| 40 & above | 77 | 57.89 | 133 |
| Total | 411 | 54.80 | 750 |

| Table 3: Distribution of Hypertension among employees (n= 750) |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Age group (Yrs) | Pre-hypertension | % | Hypertension | % | No Hypertension | % | Total |
| 20-24 | 7 | 17.95 | 2 | 5.13 | 30 | 76.92 | 39 |
| 25-29 | 47 | 22.07 | 18 | 8.45 | 148 | 69.48 | 213 |
| 30-34 | 65 | 30.52 | 12 | 5.63 | 136 | 63.85 | 213 |
| 35-39 | 56 | 36.84 | 34 | 22.37 | 62 | 40.79 | 152 |
| 40 & above | 44 | 33.08 | 26 | 19.55 | 63 | 47.37 | 133 |
| Total | 219 | 29.20 | 92 | 12.27 | 439 | 58.53 | 750 |
This study shows that the distribution of Hypertension is maximum in the age group of 35-39. It is also observed that 12.27% of the populations are hypertensive while 29.20% populations are pre-hypertensive.

**Table 4: Distribution of Pre-Diabetes and Diabetes among employees (n = 750)**

<table>
<thead>
<tr>
<th>Age Group (Yrs)</th>
<th>Diabetes %</th>
<th>IFG %</th>
<th>IGT %</th>
<th>IFG+IGT %</th>
<th>Normal %</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>39</td>
</tr>
<tr>
<td>25-29</td>
<td>0</td>
<td>2.03</td>
<td>4.84</td>
<td>2.35</td>
<td>100.00</td>
<td>39</td>
</tr>
<tr>
<td>30-34</td>
<td>13</td>
<td>8.55</td>
<td>5.26</td>
<td>4.61</td>
<td>100.00</td>
<td>39</td>
</tr>
<tr>
<td>35-39</td>
<td>13</td>
<td>8.55</td>
<td>5.26</td>
<td>4.61</td>
<td>100.00</td>
<td>39</td>
</tr>
<tr>
<td>40&amp; above</td>
<td>67</td>
<td>50.38</td>
<td>16.54</td>
<td>12.78</td>
<td>100.00</td>
<td>39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>82</strong></td>
<td><strong>49.3</strong></td>
<td><strong>29</strong></td>
<td><strong>3.87</strong></td>
<td><strong>594</strong></td>
<td><strong>750</strong></td>
</tr>
</tbody>
</table>

The study shows that Diabetes and Pre-Diabetes is maximum in the age group above 40 and above. It is also observed that 10.93% of the populations are Diabetic and 9.87% are Pre-Diabetic.

IFG Impaired Fasting Glucose, IGT-Impaired Glucose Tolerance, IFG+ IGT-Both IFG+IGT

**This study also shows that:**

- Dyslipidemia is maximum in the age group 40 & above. It is also observed that 17.9% of the populations are having Dyslipidemia.
- Metabolic Syndrome (including Diabetes) is maximum in the age group 40 & above. It is also observed that 19.6% of the population is having Metabolic Syndrome (including Diabetes). Metabolic Syndrome (excluding Diabetes) is maximum in the age group 40 & above. It is also observed that 19.6% of the populations are having Metabolic Syndrome (excluding Diabetes).
- Coronary Artery Diseases is maximum in the age group 40 & above.
- Obesity among female (21.26%) is more than Obesity among male (12.90%)
- Hypertension among male (14.31%) is more than among female 8.27%
- Pre-Diabetes and Diabetes is more in Male (10.89% & 12.30%) than Female (7.87% & 8.27%).
- Dyslipidemia is slightly more in female (18.5%) than male (17.54%)
- Metabolic Syndrome (including Diabetes) is slightly more in male (8.67%) than Female (7.48%)
- Obesity is more in married (17.38%) than in single (10.94%).
- Hypertension is more in Married (14.87%) than in Single (4.69%)
- Diabetes is more in Married (14.7%) than in Single (0%)
- Dyslipidemia is more (23.30%) in Married than Single (2.08%)
- Metabolic Syndrome (without Diabetes) is high in Married (10.57%) than in Single (1.56%)
- Obesity is high in Top Level (40%) in comparison to Mid Level (15.4%) and First Level (6.9%)
- Hypertension is high in Top Level (15.2%) of Employment in comparison to Mid Level (13.6%) and First Level (9.4%)
- Diabetes in high in Top level (14.3%) in comparison to Mid Level (11.4%) or First Level (9.1%) employment
- Dyslipidemia is high in To Level (21.9%) in comparison to Mid Level (19.8%) and First Level (13.8%)
- Metabolic Syndrome (including Diabetes) is high in Top level (19%) and Mid level (18.2%) of employment in comparison to First level (15.9%) of employment
- Metabolic Syndrome (excluding Diabetes) is high in Top level (9.5%) and Mid Level (9.2%) in comparison to First Level (6.5%) of employment.
Table 5: Distribution of modifiable risk factors of NCDs

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>164</td>
<td>33.06</td>
<td>9</td>
<td>3.54</td>
<td>173</td>
<td>23.07</td>
</tr>
<tr>
<td>Use of Smokeless tobacco</td>
<td>119</td>
<td>23.99</td>
<td>19</td>
<td>7.48</td>
<td>138</td>
<td>18.40</td>
</tr>
<tr>
<td>Alcohol</td>
<td>129</td>
<td>26.01</td>
<td>3</td>
<td>1.18</td>
<td>132</td>
<td>17.60</td>
</tr>
<tr>
<td>Unhealthy Diet</td>
<td>447</td>
<td>90.12</td>
<td>241</td>
<td>94.88</td>
<td>688</td>
<td>91.73</td>
</tr>
<tr>
<td>Low Physical Activity</td>
<td>13</td>
<td>2.62</td>
<td>25</td>
<td>9.84</td>
<td>38</td>
<td>5.07</td>
</tr>
<tr>
<td>High BMI ≥ 25Kg/M2</td>
<td>227</td>
<td>45.77</td>
<td>154</td>
<td>60.63</td>
<td>381</td>
<td>50.80</td>
</tr>
<tr>
<td>Abdominal obesity (WC ≥90cm in males and ≥80cm in females)</td>
<td>235</td>
<td>47.38</td>
<td>176</td>
<td>69.29</td>
<td>411</td>
<td>54.80</td>
</tr>
<tr>
<td>Raised blood pressure (≥120/80 mmHg)</td>
<td>236</td>
<td>47.58</td>
<td>75</td>
<td>29.53</td>
<td>311</td>
<td>41.47</td>
</tr>
<tr>
<td>Raised blood sugar (Fasting ≥110 mg/dl and or PP ≥ 140 mg/dl)</td>
<td>115</td>
<td>23.19</td>
<td>41</td>
<td>16.14</td>
<td>156</td>
<td>20.80</td>
</tr>
</tbody>
</table>

**Conclusion**

Obesity, Hypertension, Diabetes and Metabolic syndrome are predominant among the employees in the age group of 35 and above. Risk factors such as smoking, smokeless tobacco, alcohol are more in male whereas unhealthy diet, low physical activity, Dyslipidemia, high BMI, abdominal obesity are more in female. Obesity, Hypertension, Diabetes, Dyslipidemia, Metabolic Syndrome are more in Top level and Mid level management in comparison to First Level management. There is an urgent need of health awareness and health promotion activities at employee level with special focus on health diet, physical activities and behavioural risk factors. At airport level there is a need of creating an environment that promotes the adoption of positive health behaviour.

**Conflict of Interest:** Nil

**Source of Funding:** Own

**Ethical Clearance:** Approval has been obtained from the ethics committee of All India Institute of Hygiene & Public Health, Kolkata.

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Verbal Autopsy: An Adjunct to Medico-Legal Autopsy

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Abstract

Introduction: Verbal autopsy is a method, used to ascertain the cause of death based on an interview with caregivers or family members. In India, first autopsy was performed by Edward Buckley on 10ᵗʰ August 1714 in Madras.

Material and Method: A thorough study was made from the available online resources and books.

Result: It is worth mentioning that in spite of the advancements and developments in this field, still the users thrive on old standards and are unaware of the newer method of autopsy.

Conclusion: In cases, where the corpse is not available, Verbal autopsy is the only way of ascertaining the cause of death.

Keywords: VA-Verbal Autopsy, Cods-Causes of Death, Low and Middle Income Countries (LMICS), Civil Registration and Vital Statistics (CRVS).

Introduction

Autopsy, also known as necropsy, refers to the examination of the dead body, and with a view to primarily searching the cause of death. It refers to the systematic examination of a dead person for medical, legal, and/or scientific purposes. [1]

Autopsy is of three types:

Academic autopsy: Dissection carried by students of anatomy.

Medico-legal autopsy: It is done when some legal issue is involved (homicide, accident, suicide any other suspicious death). In India it is conducted by any registered medical practitioner, on the request of the investigating officer. Seeking permission of relatives is not required.

Hospital autopsy: It is done for academic purposes, research. No legal issue is involved. Permission of relatives is required.[1][2]

Besides, some other forms of autopsy are:

Virtopsy, combination of ‘virtual’ and ‘autopsy’ is a bloodless and minimal invasive procedure to examine a body for cause of death. It utilizes imaging techniques, photogrammetry and 3-D optical measuring techniques to get a reliable, accurate geometric presentation of all findings, the body surface as well as interior.

Endoscopic autopsy: It is also known as keyhole autopsy. Organs are seen through endoscopes and laparoscopes. It is conventional form of Autopsy performed for religious or other reasons. It has proven to be more rapid than conventional autopsy and left the body virtually intact.

Needle autopsy-a biopsy needle is used to take the samples of tissues and examined microscopically.
only. Virtopsy, endoscopic autopsy and needle autopsy are examples of limited autopsy (anything less than a complete autopsy).

**Psychological autopsy**: It is an investigative procedure of reconstructing a person’s state of mind prior to death. This is based upon information gathered from personal documents, police and medical records and interviews with survivors of the deceased-families, friends and others who had contact with the person.

**Verbal autopsy**: It is a protocolled procedure that allows the classification of the causes of death through analysis of data derived from structured interviewers with the family, friends and caregivers.

**Aims of Autopsy:**

- Identification of the deceased in case of decomposed, burnt, mutilated or an unidentified body.
- Cause of death, whether natural or unnatural and to interpret the significance and effect of the disease present in the case of natural death.
- Approximate time of death, mode of death, age of injuries and place of death.
- Ascertaining manner of death, poison or weapons responsible for death, extent of injuries present, any treatment received by the deceased before death.[1]

Verbal autopsy is a method, used to ascertain the cause of a death based on an interview with caregivers or family members. Information is elicited on the basis of prepared questionnaire. For building the basis of health policy, the causes of mortality prove to be of prime importance. In this regards, its planning, monitoring and evaluation of data as well as its reliability is of prime importance. Verbal Autopsy is a milestone in settings, where the majority of deaths occur at residence or away from clinical set ups or health systems. At places, where civil registration systems do not function, there is a little chance that deaths occurring away from health services will be available assuring the cause of death. In such cases, Verbal Autopsy remains of prime importance in obtaining a directional estimation of mortality at a community or population level.[7]

**Material and Method**

A thorough search related to Autopsy and Verbal Autopsy was done from various sources including online resources, various journals, and books including this topic and WHO Verbal Autopsy standards and ICDs. A thorough interviewing of police personnel (I.O.), relative of the deceased and the inquest papers were properly reviewed and incorporated in this study.

**Result and Discussion**

**History**: Egyptians in 300 BC, used to practice the removal and examination of internal organs of humans. Notable Greek autopsists were Galen, Erasistrates and Herophilus of Chalcedon.

The history of verbal autopsy is rooted deep before 19th century, in Europe, when designated death searchers used to visit the households of deceased in order to assess the nature of deaths. Systematic interviews were then used to determine the cause of death as an alternative in Asia and Africa in 1950s and 1960s and it was termed as Verbal Autopsy by workers at Narangwal project in India.

The interest of WHO in verbal autopsy of health data was first demonstrated in a publication by Dr. Yves Biraud in 1956. During the 1970s, WHO encouraged the use of lay reporting of health information by people with no medical information, leading to development in 1975 of lay reporting form. Since the late 1970s and 80s when the Reproductive Age Mortality Studies (RAMOS), Matlab and Niakhar questionnaires first emerged,
several other questionnaires have been developed for use in research settings and in national or large-scale regional surveys.

**Aims of Verbal Autopsy:** The main objective of Verbal Autopsy is to describe the cause of death at the community level or population level, where civil registrations and death certification systems are weak and people die without having any connection with the health systems or clinical set-ups. In cases, where the corpse is not available, and ascertaining the cause and manner of death is required, Verbal autopsy is the only way of ascertaining the cause of death.

**Ways of using Verbal Autopsy:** According to Development of Verbal autopsy standards, Verbal Autopsy is mainly used in three ways:

Primary use of verbal autopsy is in the field of research, as a tool. It is applicable in a number of contexts mainly in cases of children or ascertaining the maternal causes of death. It is also applicable in the cases of longitudinal population studies and intervention research programs. It is of prime importance in cases of epidemiological studies.

It has emerged as a source of cause of death statistics to meet the demand for population level estimates. It is used for estimating disease-burden, policy and priority-setting.

The third way of using Verbal autopsy is in the form of data derived from it. It is utilized as a source death statistics.

**Verbal autopsy method:** It can be Physician-certified Verbal Autopsy(PCVA) or Computer-coded Verbal Autopsy(CCVA).

PCVA-involves at least two physicians. It takes into account each record, followed by consensus review or by a third physician.

CCVA—there has been an increasing use of verbal autopsy by this method. It improves consistency and comparability. It also adds up to inter-observer agreement. The worth mentioning here is that it is faster and cheaper.

**Questionnaires:** It should utilize all available information. Query is made from police personnel about the crime scene, if a visit to crime-scene has been made. Also, the inquest papers are thoroughly scrutinized. Query should include the hospital and health records. The packets of old medicines should be taken into account. Listing some of the causes occurring frequently and age wise should be mentioned. The questionnaire should vary in cases of neonatal, child, maternal and adult health issues. A number of Questionnaire formats exist. More common are open-ended and High structured Questionnaires. Open-handed questionnaires focus on time sequence, severity and duration of symptoms while High structured questionnaires. Highly ended questionnaires include what is not salient to the respondent.

**Challenges:** At places having consistent medical records, health records are better used for the purpose. There have been some attempts to publish, document and advocate for standardized approaches to cause of death assignment. The limitations lies attributed to the facts like lack of standard data collection and thus cause of death attribution. Also, the improper tabulation leads to improper comparisons, making the things more complex. One of such factors is reliability of data which is constrained by lack of public availability of data. Further, the selection of small and non-representative samples affects the analysis. Above all these factors, lack of appropriate validation is a big hurdle in the assessment procedure.

Once captured, Verbal autopsy data should be interpreted and processed to mimic as close as possible. In international standard death certificates, there is a demand of a single underlying cause of death. In multiethnic populations, conducting Verbal Autopsy gives rise to linguistic and conceptual challenges. Also, identification of appropriate respondents is needed to be standardized. They should be close relatives, possibly present at the time of death.

**Need for standardization:** According to Applying ICD-10 to verbal autopsy, it is worth noticing that in spite of the advancements and developments in this field, still the users thrive on old standards and are unaware of the new method. The reason behind this lies in coordination gap between the users and the developers of the program. First and second generation questionnaires have been developed and stresses upon the need of researchers. Emphasis has been laid upon the type of questions needed to be put for the purpose. There are some factors acting behind the lack of standardization. The foremost factor lies in the costs of verbal autopsy. The method is easily adoptable if affordable. The other factor is
the complexity of verbal autopsy validation. Complex processes are not easily understandable and thus not easily adoptable. One such factor adding to the cause is the scarcity of comparative studies and its validation in multiple countries. Cannibalizing from previous forms is also a factor.

The WHO Verbal Autopsy standards: It has been designed for routine use. Compared to the previous standards of 2007, number of questions has been reduced. Questions have been reformed to suit the simple Yes-No question.

It includes all age groups, maternal and perinatal deaths and also death caused by injuries. It is intended to allow for simple and inexpensive identification of causes of death in places where no other routine system is in place and will serve the needs of countries’ civil registration and vital statistics (CRVS). In recent years, there has been growing interest in strengthening countries’ CRVS systems leading to demand for a more simplified and practical Verbal Autopsy instrument associated with IT applications for data collection and analysis.

The WHO Verbal Autopsy instrument has been designed for software use. It has a skip pattern embedded that takes into account all the age groups and special cases in one big questionnaire. Sample questionnaires are provided for three age groups (under four weeks, four weeks to fourteen years, fifteen years and above). The notes for translators and interviewers along with unique variable identifiers enable the translation of the instrument in the desired language. Software for interpreting verbal autopsy indicators into causes of death without the use of physician can be used in majority of cases.

Deriving causes of death from Verbal autopsy data: According to Verbal Autopsy : Method in Transition, by Fottrell E, Byass P, ascertaining cause of death at the interview stage itself has a poor validity as the information is yet to be elicited. Diagnosis is to be made at later stage by using one of the four method of interpretation: physician review without algorithmic diagnostic criteria, physician review using algorithms, computer algorithms the most recent probabilistic approaches.

Physician review-Questionnaires’ analysis by two physicians is customary as it requires subjectivity and judgement. In the case of disagreement, additional review is required and a consensus diagnosis is given. Physician review using Algorithms-These approaches are based on labeling the process of physicians review into standardized rules.

Computer algorithms-These are closely linked to the questionnaire design and field procedures. Algorithms can be developed from textbook descriptions, existing clinical algorithms, local experience or a combination of all the three.

Probabilistic approaches-Automated method applying probability and reasoning result in a range of simultaneous outcomes in contrast to algorithmic method assessing the presence or absence of a single cause.

Factors Affecting Verbal autopsy: The verbal autopsy is the outcome of thorough questionnaires. It is influenced by educational background and gender of interviewers. Proper questions need to be put for ascertaining the cause of death, which requires an elaborate knowledge of things. Any one new in the field or not well educated can’t take it properly when it comes to what is to be asked? The gender affects in a way of asking questions relevant to the gender of the interviewer. Well-trained lay men can obtain accurate information. The ultimate option of this is assigning medically trained interviewers or health professionals. A number of interviewers can be assigned but this can lead to controversies. So, in cases more than one interviewer is assigned, it is ensured that they belong to same ethnic groups as respondents in order match the words corresponding to the disease.

Validity: The validity of Verbal autopsy is attributed to a number of factors. Depending on the questions asked, respondents chosen, and the field procedures taken, VA varies. It is also affected by cause of deaths assigned by the physician. For quality studies, only those studies are included which fit our eligibility criteria. It further improves comparability of the data. It needs to be taken care of while conducting VA, that its validity thrives on questions asked. So, only studies using most validated questionnaires are eligible for it. These include a number of VA questionnaires developed: VA tools, INDEPTH, London School of Hygiene and Tropical Medicine VA, Sample Vital Registration with Verbal Autopsy. Other such tools are Routine, Reliable, Representative and Resampled Household Investigation of Mortality with Medical Evaluations (MDS) or questionnaires used in the mortality surveillance system of Tanzania and
These tools were developed under the guidelines of WHO review meeting on formulation of standard guidelines for its Verbal Autopsy tools. Second thing is that Physician Certified Verbal Autopsy coding must have been specifically carried out by Physicians himself, not other health professionals.

It necessitates the standardization of all the approaches to verbal autopsy. The methodologies are still evolving. Removing human bias is also a necessary factor for ensuring better results. It can be achieved by emphasizing on questionnaires and statistical analysis. In order to make the data better utilized by those producing it, and those utilizing it, it becomes necessary to use the standardized data..

Conclusion

Still there are questions about the accuracy of Verbal Autopsy. In countries, where inadequate registration systems are there, the accuracy of verbal autopsy means a lot. It is necessary to mention that research and development in data collection has been focused upon and has developed a lot, but the whole effort is futile without standardization of further steps. This is because variation in cause of death and proportionate mortality pattern still exists.

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References

Pitiable and Painful Life of Indian Call Girls

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Abstract

The history of prostitution is not new. It is one of the oldest known professions. Vedas, the most ancient literature have reference of organised and established institution of prostitution., millions of Indian Citizens are bound to live their lives devoid even of fundamental and constitutional rights of living. The Immoral Traffic (Suppression) Act passed in 1956 defines the base of sex workers’ status and was passed in 1956. The remedy does not lie in its legalisation alone or criminalisation or decriminalisation.

Keywords: Prostitution, Call-girls, Trafficking, Abduction, Incest.

Introduction

We as human beings just Love to Judge. We live in a society that judges people by their profession. And, when the focal point of judgments gets centred on any Woman, then our notions become even more brutal. If a girl is comfortable in talking to only a single person of opposite sex, then she is assumed to be having physical intimacy with the same person; and if a girl is comfortable with every person of opposite sex, then our society doesn’t even bat a lid to type-cast her as a slut, whore and what not!!![1] The history of prostitution is not new. It is one of the oldest known professions. Vedas, the most ancient literature have reference of organised and established institution of prostitution. The references of celestial demigods referred as Menka, Rambha, Urvashi and Thilothamma is also available. Accomplished in the art of music and dance, they were known for their unsurpassed beauty and perfect embodiments in the court of Hindu God Indra.[2]

Hindu mythology mark the culture of Devdasis, the girls married to the temple deity, and employed as goods of amusement for the priests and rich class of the society. In the Mughal era, prostitution was a recognised profession and flourished under royal patronage, except the reign of Aurangzeb. Tawaif became popular during this period. With the downfall of the Mughals, they were bound to get out and recourse to this profession as they were not skilled in any profession and the society had no job opportunities for them.

During British rule, the Indian classical dance form was taken as “prostitute dance”. The “mujras” at kothas were also of the same class and the thumri form of local song was associated with court courtesans and prostitutes.[3]

The first known registration of prostitutes took place in Rome. They were taxed and the earnings contributed to city coffers. In the fifth century BC, with the spark of Pndora’s box women were associated with evil, worsening the condition of prostitutes. Sex began being considered as “fall of humankind”. Sexual enjoyment started being considered as a way towards hell and Men started blaming women for their own desires.[4]

The religious aspect: Prostitution is an extension of the concept of reciprocity, whereby certain women become public property and their sexuality is used by more than one man. Prostitutes may be found in every strata of ancient society, regardless of religion. In general, prostitutes were accepted as a part of the society. Since time immemorial the sexual freedom has been fantasized but in public the presence of such females has been decried. [4]
Social aspect: Women who have had sexual experience earlier are treated as “used goods”. They are considered as a commodity in the society. The existence of a woman without her husband is nothing and so the widowed and divorced women have a social stigma of being “used goods”. They are not acceptable as a spouse, except few who face a lot in doing so but are on the verge of being tried for “services”.\(^2\)

The legal perspective: According to Indian penal code, acts of soliciting such services at public places, carrying out such activities in hotels, kerb crawling, pandering, being an owner of a brothel or even running one such, pimping are contraventions of the law. Here what needs to be pondered upon is that the above mentioned things are indifferent from prostitution itself. Merely out casting these things won’t make much difference.\(^5\)

The Flip Side: In striking contrast to what elaborated above, there are also a plenty of cases when females coming from a relatively better background turn out as Call Girls. Though, their circumstances might not have forced them into prostitution but again, who are we to question their choices and their chosen way of living per se. More so, why don’t we question the people who take their services in the first place. In the times we are living, ogling at girls and passing crass comments is a normality for males in cities, towns and even villages in general. Not only this, at many workplaces and offices, very often women employees are forced to sleep their way up to the ladders of success. These are some silent truths which are known by all, but acknowledged by few. Truth is not always pleasant. It is somewhat a bitter pill which we fail to engulf unless we are forced to. Similar is the case of Call Girls too. If we are not questioning their market, we don’t have a right to point fingers at them. Instead of beating the stick at problems, we should rather focus on removal of their causes. Striving for a society having a genuine respect for women may be the actual solution for resolving this problem in hand.\(^6\)

According Human Rights survey, most of the prostitutes in Mumbai are indentured from Nepal, at a tender age between 10-20 years. They are not what they are by their choice. Girls in the profession are mostly from low socio-economic background and lower educational status. Teenage girls turn towards this profession in a need of money to feed their starved stomach, get out of a debt of family or husband. One-third of the prostitutes are there in the profession because of poverty and more than a fourth due to marital problems. Sometimes they are forced into the profession by gang members and sometimes by false promises of job and employment and love-betrayals.\(^3\)

The flesh trade goes on in almost every city and society with Mumbai and Kolkata being the hotspots. In Mumbai, commercial sex district is actually two interconnected neighbourhoods in the South-Central part of the city, approximately three kilometres from the city, between the immense Muslim and Hindu slums. The city inhabits more than 2 lakh female sex workers and is known to be Asia’s largest sex bazaar. Kolkata inhabits more than 50,000 prostitutes in the red light areas. Of these, the largest Sonagachhi is run by landlords, pimps and madams.\(^3\)

They say they are addicted to the things happening to them, but psychology says that we get addicted to the things which give us pleasure and satisfaction, but if it remains a mechanical process it can’t make the things enjoyable.

Those involved in the profession get older earlier. With time there are changes in the body, gain in weight, vaginal infections with an equal chance of uterine infection and AIDS. Such burdens make the girls matured both physically and mentally before time. Hiding things from friends and family along with a compulsion to do it make them suffer from depression.\(^7\)

The things go more pathetic because the clients who find a way out in those girls do not pay any heed to the girls and their situations, they are least interested in getting involved into the things. Merely talking with them can make the things a bit comfortable but they are in a hurry to do for what they are there and get out of the place.\(^8\)

In addition to this, the most alarming is the child prostitution. According to data, one of the five sex-workers in Mumbai are under age 18 and the problem has been ignored by the government. Sex-workers of this tender age are auctioned and wealthy Arabs compete with wealthy Indian males and others in the same. Since, the virgins are far away from AIDS and other STDs, they bring a huge amount in bidding.\(^9\)

Nobody is born as a “CALL GIRL”, but the human beings make them call girls, because they are unsatisfied by their own wives or other matters of their life and most pathetic and painful thing is that sometimes parents push
their daughter into such a society only because this is the easiest way of earning money.[10]

Material and Method

A thorough search related to Prostitution and Call-Girls was done from various sources including online resources various journals, books available on this topic and various acts passed by parliament of India one of them is the Immoral Traffic (Suppression) Act passed in 1956.

Result & Discussion

Prevalence of Prostitution

History: India is one of the oldest countries having the history of prostitution.

Vedas, the earliest known Indian literature refer prostitution as an established institution. In the Hindu mythology, Menka, Rambha, Urvashi were prominent names in the court of Indradev and were known for their unsurpassed beauty and accomplishment in the field of music and dance. In the period of Aryans, well accomplished maiden were presented as token of friendship and is marked by good position of the clan. Vishkanyas were one of the kind in this field fed on poisons from infancy and used to kill the enemies of king using their beauty. The period of Pandavas and Kauravas also has a reference of prostitutes. Kautilya’s Arthshastra defines concubines and rules made during the time for prostitutes. Kamasutra by Vatsyayan also gives an account of prostitutes and their prototypes.

The third century AD witnesses religious belief of attaching girls to temples, who were known as Devdasis in South India and Mukhies in North India. They used to offer prayers to the temple God by their dance, but later on due to immorality of priests they were forced into prostitution. The Mughal era gave a great importance to women and wine and except Aurangzeb, the period shows the flourish of this profession. The words “Tawaif” and “Mujra” became popular and were associated with performing arts. After downfall of Mughal kingdom, the prostitutes in harem of the kings came out of the royal palaces and took to the same profession again as they were not skilled in any other profession and the society had no employment opportunities for them. The British rule did not show any improvement in the status of women, rather it worsened.

Sometimes the flesh-trade is used as a source of money by female folk entertainers. Qalanders and Kanjars are few in this category.

Prostitution as a tradition: In India there are places, where prostitution is the only source of income and the entire family supports in the same. One such place is Wadia in Gujrat, where men use to find suitors for women. Natpurwa in Uttar Pradesh is inhabited mainly by people of Nat caste. They have a 400 year old tradition of Devdasis, marrying young girls to Goddess Yellamma who are forced into the prostitution for rest of their lives. Karnataka also has a tradition of Devdasis at some places. In Bachara tribe of Madhya Pradesh, the eldest most girl of the family is forced into prostitution.

The religious belief: Indian men believe that having sex with a virgin will make them invulnerable to disease. Some believe that that having sex with Indian boys will make them more potent and reduce the risk of Sexually Transmitted Diseases.

Prostitution in Mumbai: Commercially this trade in the city has its hotspot in South-central part of the city, between slums of Hindus and Muslims. On the Faulkland road, lying at the centre of the city’s red light district, women are displayed in 4*6 windows called the pinjara.

The youngest and prettiest girls are displayed at places where they are most visible and can seek the attention of clients, who are mainly there for easy sex. The trade operates in four separate harmonious crime groups, each employed for a particular job. One group controls Police buys off, second controls money lending, the third maintains the districts’ internal law and order. The fourth and the most powerful group manage the procurement of women in vast network.

Prostitution in Kolkata: The brothels of Sonagachhi are run by powerful pimps and landlords. Some of the prostitutes work in the districts’ 362 brothels while the rest walk the streets. About 40,000 customers visit the district every day, which means the average prostitute there services five to six customers a day.

Child prostitution in India: India accounts for about half a million Children prostitutes in brothels. They too suffer from HIV or AIDS. They are victims of run away or child abuse. Some have been sold, abducted or enticed by gifts. Most of these come from Bangladesh and Nepal and provided for clients abroad, mostly in the middle East. Sex tourism is quite common and normal
on the beaches of Goa, Koyalam, Puducherry and Puri, perhaps as a result of decrease in the same in Thailand and Phillipines because of which pedophiles from Europe, Japan and USA turn to India.

**Types of prostitutes**

On the basis of execution, prostitutes are:

- Brothel prostitutes—Operate in brothels, owned by ex-prostitutes and get commission in lieu of the services.
- Call girls—operate generally independently, from her place, may solicit customers through a middle man.
- Street prostitutes—They solicit customers in streets and take them to an assigned place.
- Other types—some forms of prostitution also goes in dance bars, massage parlours, dance clubs, amusement centres.

**Prostitution abroad:** In poor countries like Nepal, this trade of flesh is quite common source of income. About half the prostitutes in Mumbai are Nepalese. India has a strange legal stance when it comes to sex work. We don’t have a progressive system like New Zealand, Austria, Denmark, Ecuador, Germany etc. where sex work is legal. These places have legal brothels and in most of these countries, the workers are provided with health insurance, they have to pay taxes and even receive social benefits. But in India, there is also no blanket ban on sex work like Iran, Afghanistan, Norway, Iceland and Northern Ireland etc.

**The Legislation:** Having said that, existence of some of the Asia’s largest red-light districts in Kolkata, Delhi and Mumbai is also a fact that none can deny. Then, where is the law and where are its implementers? Just because of shear flimsiness of legislation across the sex-workers, millions of Indian Citizens are bound to live their lives devoid even of fundamental and constitutional rights of living. They are left unprotected by the law and this further leads to their exploitation. All this happens because *We as a Society,* have accepted them to be immoral for their ‘choices of lives’ and assumed with our intellectual thinking that immoral should never have rights to voice against exploitation of any nature, and torture of any magnitude.

**Laws related to prostitution in India:** The Immoral Traffic(Suppression) Act passed in 1956 defines the base of sex workers’ status and was passed in 1956. The law says that the prostitutes are allowed to ply their trade in private, but not in open. Indian laws do not consider sex in exchange of money as illegal, but this trade is to be restricted within the boundary wall at distance of 200 yards of a public place.

Immoral traffic prevention act, passed in 1986 is an amendment of The Immoral Traffic(Suppression) Act. According to this law, the call girls are restricted from sharing their phone number in public will be arrested for soliciting their services or for seducing in public. Clients consorting with prostitute within 200 yards of a designated area can be imprisoned for a maximum of 3 months along with financial penalties. If someone involved in such activities is below 18 years, imprisonment of 7-10 years can be conferred. Also the landlords, housekeepers and those living with pimps are liable to be punished if fail to disprove their guilt.

**Legalising prostitution in India:** The problem seems to be inevitable because it’s next to impossible to bring a sudden pause. Legalising prostitution can be a respite to sex and child trafficking. Other things added to this will be protection of women and their rights in this field. The legalisation can provide a protection from criminals and blackmailers who in the name of keeping it a secret exploit them. Also the lawkeepers will no more be able to threaten them for exposing them. There can be a track record of sex-workers, the kind of health issues with them and health services can be made accessible to them. The foremost expectation be an alleviation in the incidences of rape, incest and similar incidences as such desires can be fulfilled with easy access to an assigned place.

**Possible solutions:** The problem has its roots deeply fabricated into the society itself. But when it comes to alleviating the plight of those in the field, it can be done by both preventing the new add ups to the profession and also rehabilitating those already there.

Preventive efforts can prove beneficial as there will be a check to the new addition to this clan. This can be done by creating awareness about the long term consequences of this field. Proper guidance and counselling can be fruitful in this regard. The abduction /abuse related to girl especially should be given prime importance and follow-ups. In order to make the community an active part of such programmes, NGOs should be promoted. The blossoming lives in the brothels should be taken out and proper grooming and education should be ensured.
in order to shape them in a way different from their mothers.

Rehabilitative-to bring a pause to prostitution, rehabilitation is needed to be ensured, both physically and psychologically. Physical rehabilitation can be achieved by taking them out to new habitats away from brothels. Protecting them from the torture and threatening of dalals and brokers should be ensured in order to make them stress free and relieved. Making them aware about their legal rights can imbibe positivity in them. Similarly, ensuring the financial security by engaging them in suitable jobs or small-scale industries can do the needful.

**NGOs working for sex-workers**

Shakti Vahini-Dehi

AAWC-Apne Aap Women Collective, Kamthipura, Mumbai

Indian Women Welfare Foundation, Faridabad

Prajwala, South India

Prerana Anti-trafficking, Mumbai

Katkatha, New Delhi

Pahal welfare society, New Delhi

In Calcutta prostitutes have formed a union-like organizations—the Durbar Mahila Samanvaya Committee (DMSC), or Committee for the Coordination of Unstoppable Women—to fight for their rights.

Recent researches highlight that more than 3 million sex workers are currently operating in our country. More concerning is the fact that majority of them belong to the age group of 15-30 years. A common statistic puts the number of girls and women currently indentured from Nepal into India at 200,000, with approximately 3,000 girls being trafficked out of the country each year, with 20 percent of prostitutes in the country being younger than 16 years old.

**Conclusion**

Many a times, the solution to a problem lies alongside the problem itself. It goes without saying that, Sex-Trading is a reality in India. Time is high we free ourselves from the cage of self-righteous cocoons. While on one hand we should definitely work on strengthening the legal framework related to sex-workers, but at the same time we should never shy from working towards creating a healthier environment at large, where women are not treated as prey for pity satisfactions of intimate fantasies of a male-dominant society; they are subjected to dignity and respect from one and all instead.

Ultimately, it would be better to say that no specific remedy is required for the problem for prostitution in India. The remedy does not lie in its legalisation alone or criminalisation or decriminalisation. The situations force her to be what she is or she chooses it by her choice—it’s only one face of the coin, the other side being a bitter truth that they do exist because of a clan of society, who find their amusement and happiness in them and find them a way to get out of their solitude in the dark, but never forget to point them out in the light.

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Healthy Diet and Literature: Representation of Children’s Food in Enid Blyton Stories

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Abstract

Food, an indispensable part of children’s lives and subsequently children’s literature, provides multifaceted dimensions to a narrative. The paper tries to explore the introduction of a healthy western cuisine to the Indian audience through the books of Enid Blyton. As many have noted, Enid Blyton in her books provide a rather healthy diet and also manages to make it appealing to the children. Her characters do not gorge themselves on junk food, but eat balanced, nutritious food. This multidisciplinary dialogue between literature and health shapes the perceptions of the young generation towards a healthier lifestyle. Enid spelt backwards is dine, a happy coincidence to generations upon generations who grew up reading Blyton’s stories. Her books, with an enduring appeal that reigns the bookshelves, is subtly centered around cultural caricatures through culinary delights irrespective of the story. An a la carte of high teas, picnic lunches and midnight feasts-commonplace in the Enid Blyton menu-vivified tastefully, result in traditional British cuisine being synonymous with fine dining. Thus, the food becomes an aspirational motif to young readers, who are attracted to not just the imperial culinary traditions, but also to the British lifestyle, of which the delicious food is only a subset. The paper explores this interplay between food and the literature, paying careful attention to how a healthy diet is prioritised in Blyton’s stories.

Keywords: Food, Health, Enid Blyton, Children’s novels, Diet.

Introduction

“You cannot have adventures on an empty stomach”, reasons Dick, one of the characters in the Blyton Adventure Series. Wendy R. Katz, one of the pioneers in connecting food to children’s literature, in her article “Some Uses of Food in Children’s Literature” argues that “children’s literature is filled with food-related images, notions, and values” because if one “understand[s] the relations between the child and food… [one] understand[s] the workings of the world of the young.” In the Blyton books that range from bedtime tales to school life adventures, food is an indispensable entity. Yet it blends so beautifully with the narrative and does not stand out in any way. It normalizes the world of children’s literature. It is an aspect familiar to children from the time they are born. The characters having food serves as a connector from the reader to the character, a habit that is shared. A normal child cannot expect to go on a picnic and find an adventure awaiting them like the Famous Five characters. The books are colourfully and deliciously packaged as a realistic fantasy to the young audience for whom the real elements of food balance out the unreal.

Materials and Method

This paper attempts a textual analysis of the Blyton books and the various articles that have come up based on them. The main focus here is on the depiction of food in these highly influential children’s stories in which the kids are introduced to healthy western food choices rather than pizza or burgers. An effort is made to look at the successful interplay of literature with food leading to a more effective impact on generations of readers.

Food in Blyton’s Stories: In the introduction to their anthology Critical Approaches to Food in Children’s Literature, Kara Keeling and Scott Pollard argue that if food is fundamental to life and a substance upon which civilizations and cultures have built themselves, then food is also fundamental to the imagination and the imaginary arts. Few authors have ever had as much of a tryst with food in their writings the way Blyton has. Adventures have begun and culminated with feasts.
Picnics have centered around them. School lives were enriched by them. Breakasts, dinners and suppers have dotted the days of our favourite childhood characters incessantly. Even the most common plant in the Enid Blyton stories-honeysuckle-resonates a joyous, jolly and distinctly “foodish” vibe.

Jane Brockett, an acclaimed wine taster and author of “The Gentle Art of Domesticity” ranked the Enid Blyton Picnic as her favourite “food scene” in Children’s Literature only behind the tea party in Elizabeth Gouge’s The Little White House. The very fact that a critic had to resort to multiple occasions rather than a standalone one to describe the sheer delicacy of her writing—if I may put it so-vindicated her standing as a harbinger of infectious happiness in children’s literature. Brockett writes “Tomato sandwiches, lemonade, tinned sardines, melt-in-the-mouth shortbread, lettuces, radishes, Nestlé milk, ginger beer, tins of pineapple chunks, squares of chocolate. The Famous Five set a standard in picnics that has never been equalled”.

In that first book, a simple spread of cold ham, salad, bacon and eggs, plums and a ginger cake fuelled the discovery of gold ingots on Kirrin Island. But over the years, as the five go off in a caravan, or camping on Billycock Hill, the author has discovered the importance of food in recounting a good yarn. The Blyton Menu is never complicated. Blyton, the crafty camouflager mixes food just the right amount. She starts her acclaimed St. Clare’s series like this: “One sunny summer afternoon four girls sat on the grass by a tenths-court, drinking lemonade.” This gives a refreshing imagery as opposed to the tiredness after the game. This is where Blyton sells her food. She uses something as simple as lemonade to make summer and games look fresh.

Blyton is an imaginative dramatic realist. She does not bring in the supernatural in all her stories and yet sends the children on unrealistic adventurous trips. Yet, in the end she preaches the values of friendship, sharing and humility. All good characters get together and share food in her stories, be it the sharing the food trunk in St Clare’s and Malory Towers or the picnic lunches in the Adventure series. We often see snobbish characters refusing to share their food but reforming themselves in the end by sharing their portion rather generously. The secret meetings of the ‘Secret Seven’ is never complete without their secret password and delicious home-made snacks.

In this passage from the fifth book of the Famous Five series, *Five go off in a caravan* the blend of food with her writing is clear. Soon they were all sitting on the rocky ledge, which was still warm, watching the sun go down into the lake. It was the most beautiful evening, with the lake as blue as a cornflower and the sky flecked with rosy clouds. They held their hard-boiled eggs in one hand and a piece of bread and butter in the other, munching happily. There was a dish of salt for everyone to dip their eggs into. Wordsworthian nature is infused with the Blytonic food making it a perfect sensory delight. The elaborate descriptions of nature require food to sell it to the children.

In Lewis Carroll’s *Alice’s Adventures in Wonderland*, C.S. Lewis’ *The Lion, the Witch, and the Wardrobe*, Roald Dahl’s *Charlie and the Chocolate Factory*, and Neil Gaiman’s *Coraline* food is used as temptation for child protagonists, a tool to lure them into doing evil deeds or being generally mischievous. In fact, even the most ancient of literature texts-The Book of Genesis-describes food and the underlying, impending danger lurking beneath the aftermath of its consumption, through the narrative on the Forbidden Fruit. While they use food as modes of temptation, Blyton uses it to normalize and humanize her stories. Even though Blyton herself is no stranger to deploying food as a prescient indicator of mischief or adventure (Sly and Gobbo, the goblins from her hugely popular Noddy stories are repeatedly guilty of stealing ice creams), the overriding joy, innocence and constant whetting of reader appetites mean that they’re mere trivialities in the grand scheme of things as far as her culinary recitals are concerned.

Enid Blyton has made her own lexicography in literature, enjoyed by adults and children alike. She made her own dictionary of the commonest of terms and used her books to define them. Unsurprisingly, food glossary stands out from those pages. She painted her own version of the dream holiday, the perfect school, the happiest families and the exciting adventures and her versions soon became every child’s dream and her, the dream weaver. Action and fighting crimes were no longer restricted to the adult world. Children were invited to be heroes in her world. The refrain “you are too small for this” is non-existent in the Blytonic universe.

Daniel points out that it established in the study of children’s literature that food is a central component in this body of writing as a whole. The boarding schools
like the St Clare’s series and the Malory Tower series has a midnight feast in almost every book. It is shown as a means of bonding among the girls. The Blyton characters are never seen to eat food by themselves. Refusing to share food is looked down upon in schools. The first thought that food brings is sharing. Values are thus transmitted into children through food. Elaborate midnight feasts attended by the whole class is the perfect example of sharing among children. Everyone contributes and has an excellent feast. “I don’t know why food tastes so much nicer in the middle of the night than in the daytime, but it does!...Golly! Pork-pie and chocolate cake, sardines and Nestlé’s milk, chocolate and peppermint creams, tinned pineapple and ginger-beer!” Jammy buns and lemons during match day half times at St Clare’s and Malory Towers paint an image of serenity and delight even amidst the intensity of competition, much like how the elaborate descriptions of culinary delights always juxtapose themselves happily next to hair raising moments of adventure and maddening moments of mystery.

Blyton’s healthy diet: Josh Sutton in a Guardian article5 points out that the characters eat a balanced diet. Despite an abundance of humbugs, toffees and ginger pop, when grouped into the five main food categories (fruit and vegetable; meat and fish; dairy; starchy foods; high fat/sugar foods), no one group outweighs another. This comes naturally to the children rather than by diktat. Sweets are eaten sparingly; hunks of crusty bread are accompanied by handfuls of radishes or fresh fruit.

The elaborate descriptions along with the excitement of the characters increase the appeal of the food much more. The temptation in Blyton is very different from that in Dahl. Blyton offers a healthier and a more positive food image. Food fantasies are seen in realistic fiction, but they are most effective, perhaps, in fantasy literature, where all sorts of foods can be enjoyed, even ones that don’t exist in reality. I argue that food can be enjoyed as much in realistic fiction as in fantasy. While fantasy literature may allow the reader to enjoy even the nonexistent food item, the realistic fiction gives an authenticity to the same making the readers connect to the experience. In Five Go To Billycock Hill, Blyton writes “A large ham sat on the table, and there were crusty loaves of new bread. Crisp lettuces, dewy and cool, and red radishes were side by side in a big glass dish. Great slabs of butter and jugs of creamy milk were there, too, with honey and home-made jam.”10 Carolyn Daniels11 argues that Blyton’s fictional feasts directly reflect the adult Edwardian extravagant cholesterol-laden diet. But, these feasts do not happen every day. While we see children sneaking out and having extravagant food once a term, the food is mostly kept simple and healthy. She also argues that the food fantasies reflect a longing for her mother’s love and emotional satisfaction that was absent during her childhood. She points out that Blyton’s most prolific period of writing took place during the war era when food rationing meant that the majority of the people in England were eating less. Following the outbreak of the World War II, food rationing went on from 1940 to 1954. He argues this as an unrealistic portrayal of the period. But, I argue that realism was not her aim. Blyton was more of an optimist. In between the bleak realities of war she managed to keep her spirits unmarred and always presented a happy story for her devoted young readers.

Influence on India: Food transcends its traditional roles to stand for emotions and adventures that triggers a child’s fascination thus shaping the image of the West both to the Occident and the Orient. For a post-colonial child, Blyton is the window to the world of the west. She shapes the image of the ‘other’ for them. Calling her writing deliberate colonial propaganda would be doing a disservice to the oft overlooked quality that Enid Blyton stories had in oodles-simplicity, joy and refreshing innocence. Take this quote from The Enchanted Wood (The Faraway Tree) for instance. Well, come back and have tea with us,” said Moon-Face. “Silky’s got some Pop Biscuits—and I’ve made some Google Buns. I don’t often make them—and I tell you they’re a treat! Superle12 points out that Blyton’s books have been extremely popular in India. Thus the Indian authors have felt the need to replicate that charm and induce the Indianness into the Blyton loving audience. Food in children’s fiction caters to a feeling of ‘otherness’ in the post-colonial world, leading to creations of Indianized epigones. Michelle Superle calls this phenomena the Indian-“Blytonnade” in her book Contemporary English-Language Indian Children’s Literature. She claims that the Indianness is infused by including Indian settings, names and by the centrality of Indian food. It has been noted that they are worthy replacements of Blyton to the Indian audience but I argue that the Indian audience need to read the original books instead of colonial imitations. Swapna Dutta’s Juneli at St Avila’s is identified as a Malory Towers clone, but starring the Indian characters of Poonam and Harbinder. The kids brought up in India do not need an introduction to India but they will benefit more by an
introduction to a new culture through the simple lens of Blyton. Favouring the books merely because of the overt Indianess will not wave the patriotic banner higher, rather it restricts the comfort zone of a child to a region. Familiarizing the child to both the worlds, I argue, is the best answer to the two choices.

**Conclusion**

Books leave a lasting impression on its readers, especially on young readers. Promoting a healthier lifestyle through books like the way Blyton does may provide effective results. The Blyton characters have a healthy diet despite their abundance. It is to be noted that the characters are never forced to eat. They enjoy the food thus sending across a positive message to the children. Unattainable luxuries like chocolate were rarely part of her menu or kept only during special occasions. Thus, the popularity of these books among generations of readers urges us to look deeper into the appeal offered by these works and the need for interdisciplinary research among various fields like literature and public health. These interdisciplinary aspects which can be used to influence a child’s healthy habits often provide a much wider positive impact.

**Ethical Clearance:** Not required as it is a review article.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References:**

Magnitude of Coexisting Cognitive Impairment and Depression among Elderly in Urban Field Practice Area of Mysuru City, Karnataka

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Abstract

Background: Cognitive impairment (CI) is an important clinical issue among elderly patients with depression and has a more complex etiology. The objective of the present study was to screen a representative sample of adults aged ≥60 years for the prevalence of Cognitive Impairment and Depression.

Method: A Community based Cross-sectional study done among 290 elderly in a declared slum area, Medar’s block, Mysuru city, Karnataka. Standard tools like Mini-Cog questionnaire was used to assess Cognitive Impairment and Geriatric Depression Scale (GDS) to estimate the prevalence of depression.

Results: Among the study participants, 201 (69.3%) belonged to the age group of 60-69 years and most of them belonged to medium Standard of living Index (SLI) 201 (69%). The prevalence of cognitive impairment was 132 (45.5%) and suggestive depression was seen in 141 (48.6%) of the elderly.

Conclusion: There was an association between cognitive impairment and depression which in turn had a significant impact on activities of daily living. Early diagnosis of these problems with appropriate intervention can bring about significant change in the quality of life among the elderly.

Keywords: Cognitive Impairment, Activities of daily living, Depression, Functional Status, Mental health, Elderly.

Introduction

Ageing is a universal process. The demographic transition is attributed to the decreasing fertility and mortality rates due to the availability of better health care services.¹ India’s elderly population in 2011 census contributed to 8.2% of the total population. The proportion of the population aged 60 years and above was 6.7 percent in 1991 and is projected to increase to 20 percent in 2050.² Various dimensions of the health of elderly persons include physical, mental and socio-economic, which at times are interlinked and often one affecting the other.

Improved healthcare promises longevity but social and economic conditions, such as poverty, break up of joint families, and poor services to the elderly, pose a psychiatric threat to them.³ Cognitive impairment mainly affects older people and about two percent of cases start before the age of 65 years. After this, the prevalence doubles every five years.

Dementia is one of the major causes of disability in later life.⁴ Prevalence rates of Mild Cognitive Impairment vary from 3% to 59% with approximately 8–15% cases converting into dementia;⁵ Indian studies have reported the relative proportion of Alzheimer’s disease between 41% and 65% and the proportion of vascular dementia between 22% and 58%.⁶-⁷

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Depression is a common cause of disability in older adults. Among its consequences are reduced life satisfaction and quality, social deprivation, loneliness, increased use of health and home care services, cognitive decline, ADL limitations. In the age group of 60 years and above, residing in various parts of the world revealed that the median prevalence rate of depressive disorders in the world was determined to be 10.3% and among the Indian elderly population was found to be 21.9%. The feeling of loneliness along with the natural age-related decline in the physical and physiological functioning make the elderly more prone to psychological disturbances. Functional dependency is common among elderly people and many will need assistance in their activities of daily living. The physical illnesses have a role of causal or association with psychiatric illness especially with depression and significant or non-significant association with cognitive impairment and depression. Of all the problems associated with an ageing population, health care demands top priority.

Therefore, screening of mental health conditions become necessary in the community which at the next level can be confirmed and managed at Primary Health Care level and/or beyond. Keeping this background in mind, the study was planned to assess Cognition, depression and Activities of daily living (ADL) among elderly persons.

Materials and Method

A Community based cross sectional Study was done over a period of one year. The sample size was calculated based on the Prevalence of Geriatric Depression in urban India of 21.9% and was worked out to be 290. Inclusion criteria were individuals aged 60 yrs and above residing in the study area for more than one year. Exclusion criteria was persons with Stroke and Aphasia, Loss of Hearing and those who were affected by loss of memory. Data collected using Semi-structured Proforma, Socio-demographic information, history of existing Medical Illness. Anthropometric measurements like height, weight were recorded. Blood Pressure recording was done using calibrated digital BP apparatus. Standard tools like Mini-Cog questionnaire, Barthel Index questionnaire and Geriatric Depression Scale (Short Form) used to assess Cognitive Impairment, Activities of daily living and Depression.

The data obtained were analyzed with SPSS 22. The prevalence of cognitive impairment and depression was calculated in percentage. Chi-square test and Independent T-test were applied. Analyses were conducted to look for differences between groups and were expressed as statistically significant at P < 0.05.

Results

In the present study, 201 (69.3%) individuals belonged to the age group of 60-69 years, with Mean±SD of 69.2±6.98 years and 170 (59%) were females, with Mean±SD of 69.25±6.99 years in females. About 152 (52.4%) of them belonged to three generation family. About 208 (71.7%) were currently married, and 29 (10%) were widow/widower, among whom 27 (93%) were widow and 2 (7%) were widower. Hypertension was seen in 205 (70.3%) of individuals, and 126 (43.6%) were known case of Diabetes Mellitus.

Based on word recall test, two-word recall was seen among 111 (34.8%) and 75 (25.8%) had one-word recall. On the basis of clock drawing test, about 109 (37.5%) were unable to or refused to draw. Cognitive Impairment was seen in 132 (45.5%) individuals. Among the study participants, 57 (19.6%) had urinary incontinence or occasional incontinence, 53 (18.2%) were immobile, or using wheelchair or needed help, 31 (10.6%) needed minor help for transfer from bed to chair and back (verbal or physical), 25 (17.9%) needed help to climb stairs (verbal, physical, carrying aid), 10 (3.4%) had occasional accidents of incontinence, 5 (1.72%) needed help cutting, spreading butter, etc., or required modified diet and other 5 (1.73%) needed assistance for bathing, grooming and 3 (1.03%) for dressing. Among the study population, 58 (20%) have disability. It was seen that there was a statistically significant difference in weight (p value 0.004), BMI (p value 0.006) and Cognitive Impairment (p value 0.001) with functional dependency.

Among the study population, 141 (48.6%) were of suggestive Depression and seen more among females (young old) about 135 (67%). The average diastolic blood pressure among individuals with suggestive Depression was comparatively lower with respect to people who did not have Depression which showed statistically significant difference (p value 0.039). There was a statistically significant association between ADL, Medical illness and Cognitive Impairment.
Table 1: Prevalence of study participants based on Cognitive Impairment, Functional disability and Depression

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Cognitive Impairment</td>
<td></td>
<td></td>
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<tr>
<td>Present</td>
<td>132</td>
<td>45.5</td>
</tr>
<tr>
<td>Absent</td>
<td>158</td>
<td>54.5</td>
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<tr>
<td>Functional Disability</td>
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<tr>
<td>Disability</td>
<td>57</td>
<td>19.7</td>
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<tr>
<td>No Disability</td>
<td>233</td>
<td>80.3</td>
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<tr>
<td>Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suggestive Depression</td>
<td>141</td>
<td>48.6</td>
</tr>
<tr>
<td>No Depression</td>
<td>149</td>
<td>51.4</td>
</tr>
</tbody>
</table>

Figure 1: Examples of Clock Drawing Test

Figure 2: Distribution of indicators of poor Activities of Daily Living among elderly population

Table 2: Association of Depression with Medical illness and Cognitive Impairment

<table>
<thead>
<tr>
<th>Variables</th>
<th>Category</th>
<th>GDS Category</th>
<th>Total N=290</th>
<th>Chi square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No Depression</td>
<td>Suggestive Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical illness</td>
<td>No Medical illness</td>
<td>14(41.2%)</td>
<td>20(58.8%)</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>8 (14.3%)</td>
<td>48(85.7%)</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
<td>33(25.8%)</td>
<td>95(74.2%)</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diabetes &amp; Hypertension</td>
<td>21(29.2%)</td>
<td>51(70.8%)</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>More than three co-morbid conditions</td>
<td>Present</td>
<td>82 (45.6)</td>
<td>98 (54.4)</td>
<td>180</td>
<td>6.443</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>67 (60.9)</td>
<td>43 (39.1)</td>
<td>110</td>
<td></td>
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<tr>
<td>Cognitive Impairment</td>
<td>Present</td>
<td>47 (31.5)</td>
<td>111 (78.7)</td>
<td>158</td>
<td>65.026</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>102 (68.5)</td>
<td>30 (21.3)</td>
<td>132</td>
<td></td>
</tr>
</tbody>
</table>

Note: Numbers within brackets indicate row percentages. *Statistically significant p <0.050
Table 3: Association of Activities of Daily Living with Cognitive Impairment and Depression

<table>
<thead>
<tr>
<th>Cognitive Impairment</th>
<th>ADL</th>
<th>Total</th>
<th>Chi square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No disability</td>
<td>Disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>50 (31.6)</td>
<td>108 (68.4)</td>
<td>158</td>
<td>28.256</td>
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<tr>
<td>Absent</td>
<td>83 (62.9)</td>
<td>49 (37.1)</td>
<td>132</td>
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</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Depression</td>
<td>95 (63.8)</td>
<td>54 (36.2)</td>
<td>149</td>
<td>14.877</td>
</tr>
<tr>
<td>Suggestive Depression</td>
<td>58 (41.1)</td>
<td>83 (58.9)</td>
<td>141</td>
<td></td>
</tr>
</tbody>
</table>

Note: Numbers within brackets indicate row percentages.*Statistically significant p <0.05

Discussion

Cognitive Impairment (CI) was assessed based on two categories. In word recall test, two words delayed recall was seen among 34.8% of elderly and 25.8% had one word delayed recall. On the basis of clock drawing test, about 37.5% were unable to or refused to draw. The reasons for refusal to draw were first due to lack of interest to draw and secondly due to instability in hands to hold a pen and further due to their low literacy level they could not write what they knew. Prevalence of cognitive impairment in our study was 45.5%. The results were similar to a study done which revealed 55% of elderly had cognitive impairment. Another study which was done among older cancer patients showed the overall prevalence of CI was approximately 35% which showed that the presence of a chronic disease may have baseline CI of upto 20%. In the present study, marital status was significantly associated with cognitive impairment, those who were widow were affected more which was similar to a study done at ludhiana.

Cognitive impairment and Depression: Those cognitively impaired were also found to be more than three times at risk of depression in the present study. Depression is associated with cognitive impairment in older adults, and a meta-analysis of case-control and prospective studies of the association between depression and dementia conducted in 2001 concluded that history of depression approximately doubled the risk for dementia. The prevalence of depression in dementia has been reported to be between 9% and 68%, and it has been proposed to be both a risk factor for as well as a prodrome of dementia. People with mild cognitive impairment and dementia exhibit greater rates of depression than age-matched cognitively intact individuals.

Activities of Daily Living and Cognitive Impairment: In the present study it was found that there is a significant decline in functional ability with an increase in cognitive impairment. A study done by Andreas E Stuck et al, revealed the highest strength of evidence for an increased risk in functional status decline was found for cognitive impairment and depression. Cross sectional studies have consistently reported that dementia is a powerful contributor for functional disability in the elderly. This has also been studied in a longitudinal study, which indicate that dementia is the strongest determinant for developing functional disability and functional decline, independent of the presence of other chronic diseases using Katz index tool which has similar domains of that of our present study tool.

Activities of Daily Living and Depression: The relationship between depression symptom and functional status is often complex, and there may be several plausible explanations for a weakened association between depression and functional challenges with age progression. Changes in coping strategies to overcome challenges, and the onset of new physical illness are strong correlates with depression which was explained by Kukull et al, in 1986 in his study. Approximately 60% of the participants reported at least one type of functional difficulty, with about 40% reporting at least one functional dependency, and more than half have some form of physical functioning and mobility difficulty.

Depression: Prevalence of suggestive depression was 48.6% in the present study. Few studies have revealed that the prevalence rates for depression in community samples of elderly in India vary from 6 to 50%. The prevalence has been reported to be 45.9%
in the urban slums of Mumbai,28 29.36% in the urban slums of Dharwad district, Karnataka,29 However, a high prevalence of depressive disorders of 52.2% among the elderly ≥ 60 years was observed in the study conducted by Nandi PS et al in the rural areas of West Bengal.30

Significant predictors for depression found among the elderly in our study were the urban residence, female sex, increasing age, nuclear family, illiteracy, and poverty.15 The elderly living in a nuclear family was more than three times likely to suffer from depression than those living in a joint family. Urbanization leads to households becoming less extended and more nuclear. Data from household surveys conducted suggest a trend toward convergence to predominantly nuclear households.31 A significant association was found between co-morbidities and depression. These co-morbidities along with depression increases physical disability, poor compliance and increased health care utilization leading to poor quality-of-life and further complicating the treatment of depression.31 (Table 2).

All these evidence strengthen the fact that depression in elderly is emerging as an important public health concern due to age-related decline in the physical and physiological functioning, urbanization, changing family structure leading to poor quality-of-life, increased disability, and morbidity.

Conclusion

The health problems identified in this study were physical as well as mental. The prevalence of CI, functional disability and Suggestive Depression was 45.5%, 19.7% and 48.6% respectively in elderly participants. There was also statistical significance between CI, Depression and ADL. Through outreach services by clinical psychologists and therapeutic interventions by psychiatrist through Medical Officer of Urban health care, can bring about the much needed solace to the existing problem.

Strengths and Limitations: Standard tools used for assessment of Cognition, ADL and Depression. Limitations were Inability to draw or refuse to draw Clock drawing Test were categorized into Cognitive Impairment based on Mini-Cog tool, which might also include few normal participants who might not be truly having cognitive impairment simply by refusal. The present study undertaken was a screening test and therefore cannot be generalized to the population and needs confirmation at the next level by the specialists.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Institutional Ethics Committee, JSS Medical College.

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Neuro Degenerative Diseases Classification Using Triplelayer Feature Extraction

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Abstract

Neuro Degenerative Diseases include Parkinson Diseases, Huntington Diseases, Ataxia, Myoclonus and Amyotrophic Lateral Sclerosis are medically, Hereditarily, pathologically fluctuated and are described by its symp-toms and execution of motor impairment. In this study, the data samples are of 15 subjects with PD, 20 subjects with HDdisease, 13 subjects with ALS and 16 subjects of healthy or fit persons. The database is composed a one minute recording of Force Sensitive Resistor (FSR) Signal. For feature deduction 2 – level wavelet Decomposition is done using Discrete Wavelet Transform (DWT). The acquired features were evaluated using the means of 10-trials for fivefold cross-validation (FFCV) in LDA with a Random Forest classifier (RFC). For NDD localization. The Random Forest Classifier gives the better outcome contrast with SVM and QB ordinary classifiers. The experimental proves that the accuracy, sensitivity and the Specificity of the proposed system is highly accurate and efficient than the previous method. The percentage of the proposed method is 98.24%, 97.92% and 96.78% as each.

Keywords: Neuro Degenerative Diseases (NDD), Amyotrophic Lateral Sclerosis (ALS), Parkinson Disease (PD), Support Vector Machine (SVM), Huntington Disease (HD), Random Forest classifier (RFC), Discrete Wavelet Transform (DWT).

Introduction

Neuro degenerative diseases are debilitating of neurons that result in accelerating degeneration. This causes problems with motor impairment. Now a day’ s predictable people are affected by some form of neurodegenerative diseases such as Parkinson’s disease (PD), Prion Disease, Amyotrophic lateral sclerosis (ALS), Huntington disease (HD), and Spinal Muscular Atrophy (SMA). In early phases of the disease, it is more difficult to distinguish the atypical variants. The early detection and stratification of neuro-degenerative disease is important and efficient for general practitionerwhich reduces the time and cost of the diagnosis process.

Gait recognition is one of a fascinated technique for suc-cessive people recognition. Even though this technology is not only limited with this function, it can be used in the clinical side to distinguish the motor disability using gait samples. Haeri.M.\textsuperscript{3} et.al told, The Gait signal may be a fine parameter for classifying the NDD’s that is caused by some demise of neurons in the human brain. In this work a hybrid method on triple layered feature extraction technique is urged to detect the neurodegenerative diseases from control and morbid signal of Parkinson Disease (PD), Huntington Disease (HD), and Amyotrophic Lateral Sclerosis (ALS).

In the Human nervous system, Parkinson Disease (PD) is one of a brain condition, which leads to tremoring and complexity with walking in movement progress, and management skill. The human muscle movements are controlled by nerve cells, these cells uses one of a chemical called dopamine. When dopamine content was getting destroyed in the nerve cells, the Parkinson disease will occur. The brain nerve cells cannot properly propel the command without dopamine. So the muscle functions are slowly losing its ability. Rigid or stiff muscles, problem with balance and walking, Stooped position, difficulty continuing to move are some most common symptoms of Parkinson diseases J. M. Hausdorff\textsuperscript{9} explained. The National Parkinson foundationsurvey shows, in worldwide there were 1% of older adults affected by this disease.Huntington Disease (HD) is a degenerative disorder which is inherited from upper generations. In this disorder, there was a hereditary defect on chromosome 4. CAG is one of a DNA part of the brain cell. It is repeated many more times than it is...
supposed to. The CAG gene portion was repeated 10 to 28 times in normal person, but in the HD gene it was repeated in 36 to 120 times. The counting of repeats tends to increase by as the gene inherited through the families. The greater chances of developing earlier symptoms are depending upon the repeats of chromosome. Slow uncontrolled actions, trembling gait, Facial movements including frowns, judgment deflection, Head turning to shift eye position are some of the symptoms of ALSJ.

M. Hausdorff\textsuperscript{9}, Amyotrophic Lateral Sclerosis (ALS) is an accelerating Neuro degenerative disease, which affect the brain and spinal cord nerve cells of the human body In ALS, because of accelerating degeneration in a nerve cell, the motor neurons are dying and losses its ability to control the muscle movements.Huang, Chenn-Jung and et al.,\textsuperscript{7} explained, the basic muscle movements of speaking, eating, moving and breathing are affected by the loss of motor neurons. Figure 1 shows the gait signal of PD, HD and ALS subjects.

Figure 1: Gait Signal of PD, HD, ALS Subjects

### Background Study:
The researcher named M.P.Murray et.al.\textsuperscript{5} demonstrated identifying gait is the best theory of recurrent development in medicinal tests, and the Peak examination can be useful in the comprehension of the diseases propelling state which is valuable data for the medicines.

The author Simon.S.R.\textsuperscript{2} proves the examinations of gait in persons are characterized as the better investigation of strolling people. In his paper, J.M.Hausdorff\textsuperscript{10} clears that Clinicians as well as specialists are requiring much of the time for gait ex-amination framework.\textsuperscript{11}

The researchers Haeri et.al.\textsuperscript{3} implemented their work as the change of gait flag might be a decent technique in separating-development issue which is due to the breaking down of some neurons in the part of brain.

### Methodology:
These medical conditions were picked in light of the fact that they are known to have related causes that may make troublesome finding of them. In this examination, we have utilized an open database from Physionet. 15 subjects with PD, 20 subjects with HD disease, 13 subjects with ALS and 16 subjects of healthy or fit person’s signals are incorporated from the benchmark database. The natural information was procured utilizing Force Sensitive resistors, with the yield roughly in respect to the power under the foot. Each file comprises two signs and it is analyzed using FSR of each foot’s Stride-to-stroll proportions with respect to footfall touch instances. In this paper, the time arrangement of flag was categorized as six intervals. The intervals are given as Right Stride interval, Left Stride interval, Left Swing interval, Right Swing interval, Left Stance interval, Right Stance interval and Double support period in-between and follow measurable, energy estimations of wavelet decay and pinnacle exam systems for spotlight extraction.

Figure 2: Movement Disorder detection and classification
The repetitive pattern of human motion is called a gait cycle. It includes steps and strides. One single step is called as a step; whole gait cycle is called as a stride. The stance and swing phases are incorporated in every gait cycle. In a verbose gait cycle the stance phase occupies 60% of the gait cycle and it can be part into the double support and single-leg support.

**Statistical Analysis:** The statistical gait analysis helps mainly in depicting the gait. In this research for each time arrangement of a single subject, the parameters such as Energy, Standard Deviation, Mean, Variance and Co Variance of a similar walk are considered. The “statistical gait analysis” approach helps to find the repetitions and exact results.

(a) **Energy**

The continuous time complex signal’s energy and it is represented as \( x(t) \) is calculated as

\[
E_x = \int_{-\infty}^{\infty} |X(t)|^2 \, dt
\]

(b) **Mean**

The mean is always calculated to know the average rate of the signal or the preferred sample. The calculation of mean value is done using the below formula.

\[
\mu = \frac{1}{N} \sum_{i=0}^{N-1} X_i
\]

(c) **Standard Deviation**

The computation of Standard deviation is the diffusion set of records from its mean. It measures the complete variability of a distribution. The mathematical representation of standard deviation is as follows.

\[
\sigma = \sqrt{\frac{1}{N-1} \sum_{i=0}^{N-1} (X_i - \mu)^2}
\]

(d) **Variance**

The Variance calculation is done using the below representation.

\[
Var(X) = E[(X - \mu)^2]
\]

(e) **Co Variance**

The covariance of data sample of X and Y is calculated as follows.

\[
COV = \sum_{i=1}^{n} (X_i - \bar{x})(Y_i - \bar{y})
\]

**Discrete Wavelet Transform:**

**a) Decomposition of Wavelet Signals:** The decomposition of wavelet is one of the best approaches to identify signals in the field of signal processing.

The utilization of wavelet decomposition is to break down the signals into its appropriate segments for testing purpose.

The proposed method handles two phases of decomposition of wavelet which is mainly used for feature extraction. The process of signal decomposition resulted in approximation and detailed set of three. Basically, a wavelet is a function \( \varphi \in L^2(R) \) with a zero \( \int_{-\infty}^{\infty} \varphi(t) dt = 0 \).

The continuous Wavelet Transformation (CWT) of a signal \( x(t) \) is then defined as:

\[
CWT_\varphi x(a,b) = \frac{1}{\sqrt{|a|}} \int_{-\infty}^{\infty} x(t) \varphi^* \left[ \frac{t-b}{a} \right] dt
\]

where,

\( \gamma(t) \) represents the ancestor of wavelet,

\* is defined as complex conjugate,

Scaling parameters are \( a \) and \( b \).

The recurrence of the oscillation and the wavelet length is defined by the scaling parameter \( a \). The scaling parameter \( b \) defines the position of moving of wavelet. The capacity of scaling and function of wavelet is addressed to Low-Pass Filters (LPF) and High-Pass Filters (HPF).

The process of decomposition of signal starts by transiting through these filters. The low-frequency parts of the time arrangement is considered as approximation and the high-frequency segments are computed by points of interest. The signal processing passes through the low-pass filters and high-pass filters. To get the detail coefficients and the approximation coefficients \( A1 \) and \( D1 \) at first level, the yielded signals from the filters are crushed. The approximation, coefficients are obtained and passed to the next phase, which is to rehash the technique. The signal is deteriorated at the normal level in the last phase of decomposition process.

The energy of a vague signal can be separated at different resolution levels. Mathematically, this can be presented at
\[ ED_i = \sum_{j=1}^{N} |D_{ij}|^2, i = 1, \ldots, I \]

\[ EA_l = \sum_{j=1}^{N} |A_{ij}|^2 \]

Where \( i = 1, \ldots, l \) is the wavelet decomposition level from level 1 to level \( l \). \( N \) is the number of the coefficients of detail or approximate at each decomposition level. \( ED_i \) is the energy of the detail at decomposition level \( i \) and \( EA_l \) is the energy of the approximate at decomposition level \( l \).

**Peak Analysis:** For analyzing signals, peaks are considered to be the most important thing. In identifying the signals, the peaks are categorized within the signal’s series of time. Using the six intervals, the interims and histogram of normal peak is calculated.

**a. Classification**

The proposed theory is carried out with the help of three different classifiers which are random Forest Classifier (RFC), Quadratic Bayes (QB) and Support Vector Machine (SVM). It helps mainly in the identification and characterization of signals. The chosen classifiers in the proposed work is considered to be learning classifiers and they mainly supports in the categorization of various levels of class in the test vector. Leo Breiman\[^8\] explained among the three classifiers, the SVM belongs to two class classifier category. It is used in the process of augmenting the hyper-plane with the choice limit comparison. The arrangement of work is done by SVM and the preparation of group vectors \( x \) as per the accompanying condition:

\[ c = \sum_{k} a_{k(x_i, x)} + b \]

Where, Support Vector is represented as \( S_{k,x} \) is used to define the weight, bias is represented as \( b \), and \( k \) is to represent the kernel function. \( k \) is considered to be the dot product, when the process is of a linear kernel. In the case of \( c > = 0 \), the member of group 1 is categorized by \( x \), or else it is categorized as a member group 2.

The next classifier is Random Forest Classifier which is a combination of predictors of tree. In that each predictor of tree is individually dependent on the sampled random vector values like the distribution as same in all the trees of forest. The algorithm for random forests applies the general technique of bagging, to tree learners. A training set is denoted as \( X = x_1, \ldots, x_n \) with responses \( Y = y_1, \ldots, y_n \), bagging repeatedly \( (B \) times \) selects a random sample with replacement of the training set and fits trees to these samples for \( b = 1, \ldots, B \). Sample, with replacement, \( n \) training examples from \( X, Y \); call these \( X_{b}, Y_{b} \). Train a decision or regression tree \( f_{b} \) on \( X_{b}, Y_{b} \). After training, predictions for unseen samples \( x' \) can be made by averaging the predictions from all the individual regression trees on \( x' \):

\[ \hat{f} = \frac{1}{B} \sum_{b=1}^{B} f_{b}(x') \]

Another classifier Quadratic Bayes normal classifier, in this classifier, the pattern-generating mechanism is represented in a probabilistic framework. A Bayes classifier is a pattern classifier based on two fundamentals: (1) When an object is injured or loss its value by the incorrect classification it can be quantified as a cost. (2) The anticipation of the cost is acceptable as an optimization criterion.

**Performance Measures:** The classifiers performance is calculated in the terms of sensitivity, accuracy and specificity. The terms are presented based on the comparison of actual and predicted output. The confusion matrix is used to predict the count of True positives, False positives, False negatives and True negatives of each classifier.

The ability of trained method to identify the positivity of NDDs is done using the sensitivity rate calculation. The Sensitivity (SE) calculation is as below.

\[ SE = \frac{TP}{TP + FN} \]

The specificity rate (SP) is calculated to review the result of negativity with respect to healthy subjects or non-infracted and it is evaluated as below.

\[ SP = \frac{TN}{TN + FP} \]

Accuracy is basically a measurement system which helps in the computation of degree of closeness of a quantity to its actual or true value. The formulaic of computation is as follows.

\[ Acc = \frac{TP + TN}{TP + TN + FP + FN} \]

**Results and Discussion**

For the proposed method, the data samples are collected from the online database Physionet.
In this paper, the proposed method based on the analysis of statistical, energy and peak is discussed. The parameters like energy, standard deviation, mean, variance and co-variance are evaluated with respect to 6 intervals in statistical analysis. The six intervals are Left Stride Interval, Right Stride Interval, Left Swing Interval, Right Swing Interval, Left Stance Interval, Right Stance Interval and Double support interval signals.

The energy space is calculated from the signal decomposition using Discrete Wavelet Transformation in the phase of energy analysis.

Average peak interval and Histogram is computed in the last phase peak analysis.

For better performance and high accuracy result, the three different analysis method are combined. The tabular view of performance, classification, specificity and sensitivity of all the three classifiers SVM, QB and RFC comparison is presented in the following section.

Table 1: Tabular Representation of Classifiers.

<table>
<thead>
<tr>
<th>Classification Rate</th>
<th>Stride</th>
<th>Swing</th>
<th>Stance</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>QB</td>
<td>71.14</td>
<td>69.54</td>
<td>70.47</td>
<td>70.86</td>
</tr>
<tr>
<td>RF</td>
<td>93.75</td>
<td>93.75</td>
<td>93.75</td>
<td>96.875</td>
</tr>
<tr>
<td>SVM</td>
<td>81.25</td>
<td>84.37</td>
<td>84.37</td>
<td>81.25</td>
</tr>
</tbody>
</table>

Table 2: Tabular representation Performance Measures.

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>QBC</td>
<td>61.9048</td>
<td>61.9048</td>
<td>76.6667</td>
</tr>
<tr>
<td>RF</td>
<td>85.743</td>
<td>85.743</td>
<td>90</td>
</tr>
<tr>
<td>SVM</td>
<td>71.4286</td>
<td>71.4286</td>
<td>76.7677</td>
</tr>
</tbody>
</table>

Conclusion

In this paper, the Neuro Degenerative Diseases are successfully detected by the proposed method. This is achieved using force sensitive resistor signals. The proposed method is based on the single method and it comprised the three different sets of analysis. This type of proposing resulted in the high rate of accuracy percentage in early analysis of disease. The accuracy 85.743% is considered as reasonable of proposed method based on Random Forest Classifier (RFC). The discussion of comparison is also presented in this paper and the effectiveness of proposed method is explained.

Ethical Clearance: Taken from Mother Teresa Women’s University.

Source of Funding: Self

Conflict of Interest: Nil

References


A Comparative Study on Effectiveness of Craniosacral Therapy Versus Self Sustained Natural Apophyseal Glide (SNAG) in the management of Cervicogenic Headache

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Abstract

Background: Headache that is caused by the structures of the upper neck is called cervicogenic headache. It usually starts on one or both sides of the upper neck area and then spreads to different area in forehead and face, there is a continuous need for some non-pharmacological intervention in the management of headache.

Objective: The aim of the study is to find the effectiveness of Craniosacral therapy and SNAG in cervicogenic headache patients to reduce the headache symptoms and improve the quality of life.

Methodology: Total number of participants in this study in 30 subjects and randomly allocated to two groups, 15 patients with cervico-genic headache in group A receives Cranio-sacral therapy and 15 in group B receives SNAG. The period of intervention for each participant was 3 weeks alternative days and total study duration was 3 months.

Discussion: From the statistical tool it has been analyzed the group A shows significant reduction of headache symptoms and the level of pain than compared with group B.

Conclusion: It has been concluded that craniosacral therapy shows that more significant reduction of headache symptoms and pain in cervicogenic headache patients than compared with SNAG group.

Keywords: Craniosacral therapy, cervicogenic headache, SNAG.

Background

Cervicogenic headache is a chronic, hemicranial pain syndrome in which the sensation of pain originates in the cervical spine or soft tissues of the neck and is referred to the head. Primary headache disorder may present with coexisting neck pain and tenderness(2).

Headache that is caused by the structures of the upper neck is called cervicogenic headache. It usually starts on one or both sides of the upper neck area and then spreads to different area in forehead and face. Specific neck movements or keeping the neck in one position or longer time aggravate the increasing of headache symptoms(1).

Cervicogenic headache have an average of 17° less rotation toward the headache side in the FRT, in contrast to those with no headache or migraine with aura. The incidence of an cervicogenic headache has been estimated to be 14 to 18% through in a recent population. Other treatment for cervicogenic headache includes cervical spine manipulation, strengthenening exercise, thoracic spine thrust manipulation.(3-5)

In addition these individuals report lower quality of life than healthy individuals. Manual therapy is advocated for managing cervicogenic headache .Trial studies shows that mulligan manual therapy was beneficial the reduction of cervicogenic headache. There is a increased demand for a non pharmacological approach in the management of patient with cervicogenic headache. Craniosacral therapy is a
Mulligan has described a novel approach for the self management of articular dysfunction in cervicogenic headache. The c1-c2 self SNAG targets c1-c2 dysfunction by emphasizing c1-c2 rotation using cervical self SNAG strap although the Mulligan concept is frequently used in clinical practice.

Craniosacral therapy is a light touch modality when we have to apply gentle manual force to the somatic dysfunction of the head and mobilize the cranial sutures which is leading to loss of normal physiological function. It actually mobilize the surrounding peripheral tissues and fascia that might produce the restriction in the movement of the body.

CST helps to prevent and abort headaches primarily by releasing tensions throughout the meninges by removing restrictions from meningeal and cranial bone structures, pressure is taken off the nervous system and the entire craniosacral system can open up. This also allows fluid to drain, so back pressure does not build up.

It causes tightening and loss of mobility of the dural tube related to the facilitated vertebral segments with increased nerve pressure from a contracted dural tube sleeve resulting in continual neuronal firing.

Also, the nerves in the area go to the intervertebral muscle, causing them to contract and cause fixation and subluxation. If a peripheral restriction is released but the dural tube restriction and facilitated spinal cord segments are not, the peripheral problem usually re-occurs. So a peripheral problem can translate through the facilitated segments up into the cranium and cause the meninges to contract in the same way an intracranial meningeal problem can translate down the dural tube and cause facilitation.

**Objective:** The aim of the study is to find the effectiveness of Craniosacral therapy and SNAG in cervicogenic headache patients to reduce the headache symptoms and improve the quality of life.(6-12)

**Methodology:** Total number of participants in this study in 30 subjects and randomly allocated to two groups, 15 patients with cervico-genic headache in group A receives Craniosacral therapy and 15 in group B receives SNAG, The study design employed here is comparative design and the population selected for this trial includes both male and female age group above 18 and the period of intervention for each participant was 3 weeks alternative days and total study duration was 3 months.

**Selection Criteria:** Patients with Unilateral Headache with neck stiffness or side dominant headache with the duration of 3 months and those having Positive flexion rotation test and restriction < 10 degree were included and the participants having onset of headache following cranial tumors and meningitis and with Sudden onset of new severe headache and history of cancer and HIV were excluded out of the study.

**Outcome Measures:** Outcome measures used in this trail is NPRS (numerical pain rating scale) and HIT-6 (headache impact test).
**Procedure:** The subjects those who fulfill the inclusion criteria were included in this study will be explained about the study and a written consent were taken and the participants are will be divided into group A and group B.

**GROUP A (Recevied SNAG)**

Self sustained natural apophyseal glide (SNAG) group. Patient in this group will be mobilized with a c1-c2 self SNAG using the thin, rubber-covered strap, position on the posterior arch of c1 and drawn horizontally forward across the face. The subjects will apply forward pressure on the strap and turn the head toward the restricted side of rotation, sustaining end for 3 seconds. Subjects will ask to perform 10 repetitions of the self mobilizations SNAG during every treatment sessions\(^\text{15}\).

**GROUP B (Received Cranio-sacral therapy)**

In Stage 1, the patient has been positioned in supine lying and they were given instructions to take deep breath and the therapist flexes the neck in 10 to 15 degree and maintains this position for 2 minutes.

In Stage 2, the patient has been positioned in supine lying and they were instructed to take deep breath and therapist lateral flexes the trunk on right side and lower limbs passively and maintain this position for 2 minutes.

In Stage 3, the patient has been positioned in supine lying and instructions were given to take deep breath and lateral flexes the trunk on left side passively and maintain this position for 2 minutes.

In Stage 4, supine lying was adapted by the patient and they were instructed to take deep breath and hip and knee flexed 90 degree passively and maintain this position for 2 minutes.

**Data Analysis and Representation**

**Statistical Analysis:** Baseline characteristics of all the subjects were given as Mean ± SD.

The outcomes values obtained were manually tabulate in Microsoft Excel '07 spreadsheet, and were exported to “Graph pad prism 5” for Windows version 5.03 for statistical analysis.

Statistical comparisons within the group and between the groups for post traumatic stiffness, NPRS and ROM were analyzed using paired ‘t’ test and unpaired ‘t’ test respectively.

The paired “t” test is formulated as:

\[
t = \frac{\bar{d}}{s / \sqrt{n}}
\]

Where, \( \bar{d} \) = mean difference
\( d \) = mean,
\( n \) = total no. of sample.

The unpaired “t” test is formulated as:

\[
t = \frac{x_1 - x_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}
\]

\[
S = \sqrt{\frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2}}
\]

Where, \( X_1 \) & \( X_2 \) are means of group A & B;
\( N_1 \) and \( n_2 \) are sample sizes of two groups. Variance of sample 1 \((s_1^2) = \frac{\Sigma (x_i - \bar{x}_1)^2}{n_1 - 1}\)

Variance of sample 2 \((s_2^2) = \frac{\Sigma (x_i - \bar{x}_2)^2}{n_2 - 1}\)

The p-value was chosen as per the description given by “Graph pad prism 5” for Windows version 5.03.

**Description of p- value:**

<table>
<thead>
<tr>
<th>P- value</th>
<th>Level of significance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.0001</td>
<td>★★★</td>
<td>Extremely significant</td>
</tr>
<tr>
<td>0.001 to 0.01</td>
<td>★★</td>
<td>Very significant</td>
</tr>
<tr>
<td>0.01 to 0.05</td>
<td>★</td>
<td>Significant</td>
</tr>
<tr>
<td>&gt;0.05</td>
<td>NS</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

All data analysis were done using presented as mean value ± SD. For using the above said outcome measures, data were collected regarding the pretest and posttest values. The related paired ‘t’ test was performed to find the significant changes after treatment using the formula.

**Result**

The collected data was analysed using the graph pad prism 3.

The mean and standard deviation of pre and post value of NPRS for GROUP A with Pre test(8.06) Post test(3.93) and GROUP B with Pre test (7.93) Post test(5.93)

The mean and standard deviation of Pre and Post value of HIT-6 for GROUP A with Pre test(59.4) Post test(41.3) and GROUP B with Pre test(56.3) Post test(49.2)
Within the group analysis it have been shown that the Pre and Post values of NPRS & HIT 6 shows significant in Group A than the Group B and the Between Group analysis the pre test and post test values of both groups shows NPRS Group A(18.42), Group B(7.72), HIT-6 Group A(9.99), Group B(5.60)

Between group analysis the post test values shows that Group A is more significant than Group B. After statistically analyzed, it have been seen that there is high reduction of pain in craniosacral therapy group than SNAG group. The post test values (between group analyzes) of both group were analysed with the mean differences of NPRS and HIT-6.NPRS Group A(4.1) & Group B(2.1). HIT-6 Group A(18) & Group B(7.1) Which shows that Group A shows much significant than Group B. It have been concluded that Group A shows high reduction of pain than Group B.

Discussion

From the statistical tool it has been analyzed the group A shows significant reduction of headache symptoms and the level of pain than compared with group B.Januz Kojan et al., (2015) they have performed a study to effect of a c1-c2 muligan sustained natural apophyseal glide (SNAG) in the treatment of cervicogenic headache .the result of this study shows significant reduction of pain and improvement of ROM in upper cervical region use of muligan technique.(28) cervicogenic headache and improving cervical range of motion more related with neurophysiological changes in pain modulation.(28)

Jull et aevaluated mobilization and specific exercise for the management of patients with cervicogenic headache. Combined interventions did not produce a significantly better effect than the single therapies across all outcomes. Nevertheless, there was a 10% better response for the participants who received the combined therapy, which was thought to be clinically relevant.(30)

In that study there was a 50% reduction in headache frequency in 71% of subjects receiving manual therapy alone. The results of both studies suggest a significant benefit of manual therapy in the management of patients with cervicogenic headache.

A number of studies have shown manual therapy to be effective in the management of cervicogenic headache. The majority have investigated a combination of manual therapy with exercise, as cervicogenic headache is a disorder of cervical muscular impairment as much as cervical joint dysfunction.(31-32)

From thus study it has been seen that SNAG reduced the symptoms of headache disorders because it stimulate the mechanoreceptors of the joint capsule and surrounding tissues which inhibit the pain at the spinal cord. SNAG is also improving the cervical ROM which likely reduced the joint stiffness and breakdown the adhesions of soft tissue structures in the vice versa it improving joint ROM which further decrease the symptoms of head ache disorders.

SNAG usually workout for upper cervical joint segments which reduce the pain radiating area for cervicogenic headache subjects.

In subjects with craniosacral therapy shows that reduction of pain sensitive tissues in the brain. This relates to pain gate theory in which pain supports in the upper cervical segments tensions thoughtout the meninges which might open the entire craniosacral system. It will be releasing the tightening and loss of mobility of the dural tube which further release the dural tube restrictionsin order to normalize the ability of facilitated spinal cord segments.

Craniosacral therapy is difficult to perform due to changing posture and variations as to be done but result benefits to subjects with cervicogenic headache disorder usually SNAG workout on the part of upper cervical segments but CST shows benefits of entire mobilization of vertebral body segments.

Conclusion

It has been concluded that craniosacral therapy shows that more significant reduction of headache symptoms and pain in cervicogenic headache patients than compared with SNAG group

Limitations of the Study: Further study should be conducted in longer duration with large sample size and more than two outcome tools should be used for further research.

Conflict of Interest: There has been no conflict of interest for the authors.

External Funding: No funding has been needed for this study.

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Assessment of Knowledge, Attitude and Practices Regarding Breastfeeding among Primiparas Mothers in Kanchipuram District, Tamilnadu

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Abstract

Background: Breastfeeding is the fundamental component of the child-survival strategy. Lack of breastfeeding – especially exclusive breastfeeding during first few months of life is important as it reduces the risk factors for the infant mortality and the morbidity rate. Limited studies have attempted to understand the knowledge on benefits of breastfeeding among mothers which affect breastfeeding pattern in urban areas.

Objective: To find out the association of socio demographic factors and breastfeeding knowledge among Primiparas. To understand the current practices of breastfeeding among Primiparas.

Method: A quantitative, institutional based cross sectional study was conducted in a PG Medical college. Convenient Sampling was used to collect data from 216 Primiparas in the age group of 18-49 years having a child up to 12 months of age for a period of one month. Their knowledge and practice with regard to prelacteal feeds, initiation of breastfeeding, feeding colostrum, and exclusive breastfeeding were assessed.

Results: Various demographic factors like the Maternal age, Maternal age at marriage, Maternal education, type of delivery, and religion had a direct association on Breastfeeding knowledge. Statistically significant difference was also found in the prevalence of knowledge about advantages of breast feeding with respect to education trend (p<0.005). The main reason cited for incorrect practices was shortage of breastmilk which led to mixed feed and discontinuation of Exclusive breastfeeding.

Conclusion: Increased Involvement of the Heath care personnel’s in imparting knowledge on breastfeeding benefits to both mother and the baby would encourage and counsel the mothers for proper breastfeeding practices.

Keywords: Breast feeding, Knowledge and Practices, Advantages, Colostrum, Exclusive Breast feeding.

Introduction

Breastfeeding is the fundamental component of the child-survival strategy. It provides all the energy and nutrients that the infant needs for the first months of life. It continues to provide up to half or more of a children nutritional needs during the second half of the first year, and up to one third during the second year of life.1 WHO recommends Exclusive breastfeeding for the first six months of life. Breastfeeding also benefits mothers. Exclusive breastfeeding is associated with a natural (though not fail-safe) method of birth control (98% protection in the first six months after birth).2 Breastfeeding technique is a learned skill for both mother and new-born. Breastfeeding techniques comprises of commencement of breast feeding, breastfeeding positioning, latching on, taking your baby off the breast and burping.3

Study Design: A quantitative, institutional based cross sectional study was conducted in a PG Medical college, Kanchipuram district. Multipara mothers, Primi mothers with post-natal complications, Primi mothers who are not willing to participate in the study were excluded from the study. The study was approved by Institutional Review Board of the School of Public Health, SRM University and IEC PG Medical college, Kanchipuram district.

Data Collection: The data was collected from Primi mothers in the age group of 18-49 years having a child up to 12 months of age. Since it was knowledge based study the literacy level was taken for calculating the sample size. With prevalence of 85.6% literacy level among urban women (NFHS-4) in Chennai, Tamil Nadu with marginal error of 5% for 95% Confidence interval.
and oversampling of 10% the sample size calculated was 216. The respondents were selected using convenient sampling. The data collection was conducted for one month through semi structured questionnaire and with informed consent printed in English.

Statistical Analysis: Data was analyzed through Statistical package for social sciences version 20. Descriptive statistics were used to present the level of knowledge and practices of breastfeeding among Primipara mothers. Chi square was used to find out the association between the socio demographic variables and Knowledge and Practice scores.

Results: It was seen that majority of the primipara mothers were in the age group 24-28 years with mean age of 25.37 years. Around 47.7% of the mothers were married in the age group of 22-26 years. 64% of the Primipara mothers have undergone C-Section delivery while remaining 36% primiparas delivered normally. Most of the mothers were Graduates (52.8%) with most of them studied till high school (45.4%) followed by primary school.

Table-1: Knowledge of primi mothers towards breastfeeding.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Benefits to Mother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Acts as Natural Contraception</td>
<td>42.6</td>
<td>57.4</td>
</tr>
<tr>
<td>b) Helps to Lose weight Post Pregnancy</td>
<td>51.9</td>
<td>48.1</td>
</tr>
<tr>
<td>c) Prevents Different forms of Cancer</td>
<td>68.5</td>
<td>31.5</td>
</tr>
<tr>
<td>d) Prevents postpartum depression</td>
<td>10.6</td>
<td>89.4</td>
</tr>
</tbody>
</table>

Table-1 reveals the Knowledge among Primiparas towards the benefits of breastfeeding. Most of the Primipara mothers knew the importance of Breastfeed. 94% agreed that breast milk is nutritious and protective in nature compared to bottle milk. It was seen that only 31% of were aware that prolonged breastfeeding prevents Dental Caries, Diabetes and other Non-Communicable disease among babies in future. The knowledge on benefits of breastfeeding among Primipara mothers was noted to be moderate. Around 51.9% agreed that breastfeeding helps to lose weight Post pregnancy. 42.6% of mothers knew that prolonged breastfeeding acts as a natural contraception. It was seen that effect of Breastfeeding on Post-Partum Depression to be very low (10.6%) among Primiparas.

Table-2 Exclusive Breast Feeding (EBF)

<table>
<thead>
<tr>
<th>Si. No.</th>
<th>Knowledge</th>
<th>Frequency (%)</th>
<th>Practice</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greater than 6 months</td>
<td>84.26</td>
<td>EBF Done</td>
<td>71.8</td>
</tr>
<tr>
<td>2</td>
<td>Less than 6 months</td>
<td>15.74</td>
<td>EBF not Done</td>
<td>28.2</td>
</tr>
</tbody>
</table>

Introduction of Complimentary Food

<table>
<thead>
<tr>
<th>Si. No.</th>
<th>Knowledge</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EBF to be followed up to 6 months</td>
<td>83.8</td>
</tr>
<tr>
<td>2</td>
<td>EBF to be followed &lt; 6 months</td>
<td>16.2</td>
</tr>
</tbody>
</table>

Table-2 Exclusive Breastfeeding was practiced by 71.8% of the mothers. Major reason cited for stopping exclusive breastfeeding was inadequate Breast feed (68.9%). 13.1% of the mothers were unable to feed as the child was in NICU. Mixed Feeding was done in the form of Formula Milk, Water, Cow Milk, Cerelac, Biscuit and Rice.
Table-3: Initiation of Breast Feeding.

<table>
<thead>
<tr>
<th>SI.No</th>
<th>Knowledge</th>
<th>Normal Delivery</th>
<th>Frequency (%)</th>
<th>Practice</th>
<th>C-Section Delivery</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Within 1 hour</td>
<td></td>
<td>63.6</td>
<td>Within 1 hour</td>
<td></td>
<td>68.8</td>
</tr>
<tr>
<td>2</td>
<td>Greater than 24 hours</td>
<td></td>
<td>5.2</td>
<td>Within 1-24 hours</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>3</td>
<td>Don’t know</td>
<td></td>
<td>31.2</td>
<td>Greater than 24 Hours</td>
<td></td>
<td>23.4</td>
</tr>
</tbody>
</table>

Table-4: Colostrum Feeding.

<table>
<thead>
<tr>
<th>SI.No</th>
<th>Knowledge</th>
<th>Yes</th>
<th>No</th>
<th>Practice</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you ever heard of Colostrum?</td>
<td>95.4</td>
<td>4.6</td>
<td>Did you feed Colostrum?</td>
<td>88.0</td>
<td>12.0</td>
</tr>
<tr>
<td>2</td>
<td>Have you ever heard of Prelacteal feed?</td>
<td>91.2</td>
<td>8.8</td>
<td>Did you feed Prelacteal feed?</td>
<td>8.3</td>
<td>91.7</td>
</tr>
<tr>
<td>3</td>
<td>Have you ever heard of Post burp feed?</td>
<td>88.4</td>
<td>11.6</td>
<td>Did you make the child burp post feeding by patting the back?</td>
<td>64.4</td>
<td>35.7</td>
</tr>
</tbody>
</table>

Table 4-shows that 88.4% of the mothers knew how to make the child burp post feed. Baby getting. Wet burp, falling asleep, getting relaxed, stop crying were few signs of fully fed baby according to mothers.

Discussion

The main rationale behind the study was to understand the level of knowledge and breastfeeding practices among Primi mothers with child under one year. Although, most of the women were literate, it was seen that they possessed moderate knowledge on breastfeeding (57.87%).

Attitude of mothers towards breastfeeding revealed that majority of mothers had favorable attitude towards breastfeeding. 94% of mothers agreed that breast milk is nutritious and protective for the baby and 81.9% felt that it strengthens the immune system. According to study by Naseem et al. 67.5% of mothers agreed that breast milk is the best milk. Half of the mothers knew that Breastfeeding helped to lose weight post pregnancy and acts as a natural contraception. Only one tenth of the mothers knew that breastfeeding prevents postpartum depression.

In our study it is seen that the main sources of information about breastfeeding were Elders (56%), whereas only 32.5% received information from the Health care providers. In a similar study conducted by M. Ekambaram et al it was seen that 17% received help from health care workers. It was noted that mothers who delivered normally, the level of knowledge (63.6%) and practice (68.8%) on initiation of breastfeeding were nearly the same. In a study conducted at Bengaluru, few issues like, baby shifted to NICU for observation (38.5%), mother seriously ill (requiring ICU care-2.5%) were cited as the main reasons for delay in initiation of breastfeed.

Surprisingly, it was seen that only 24.5% of the mothers were aware about initiation of breastfeeding after C-section but nearly three fourth started breastfeeding within 4 hours. The prime reason behind this may be the support and counseling provided by Health care workers on the importance of breastfeeding. Various Indian studies have noted higher knowledge about early initiation of breastfeeding ranging from 87-92% but breastfeeding initiation varied from a low 6% to 36%.

According to WHO, Exclusive Breastfeeding should be practised for 6 months. In our study around 83.8% of the mothers knew the importance of EBF but 71.8% practiced it. In a study conducted at Mangalore 71.6% of the mothers practiced Exclusive Breast feeding. Mixed
Feed was practiced by 28.2% of the Primi mothers. Poor health of lactating mother, Insufficient milk Production, depending on infant formula for ease and lack of guidance were few reasons cited for discontinuing Exclusive Breast Feeding.

Nearly 88% of the mothers fed colostrum to their babies and 12% discarded as advised by elders owing to their cultural beliefs. This runs parallel to a study at Telangana, where 88% of the children were given Colostrum\textsuperscript{4}. The prevalence of prelacteal feed was lower in studies done by Madhu et al.\textsuperscript{11} (19%) and S. Jain\textsuperscript{5} (4.7%) whereas it was higher in studies done by Abhay Bagul et al.\textsuperscript{12} (78.6%), than the present study (8.3%) and was practiced mostly by Hindus.

In the present study 34.7% mothers practiced demand feeding whereas in studies done by Srivastava A et al.\textsuperscript{10} (32.5%) were practicing demand feeding. Post burp feeding was found to be practiced by 88.4% but Srivastava et al\textsuperscript{10} in their study found that only 40.3% mothers practiced post feeding burping. In the present study 62.7% were aware of the different breastfeeding techniques. The knowledge regarding techniques of breast feeding was noted to be 35% in a study done by Premlata Mittal et al\textsuperscript{13} in their study in Rajasthan.

According to our study, higher breastfeeding scores shows association with higher maternal age(p<0.005). Similar findings have been reported in study done by Narayan et al\textsuperscript{14} and Scott J. A.\textsuperscript{15}. An association was seen between breastfeeding scores and maternal education status which similar to a few other studies\textsuperscript{16,17}. Young and less educated Primiparas should be given support and counselling. Other than age, and educational status, maternal age at marriage, type of delivery, place of delivery and religion were positively associated with better breastfeeding scores.

**Conclusion**

Majority of Primi mothers had knowledge about the benefits of breastfeeding to the child, but nearly half of them were still unaware about the long and short term benefits of breastfeeding to mothers. Health care personnel’s can emphasize primi mothers on the health benefits of exclusive breastfeeding and colostrum feed, educate them during ante-natal period, support at the time of birth to help them initiate breastfeeding and ensure that breastfeeding is fully established in the post-natal period. Measures should be taken to educate the mother on dietary habits after delivery to ensure sufficient milk production which will help them to breastfeed exclusively. Doctors can play a proactive role by motivating and keeping the mother under supervision until they acquire proper skills of breastfeeding like attachment, positioning and demand feeding. Efforts should be taken to disseminate and promote breastfeeding which supports and encourages young primi mothers.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Received IEC from PG Hospital where the study was conducted.

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7. Gunasekaran Dhandapany,1AdhisivamBethou, corresponding author1 Arulkumaran Arunagirinathan,1 and Shanthi Ananthakrishnan1. Antenatal counseling on breastfeeding – is it adequate? A descriptive study from Pondicherry,
Chromosomal Aberrations in Breast Cancer Females

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¹Jawaharlal Nehru Cancer Hospital and Research Centre, Idgah Hills, Bhopal

Abstract

Breast cancer is one of the most prevalent cancers in women and accounts for nearly 23% of all cancers worldwide. It has been increasing at an alarming speed and there is a need to search for new and better diagnostic tools for its early and effective diagnosis. The current diagnostic tools include mammography, MRI, and FNAC. In this regard, cytogenetic analysis of breast cancer using standard Lymphocyte Culture Technique ¹ can be proved as a powerful and cost-effective tool to identify women with high risk of developing Breast Cancer. The technique can be used to study the altered chromosomal pattern in terms of its number or structure owing to its diseased condition that might be specific to Breast Cancer. In the present study, peripheral blood from breast cancer as well as healthy females were taken and subjected to cytogenetic analysis and studying their structural and numerical aberrations. The breast cancer patients were found to be having higher frequency of aberrations than healthy control.

Introduction

Chromosomal instability is a known feature of cancer and a number of aberrations, both numerical and structural are found in all types of cancer. The majority of cancer cells represent dynamic karyotypic changes, including chromosomal rearrangements². A positive association between the frequency of chromosomal aberrations in peripheral blood lymphocytes (PBLs) and the risk of cancer at different sites has been supported by numerous clinical observations³. Different case-control studies have also reported a significant increase in the frequency of aberrant cells in PBLs of cancer patients⁴. The discovery of Philadelphia chromosome (9; 22 translocation) was a breakthrough discovery in the field of cytogenetics which led to the development of cytogenetic analysis as a powerful tool for the diagnosis of some type of cancer. In case of Breast Cancer also chromosomal aberrations play a very important role and hence cytogenetic marker of breast cancer can be a very powerful diagnostic tool for this dreaded disease.

In this regard, it can also be useful in the study of Breast Cancer and if any specific chromosomal aberration pattern is indeed found, it can be used for screening females who are at high risk to develop this deadly disease and also for monitoring the prognosis and treatment response of Breast Cancer patients. Therefore, it is essential to assign role of cytogenetic endpoints such as chromosomal aberrations for the diagnosis and treatment of breast cancer.

Material and Method

Collection of Sample: Peripheral blood samples were collected from 50 registered Breast Cancer patients of age 18-65 years from the ward and Pathology Department of Jawaharlal Nehru Cancer Hospital & Research Centre after obtaining patient informed consent and other details such as Medical History, Family History, Ob/Gyn History and the samples were processed for cytogenetic analysis. Blood samples were also collected and analyzed from age-matched 50 healthy females for control study. For cytogenetic analysis, blood samples were cultured by following standard Lymphocyte Culture protocol of Moorehead et al., (1964) and Karyotype were prepared to look for any chromosomal aberrations that might be identified in breast cancer patients.

Lymphocyte Culture: Lymphocyte cultures were set up by Moorhead et al., protocol. Heparinized whole blood (1 ml) was added to a mixture containing 5 ml of culture medium RPMI 1640 and 300 ul of phytohemagglutinin (PHA). Then the culture vials were kept in HERA cell CO₂ incubator for 72 hrs, at 37 °C with 5 % CO₂. Then 0.02% of Colchicine solution was added at 70th hour of incubation period to arrest cells at metaphase. The cells were collected by centrifugation, resuspended in a prewarmed hypotonic solution (KCL,
0.075 M) for 17 minutes and fixed in chilled methanol/acetic acid (3:1 v/v) solution (Carnoy’s fixative). Then drops of cell suspension were allowed to fall from at least 6 inches height on pre chilled and chemically cleaned slides. These slides were air dried on a hot plate at 50-60 °C. All slides were labelled and stained with Giemsa stain and observed under microscope to look for well spread chromosome. The slides showing best metaphase plates were then selected for GTG Banding to prepare karyotype and study chromosomal aberrations. Slides were GTG banded according to the Benn and Perle method. Banded slides were scanned for numerical and structural aberrations. For each subject, 50 clear metaphases were assessed for CAs. Of these, 10 metaphases were karyotyped.

**Results**

The Chromosomal Assay showed higher frequency of abnormal metaphases with numerical as well as structural chromosomal aberrations observed in 50 Breast Cancer patients as compared to equal number of age-matched Healthy Controls. Most of the Breast Cancer patients showed Hypoaneuploidy, Fragments, Breaks, Acrocentric Association, Rings, PCD and ICD etc. (p value 0.0001***, highly significant) as shown in Table 1 and 2 and Figure 1 to 4, whereas Healthy Control females showed normal karyotype. However, very few subjects were presented with minimal chromosomal aberration pattern. The p value was calculated by Two Sample t test using OriginPro 8 Software.

**Table 1: Mean Structural Chromosomal Aberration in Healthy Control and Breast Cancer Females.**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>TC</th>
<th>AM</th>
<th>Chromosomal Aberrations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>45</td>
<td>DM (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.7±1.10</td>
<td>BR (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>2±1.73</td>
<td>FR (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>2±0.89</td>
<td>RG (Mean±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.54±0.93</td>
<td>IC (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>2±0.70</td>
<td>PCD (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1±1</td>
<td>AA (Mean ±SD)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.6±0.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.66±0.57</td>
<td></td>
</tr>
</tbody>
</table>


ns P > 0.05, * P ≤ 0.05 significant, ** P ≤ 0.01 very significant, *** P ≤ 0.001 highly significant.

**Table 2: Mean Numerical Chromosomal Aberrations in HC & BC Females.**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Total Metaphase Count</th>
<th>Mean Normal Metaphase (Mean±SD)</th>
<th>Mean Abnormal metaphase (Mean±SD)</th>
<th>Mean Hypoaneuploidy (Mean±SD)</th>
<th>Mean Hyperaneuploidy (Mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC (N=50)</td>
<td>30</td>
<td>27±1.90</td>
<td>2.96±1.90</td>
<td>3.06±1.76</td>
<td>0</td>
</tr>
<tr>
<td>BC (N=50)</td>
<td>30</td>
<td>7±2.15***</td>
<td>22.9±2.15***</td>
<td>17.48±7.84***</td>
<td>1.62±1.08***</td>
</tr>
</tbody>
</table>

Legends: HC: Healthy control, BC: Breast Cancer

ns P > 0.05, * P ≤ 0.05 significant, ** P ≤ 0.01 very significant, *** P ≤ 0.001 highly significant.

**Figures showing structural and numerical chromosomal aberrations in Breast Cancer Females**

![](image1)  
**Fig. 1: Break**  
![](image2)  
**Fig. 2: Fragment.**
Genetic instability is a defining feature of human cancer. In the present study, breast cancer patients had a significantly higher percentage of aberrant metaphases as compared with controls. There was a high frequency of numerical as well as structural abnormalities in the cultured lymphocytes of patients. Thus, determination of the genomic instability level by chromosomal analysis which is a very cost effective technique can be used as a diagnostic tool for identifying females with high risk of developing Breast Cancer and also in monitoring disease progression and prognosis.

Conclusion

It can be concluded from this study that chromosomal assay is a very effective and cost effective tool to look for tumor markers in breast cancer patients and for screening high-risk categories as the constitutional chromosomal aberrations indicate towards a genetic damage that can lead to cancer. It has the potential to be used as a routine screening diagnostic marker in breast cancer. The non-invasive nature of the test requiring just 2 ml of peripheral blood and cost-effectiveness is an added advantage in a developing country like us where costly molecular tests are not affordable to everyone. More large scale cytogenetic studies needs to be done in this area to establish this as a potential tumor marker.

Acknowledgement: We are thankful to the management of JNCH&RC, Idgah Hills, Bhopal for providing us the facilities of the Research Lab to carry out this research work and would like to acknowledge my deep sense of gratitude for the same.

Conflict of Interest: Nil. The authors declare no conflict of interest.

Ethical Clearance: Approved by Institutional Human Ethical Committee board (IEC No 547/2016).

References


Study of Factors Affecting Low Birth Weight of Newborn in Uttar Pradesh

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Abstract

82 (Eighty two) pregnant ladies aged between 16-30 years were studied. The maternal history was—qualification, 38(46.3%) were illiterate, 28(34%) were primary school educated, 16(19.5%) were secondary schooleducated. The habits were, 4(4.87%) were smokers, 36(43.9%) were passive smokers, 42(51.2%) were Tobacco chewers. Socio-economic status was 12(14.6%) were house wives, 17(20.7) were shop keepers, 53(64.3%) were laborer. The material age was, 38(46.3%) were aged between 16-19 were, 29(35.3%), were aged between 20-25, 15(18.2%) were aged between26-30. The clinical manifestation during pregnancy was—14(17%) had PIH, 4(4.87%) had pre-eclampsia, 2(2.43%) had eclampsia, 6(7.31%) had gestational diabetes, 24(29.2%) had APH, 32(30%) had PROM. The obstetric factors were 30(36.5%) were prim bares, 52(63.4%) were multiparous, 62(75.6%) had history of LBW, 38(46.3%) had history of miscarriage, the period of amenorrhea was—22,(26.8%) had 28 to 37 weeks, 53(64.3%) had 38-40 weeks 7(8.53%) had above 40 week 5(6.09%) had multiple pregnancy. This pragmatic approach study of LBW will be quite helpful to obstetricians and gynecologists, pediatricians, physicians to treat such patients actively to prevent morbidity and mortality of low birth newborn which is a great threat and challenge to the medical fraternity globally.

Keywords: PIH- pregnancy Induced Hypertension APH= Ante partum Hemorrhage PROM= premature rapture of membrane LBW= Low Birth weight.

Introduction

LBW (low birth weight) defined as weight at birth which is less than 2500gm usually measured in the first hour of life irrespective of the gestation age(¹). LBW is the major cause and contributes to about 60% to 80% of all neonatal deaths(²). Based on epidemiological studies, infants weighing less than 2500 gm, are more, likely to, die than normal weight babies. Global occurrence of LBW is 15.5% which amounts to about 20 million low birth weight infants each year. 96.5% of them in developing countries(³). Many of the LBW newborn become the victims of protein energy malnutrition (PEM) and infection. The causes of LBW are socio-economic status, poor nutrition during pregnancy, education level, and awareness of health condition. LBW is one of the most serious challenges for mother and child health. It has number of public health consequences such as mental retardation, congenital anomalies, morbidity and mortality. Moreover very high cost of special care and intensive care unit(⁴). Hence attempt was made to study the different causes of LBW because there is increase of neonatal death every year globally.

Material and Method

82 (Eighty two) pregnant ladies aged between 16-30 years, regularly visiting to obstetrics and gynecology department of G.S medical college hospital NH24 near Dhoori petrol pump, Peeplabandpur, Pilkhuwa-245204 (U.P.), were selected for study. They were admitted as per their expected delivery date (EDD). History of every patients was noted individually. The history

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clinical manifestations of pregnancy and obstetrics problems were noted and classified with percentage. The LBW babies were referred to neo-natal department for further investigation. The patients having neurological complications, HIV, HbSAG and mothers having still born babies were excluded from the study.

The duration of the study was about 2 years (from September-2016 to December-2018).

**Observation and Results**

**Table 1: Maternal history in LBW fetal study.**

1. Qualification study: 38(46.3%) were illiterate, 28(34%) were qualified upto primary school, 16 (19.5%) up to high school. (Secondary school)
2. Habit study: 4(4.87%) were smokers, 36(43.9%) were passive smokers, 42(5.2%) were Tobacco chewers.
3. Socio-economic status: 12(14.6%) were house wives, 17(20.7%) were shop keepers, 53(64.3%) were laborer.
4. Age of maternal: 38(46.3%) were between 16-19 years, 29(35.3%) were between 20-25 years, 15(18.2%) were aged between 26-30 years.

**Table 2: Study of clinical manifestation during pregnancy.**

14(17%) had PIH (Pregnancy Induces Hyper tension), 4(4.87%) had Pre-eclampsia, 6(7.31%) had gestational Diabetes mellitus, 24(29.2%) had APH (Antepartum hemorrhage), 32(39%) had PROM (Premature Rupture of Membrane).

**Table 3: Obstetric factors affecting LBW.**

30(36.5%) were primiparous, 52(63.4%) were multiparous, 62 (75.6%) had previous history of LBW, 38(46.3%) had history of miscarriage.

The period of amenorrhea at delivery, 22(26.8%) had 28-37 weeks, 53(64.6%) had 38-40 weeks, 7(8.53%) had above 40 weeks, 5(6%) mothers had multiple pregnancies.

**Discussion**

In the present study of factors, affecting LBW of newborn in Uttar Pradesh. The maternal history was qualification 38(46.3%) were illiterate, 28(34%) were studied till primary school. 16(19.5%) were educated till secondary school. The habits were 4(4.8%) were smoker, 36(43.9%) were passive smokers, 42(51.2%) were Tobacco chewer (like Gutaka). The Socio-economic status was 12(14.6%) were house wife, 17(20.7%) were shop keepers, 53(64.3%) were laborer. The age of pregnant mothers was 38(46.3%) were between 16-19 years, 29(35.3%) were aged between 20-25, 15(18.2%) were 26-30 years old. (Table-1). The clinical manifestation of pregnant mother was 14(17%)PIH (Pregnancy induced Hyper tension HTN), 4(4.87%) had pre-eclampsia, 2(2.43%) had eclampsia, 6(7.3%) had gestational diabetes, 24(29.2%) APH (Antepartum hemorrhage), 32(39%) had PROM (Premature Rupture of Membrane) (Table-2). The obstetric factors were –In parity study 30(36.5%) were primiparous, 52(63.4%) were multiparous, 62(75.6%) mothers had previous history of LBW, 38(46.3%) mother had history of miscarriage. The period of amenorrhea was 22(26.8%) had 28-37 weeks, 53(64.6%) had 38-40 weeks, 7(8.53%), had above 40 weeks, 5(6%) mothers had multiple pregnancies. This finding were more or less in agreement with previous studies. The socio-economic conditions such as poverty, education level, violence during pregnancy, passive smoking (because her husband or father in law, family members could be smokers) early marriages are also contributing factors for LBW. Infectious agents have potential to penetrate through uterus in lesser immunity females and cause inflammation in uterus and placenta. Cytokines are released in response to the inflammation by the body immune system resulting in preterm initiation of labor which results in LBW. Adolescent when become pregnant before their own growth is completed faces difficulty in fulfilling their own and nutritional requirement. It has been also reported that passive smokers exposure to beedi or cigarettes smoking contains a complex mixture of various mutagenic which endogenous to growing fetus.

LBW individuals experience many health complication throughout their life which can cause long and short terms consequences including hypothermia, perinatal asphyxia respiratory problems, Hyperbilirubinemia, anemia, infection, neurological problems, ophthalmic complications, hearing defects, sudden infant death syndrome, coronary artery disease, immune-system problems. LBW could be due to serious placental problems leading to insufficient transport of nutrient and oxygen to fetus. Hence expecting mothers should have proper nutritional intake and regular medical check-up moreover expecting mothers should
not take self-medicine without advice of physician or obstetrician and gynecologist

Sometimes premature LBW babies need to be born to save mothers life due to other complications like anomalies of placenta, severe bleeding etc. It is also hypothesized that, violence during pregnancy leads to stress and strain on growing fetus may impair or retard the growth of fetus lead to LBW with de-arrangements of cardio-vascular and central nervous system. The LBW babies suffer with this de-arrangement in their future life, such children will be burden to whole family and society as well.

During pregnancy, apart from proper nutrition, regular medical check-up, expecting mothers should be treated, sympathetically and amicably for healthy growth of fetus.

Summary and Conclusion

The present study of factors affecting LBW of newborn in Uttar Pradesh will be quite useful to obstetric and gynecologist, physician pediatrician to avoid the morbidity and mortality of newborn. It is necessary improve the maternal health through nutrition and education because maternal malnutrition and anemia have significant association with LBW but this study further demands genetic, immunological, nutritional and embryological study because exact function of placental barrier and duration of formation of germ layers is still un-clear.

This research paper was approved by ethical committee of G.S. Medical College, NH24, Near Petrol Pump, Peelabandapur, Pilkhuwa-245304(UP).

No conflict of interest
No funding

Table 1: Maternal history in LBW fetal study.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-Illiterate</td>
<td>38</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>b-Primary school</td>
<td>28</td>
<td>34.1</td>
</tr>
<tr>
<td></td>
<td>c-High school</td>
<td>16</td>
<td>19.5</td>
</tr>
<tr>
<td>2</td>
<td>Habits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-Smokers</td>
<td>04</td>
<td>4.87</td>
</tr>
<tr>
<td></td>
<td>b-Passive smokers</td>
<td>36</td>
<td>43.9</td>
</tr>
<tr>
<td></td>
<td>c-Tobacco chewers</td>
<td>42</td>
<td>51.2</td>
</tr>
<tr>
<td>3</td>
<td>Scio-Economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-House wife</td>
<td>12</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>b-Shop keepers</td>
<td>17</td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>c-Labors</td>
<td>53</td>
<td>64.3</td>
</tr>
<tr>
<td>4</td>
<td>Age of the maternal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-16-20 years</td>
<td>38</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>b-20-25 years</td>
<td>29</td>
<td>35.3</td>
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<tr>
<td></td>
<td>c-26-30 years</td>
<td>15</td>
<td>18.2</td>
</tr>
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</table>

Table 2: Study of clinical manifestation during pregnancy.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PIH</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Pregnancy Induced HIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pre-eclampsia</td>
<td>04</td>
<td>4.87</td>
</tr>
<tr>
<td>3</td>
<td>Eclampsia</td>
<td>02</td>
<td>2.43</td>
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<tr>
<td>4</td>
<td>Gestation Diabetes</td>
<td>06</td>
<td>7.31</td>
</tr>
<tr>
<td>5</td>
<td>APH</td>
<td>24</td>
<td>27.2</td>
</tr>
<tr>
<td></td>
<td>Ante partum haermarrage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PROM</td>
<td>32</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Premature rapture of membrane</td>
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</tbody>
</table>
### Table 3: Obstetric factors affecting LBW

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>No of Patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-Primiparous</td>
<td>30</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>b-Multiparous</td>
<td>52</td>
<td>63.4</td>
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<tr>
<td>2</td>
<td>Previous history of LBW</td>
<td>62</td>
<td>75.6</td>
</tr>
<tr>
<td>3</td>
<td>History of miscarriage</td>
<td>38</td>
<td>46.3</td>
</tr>
<tr>
<td>4</td>
<td>Period of Amenorrhea at delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a-28-37 week</td>
<td>22</td>
<td>26.8</td>
</tr>
<tr>
<td></td>
<td>b-38-40 week</td>
<td>53</td>
<td>64.6</td>
</tr>
<tr>
<td></td>
<td>c-Above 40 week</td>
<td>07</td>
<td>8.53</td>
</tr>
<tr>
<td>5</td>
<td>Multiple pregnancy</td>
<td>05</td>
<td>6.09</td>
</tr>
</tbody>
</table>

### References


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¹Postgraduate, ²Professor, ³Assistant Professor, ⁴Professor and Head, Department of Community Medicine, JSS Medical College, Mysuru

Abstract

Background: “Demographic transition” has affected the health-care needs of the world’s population. The epidemiological transition from communicable diseases to Non-communicable diseases (NCDs) and Cardiovascular diseases (CVDs) being a leading cause of death calls for prevention of CVDs which will be the essential step to control the epidemic of NCDs. The aim of this study is to estimate the cardiovascular risk among adults aged ≥40 years, utilizing WHO/ISH risk charts.

Method: A community based cross-sectional study conducted among 250 individuals aged ≥40 years residing in urban area of Mysuru, Karnataka. Study participants were personally interviewed using a semi-structured questionnaire. Information regarding anthropometric measurements and laboratory investigations were also collected. The 10-year risk for cardiovascular events was estimated using the WHO/ISH risk prediction charts.

Results: Among 250 study participants, the mean age was 52.7 (+9.5) years and majority were females (69.6%). 25.6% had very high (≥40%) risk, 18% had 10–<20% risk, 23.2% had 20–<30% risk and 8% had 30–<40% estimated risk of developing fatal and non-fatal CVD event in next 10 years. The prevalence of risk factors like Hypertension, Diabetes, Hypercholesterolemia, Moderate Stress and Physical Inactivity were 49.2%, 28.8%, 24.4%, 45.6% and 8.8% respectively. Over-nutrition was more prevalent where 34.4% and 27.2% had class I obesity and class II obesity respectively.

Conclusion: There was a high prevalence of CVD risk factors and estimated risk of CVD are significantly prevalent in the urban population. Simple tool like WHO/ISH risk prediction charts can be used as a screening tool to estimate the CVD risk occurrence in next 10 years, in a low resource country like India, even at a community level.

Keywords: CVDs, CVD risk factors, Estimated 10 year CVD risk, WHO/ISH risk prediction charts, Urban population.

Background

Cardiovascular Diseases (CVDs) comprises a group of diseases of the heart and the vascular system.[¹] CVDs are the leading cause of death globally with 17.5 million annual deaths which is more in Low- and middle-income countries (LMICs).[²] By 2030, almost 23.6 million people will die from CVDs, mainly from heart disease and stroke.[³]

There has been a paradigm shift in the focus from communicable diseases to a new epidemic of NCDs and their sequelae. CVD, cancer, and diabetes mellitus (DM) have become the major causes of morbidity and mortality worldwide, but particularly in Southeast Asia region where they contribute to 52% of deaths and 38% of disease burden.[⁴]

Currently, India is facing a rapid health transition from Communicable disease to NCDs which account for
around 60% of all deaths causing a considerable loss in productive years of life. These losses due to premature deaths are projected to increase over the coming years.\[^5\] Compared with other countries, India suffers the highest loss in potentially productive years of life, due to deaths from CVD in people aged 35-64 years.\[^1\]

The prevalence of CVD reported to be 2-3 times higher in urban population.\[^1\] Over the past four decades, the prevalence of IHD in India has raised twofold in rural areas and sixfold in urban areas. At present, estimated prevalence of CHD is 7-13% in urban and 2-7% in rural areas.\[^2\] This higher incidence of CVD in urban areas reflects the acquisition of several risk factors such as tobacco consumption, lack of physical activity, unhealthy diet etc.

As CVDs are eminently preventable, Investment in prevention is the most sustainable solution. Over the last two decades, CVD mortality has declined in developed countries due to a combination of prevention and control measures.\[^6\] LMICs can be benefitted from the strategy of primary prevention.\[^1\] Research from several countries has consistently shown that treatments of established CVD explain less of the decline than reductions in risk factors to prevent development of CVDs.\[^7\] Therefore, Established tool like WHO/ISH risk prediction charts is used to estimate the total CVD risk.\[^8\]

In this context, present study was conducted with the objective of evaluating cardiovascular diseases risk utilizing WHO/ISH risk prediction charts among urban population in Mysuru, Karnataka.

**Methodology**

A community based cross-sectional study was conducted from January 2017-December 2017 among urban population residing in Mysuru, Karnataka. The required sample size was calculated using the prevalence of diabetes, 17% (CVD risk factors with highest prevalence)\[^8\] with 5% absolute precision, confidence level of 95% and non-response rate of 10%, the required sample size was 239 which was rounded off to 250. Study participants were selected using simple random sampling method. Individuals who were ≥40 years and residing for at least past one year were included. Individuals who were unavailable for two consecutive visits to the houses and those with confirmed CHD, stroke or other atherosclerotic diseases were excluded.

After obtaining clearance from institutional Ethics committee, study participants were personally interviewed using semi-structured questionnaire. Information about socio-demographic profile, family history, diet, personal habits, physical activity (GPAQ), and stress (DASS 21) was collected. BP (Prehypertension: BP 120-139/80-89 mmHg; Hypertension: BP ≥140/90 mmHg), anthropometric measurements, obesity (according to WHO-Asia-Pacific perspective BMI), total cholesterol (≥200 mg/dl) and random capillary blood glucose levels (Impaired glucose tolerance: ≥140-<200 mg/dl; Diabetes mellitus: ≥200mg/dl) were measured.

Estimation of CVD risk was done using SEAR-D specific WHO/ISH Risk prediction charts,\[^9\] according to gender, age, systolic blood pressure, total cholesterol, smoking status and presence or absence of DM. The risk was classified into five levels as <10%; 10% to <20%; 20% to <30%; 30% to <40%; and ≥40% and were depicted with green, yellow, orange, red and deep red colours respectively.

Data thus obtained was coded and entered in Microsoft Excel 2010 and analyzed using SPSS software version 22. Descriptive statistics such as frequencies, percentages, mean and standard deviation were calculated. Data was represented as tables and graphs as relevant.

**Results**

The Mean (SD) age was 52.7 (±9.5) years and majority (70%) belonged to age groups of 40-49 and 50-59 years with nearly equal representation from both the groups. Higher proportion of study individuals were females (69.6%), non-literates (53.2%) and homemaker (52.4%). According to modified Kuppuswamy scale for Socioeconomic status classification, 63.2% of them belonged to Upper Lower class.

In the present study, Family history of CVD was reported in 5.6% of study individuals. 15.2% were smokers and 9.2% had habit of tobacco chewing. Alcohol consumption was noted in 15.6%. 89.6% were consuming mixed diet.

History of hypertension (who were either diagnosed previously as hypertensive and/or was taking treatment) was noted in 28%, 21.2% were newly diagnosed as hypertensive and 15.6% as pre-hypertensive. The overall prevalence of hypertension was 49.2%. Similarly, 23.6% gave history of DM (who were either diagnosed previously as Diabetic and/or was taking treatment). 5.2% were newly diagnosed as diabetics and 13.6% as pre-diabetics during the study. Overall, 8.8% of the study participants had DM. Only 2.8% were aware
about their hypercholesterolemia status and 21.6% were newly diagnosed during the study. The prevalence of hypercholesterolemia was 24.4%.

It was observed that, 79.6% had substantially increased risk based on Waist-Hip Ratio. 61.6% were Obese and 16% had At risk Obesity. Underweight was noted among 5.6% of the study individuals. Mild to moderate stress (total score between 15-25) was noted in 55.2% and 28% had severe/extremely severe stress (total score ≥26) according to DASS-21. Majority, 91.2% were physically active and were meeting the WHO recommended metabolic equivalents of >600 minutes per week. Those who did not meet the criteria and belonged to sedentary group contributed only to 8.8%.

From the Figure 1 it was observed that, 25.6% of the study individuals had very high (≥40%) risk of developing fatal or non-fatal CVD event in next 10 years. 18% had 10%–<20% risk, 23.2% had 20% – <30% risk and 8% had 30%– <40% risk.

The estimated overall CVD risk was more in females than in males. Females were having more risk in all the levels of risk except for very high risk (≥40%) where males had 38.2% chance and females had 20.1% chances of having CVD occurrence in next 10 years, but statistically association was not noted between males and females with respect to estimated CVD risk (p value: 0.053). (Figure 2)

In present study, family history of CVD was reported among 5.6% of study individuals. Other studies conducted in central India and in Urban population also reported low prevalence of family history of CVD as 4.1% and 4.6% respectively.[4,10] Prevalence of tobacco consumption was noted among 24.4% of the study individuals whereas Global Adult Tobacco Survey 2 (GATS 2) done in India reported 28.6% of tobacco use in adults in any form.[11] Our findings are in accordance with this findings. Alcohol consumption was noted only in males (15.6%). Study done by Junapudi SS and Rao BB reported high prevalence (30.7%) than our study. This could be due to more sample size in their study.[12] Study by Ghorpade AG in South India also reported high prevalence of alcohol as 53%.[8]

Present study reports hypertension in 49.2%. Prevalence of hypertension was 18.7% and 21% in study done by Junapudi SS and Sekri T respectively which is in contrast with our study.[10,12] High prevalence of hypertension is noted in study done in Kathmandu, Nepal (53.6%) and study by Satyanarayana PT(41.9%).[13,14] In our study, prevalence of DM was 28.8%. Similar result was found in study conducted in Tamil Nadu, where DM in urban area was 23.6%.[15] However, contrast result was noted in study conducted in rural Indian population (16%) by Sekhri T et al.[10] The CARRS (Center for Cardio-metabolic Risk Reduction in South Asia) Study has shown that overall prevalence of diabetes in 3 major cities of South Asia was Chennai (South India): 22.8% (21.5-24.1%); Delhi (North India): 25.2% (23.6-26.8%); and Karachi (Pakistan): 16.3% (15.2-17.3%).[16] There is marked heterogeneity in prevalence of diabetes based on residence. Prevalence of hypercholesterolemia in our study was 24.4%, whereas, it was contrasting in study by Oommen AM et al where prevalence of total cholesterol was 44.3%.[15] This could be due to lower cut off value of total cholesterol than our study (total cholesterol >200 mg/dl) which led to inclusion of more individuals. Along with epidemiological transition, developing countries are also undergoing nutritional transition from an earlier high prevalence of under-nutrition to now facing a burden over nutrition both in urban and rural areas. Our study also revealed over-nutrition with the prevalence of 5.6% underweight (BMI<18.5), 16% at risk obesity (BMI 23 to 24.9) and 34.4% obesity class I (BMI 25 – 29.9) and 27.2% obesity class II (BMI > 30). According to the nationwide, population-based Indian Council of Medical Research-India Diabetes (ICMR-INDIAB)
In our study, prevalence of generalized obesity, varied from 11.8% in Jharkhand to 31.3% in Chandigarh.\textsuperscript{[17]}

In our study, 45.6% had moderate stress and 6.8% had extremely severe stress. Physical inactivity was seen in 8.8%. Study conducted in Nepal showed physical inactivity among 18.7%.\textsuperscript{[13]} and study by Junapudi SS, reported, sedentary life in 13.7% in urban population\textsuperscript{[12]}

In our study, WHO/ISH risk prediction chart reported that, 25.6% had very high (> 40%) risk, 8% had 30-<40% risk, 23.2% had 20-<30% risk, 18% had 10-<20% risk, 25.2% had low (<10%) estimated risk of developing fatal or non-fatal CVD event in next 10 years. It was found that the estimated overall CVD risk was more in females than males. However, the very high (> 40%) risk was more among males (38.2%) than females (20.1%). Study done in rural India utilizing WHO/ISH risk prediction chart reports 86% subjects to have a low risk (<10%) of the CVD event and only 7 people to have a risk of >30%.\textsuperscript{[9]} Our results are in contrast with these results and this could be due to low prevalence of hypertension and diabetes in their study compared to ours. Another study done among supporting staff of tertiary care hospital predicted, 1.7% had >10% of CVD risk and 98.3% had less than 10% risk\textsuperscript{[18]} and in Bansal Pet al\textsuperscript{[19]}, risk of CVD was assessed to be ≥10% in 44.4% of subjects, while 55.6% subjects were predicted to have <10% risk of CVD in 10 year duration. Low risk (<10%) is noted in these study and this could be due to non-consideration of another important risk factor i.e, Total Cholesterol while using WHO/ISH risk prediction chart and this might have led more members to fall in low risk (<10%) category.

**Conclusion**

Significant portion of study participants with higher prevalence of CVD risk factors and very high CVD risk in next 10 years calls for preventive measures by investing in primary and secondary prevention of CVD risk factors which will be the sustainable solution for CVD epidemic. Simple tool like WHO/ISH risk prediction charts which is graphical and easy to understand by general population, can be used as a screening tool to estimate the CVD risk occurrence in next 10 years, in a low resource country like India, even at a community level.

**Conflict of Interest:** Non declared

**Source of Funding:** Self

**Ethical Clearance:** Ethical clearance was obtained from JSS Medical College Institutional Ethics Committee before start of the study. Written informed consent was obtained from all the study individuals before interviewing them and at most care was taken to maintain privacy and confidentiality.

**References**


Health Care in Andaman, Lakshadweep and Puducherry: A Comparative Study

Anita Banerjee
Assistant Professor (in Economics), Andaman Law College, Port Blair

Abstract

Given the growing importance of health care in the present day world, The present study attempts to draw a comparison between supply of health care (infrastructure) and the demand for health care (in terms of health outcomes) in the three Union territories of Andaman, Lakshadweep and Puducherry, in the backdrop of the recently published report on “healthy states” published by the government of India. The study points out through health outcomes, the lacunae in certain areas which needs to be corrected.

Keywords: Infrastructure, Birth Rates, IMR, U5 mortality rates.

Introduction

To begin with what is health care? Well broadly defined health care implies providing individuals as well as the community adequate medical care. More specifically health care would mean monitoring of health through prevention, diagnosis, treatment of diseases, and injury besides other ailments. Health care is provided by health professionals through private or public health care institutions. In India health care services has gradually evolved over the years, starting from the Bhore Committee report in 1946, which gave an outline of the health systems and policies for betterment, yet a lot has to be done towards this direction. Even in the constitution, health care is a subject which has been mentioned right from the time it was implemented. There is a mention of social justice and health care and the principle of justice in the matter of equal access to health care is tacitly mentioned in the constitution. The subject of health is also referred to under fundamental rights. In recent times concerns of health has been gaining importance. In the recently published report by the central government on the performance of health outcomes of states and union territories under the title “Healthy States, Progressives India” ranked states, and union territories based on certain indicators. The present study seeks to draw a comparison between the three union territories based on supply side factors (health infrastructure) and the demand side health outcomes (indicators), in the process pin-point the areas which need special attention.

Methodology: The study is based on secondary data collected from the various Government departments and websites. For the purpose of comparison a method of percentage analysis was adopted.

Earlier studies on health care: Studies based on comparison of health care facilities and health indicators have been undertaken with respect to interstate comparisons among populous states such as Uttar Pradesh and Bihar where it was found that there existed a poor and insignificant correlation between infrastructure and outcome. In a somewhat different study based on health care needs and accessibility to health care in a county in Romania it was revealed that there existed inequalities in people’s access to health care services. It also showed that there existed an inverse relationship between higher health care needs and poor health care services. In yet another study on health infrastructure and health indicators in Andhra Pradesh it was found that 70% of the variation in all health indicators is explained by health infrastructure. Similarly in a study based on a comparative evaluation of Public health services with private health centres using Data Envelopment Analysis (DEA) technique in Uttar Pradesh found that the primary health care services were far more efficient than the private health facilities with better efficiency.
scores. A description of public health infrastructure was also attempted in an article on public health systems with focus on new born. It also emphasizes that health infrastructure and health systems have a bearing on health outcomes. Most studies on health systems have highlighted the structural constraints in providing health care services in government health care facilities.

Thus from the various studies it can be inferred that there does exist a relation between health infrastructure and health indicators.

The present study seeks to study the status of health care facilities and health indicators in the three union territories in the peninsular India. First a brief overview about these union territories: the three union territories are located in the Indian peninsula. Two of them that are Lakshadweep and Andaman & Nicobar are islands and Puducherry is a land locked area.

For the purpose of drawing a comparison between the three union territories two major variables have been taken into account they are the health infrastructure and the health outcomes that is stated in other terms on the supply side are the health infrastructure provided by the government and on the other hand is the health outcomes in terms of infant mortality rate (IMR), Birth Rates and Under Five Mortality Rate (U5). First a comparative study of the health facilities in the three union territories under study. To begin with the union territory of Andaman and Nicobar Islands has a population of 3.85 lakhs, with literacy rate of 86.63% and a sex ratio of 876 females per thousand males. It has a total of 31 rural hospitals and 1 urban hospital with a total of 1075 number of beds. The average number of population served per hospital is 16642 and average number of population served per hospital bed is 495. Puducherry has population of 12.4 Lakhs. Sex ratio is 1037, literacy rate at 85.85%. This union territory has nearly equally distributed number of hospitals in rural and urban areas. A total of 27 rural hospitals and 26 hospitals in urban areas, total number of beds in the hospitals are 3271. The average population served per Government hospital is 29677 and the average population served per government hospital bed is 481. Location of this union territory Puducherry is such that it attracts people from nearby districts of Tamil Nadu. Lakshadweep an island in the Arabian Sea has a population of only 64673 but has a better literacy rate than the other two union territories under study (92%) and a better sex ratio than Andaman and Nicobar Islands with 946 females per thousand males. Total number of hospitals in Lakshadweep islands is 9, the reason is that it is by and large a rural island with no hospitals in urban areas, the total number of hospital beds is 300 and average population served per hospital is 8698, whereas average population served per hospital bed is 261.

Health Indicators: Though there are several indicators of health to assess, for the present study only three have been chosen for comparison. The birth rate for Lakshadweep has remained constant in the three year period at 14.8% whereas in the other two union territories of Puducherry and Andaman and Nicobar Islands have registered a decline during the period. Infant mortality Rate that is per thousand live births is identical for both the island union territories of Andaman & Nicobar and Lakshadweep whereas for Puducherry its much lower at 17 per thousand live births though it has a larger population than both Lakshadweep and A & N Islands. In terms of children who die before attaining the age of five, Andaman Nicobar Islands recorded the lowest deaths at 13 per thousand live births, indicating that child and mother care health are better looked after than in Lakshadweep which had registered a higher under five mortality rate at 23 per thousand live birth followed by Puducherry with 16 death for every thousand live births.

<table>
<thead>
<tr>
<th>Names of UTs</th>
<th>Birth Rates (per thousand live births)*</th>
<th>IMR (per thousand live births)</th>
<th>U-5 Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A&amp; N Islands</td>
<td>15.1, 15.2, 15.3</td>
<td>14.6, 14.7, 14.8</td>
<td>24, 24, 24</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>14.7, 14.8, 14.9</td>
<td>14.8, 14.9, 15.0</td>
<td>24, 24, 24</td>
</tr>
<tr>
<td>Puducherry</td>
<td>16.1, 16.2, 16.3</td>
<td>15.8, 15.9, 16.0</td>
<td>17, 17, 17</td>
</tr>
</tbody>
</table>

Source: SRS Bulletin, September 2013, Registrar General of India.

*Based on three year period 2010-2012 (from National Health Profile 2015).

Other significant indicators which are considered relevant for assessing the health status of the people of a state are maternal and child health. In this respect also a comparison is made between the three union territories.

Maternal and Child Health Care Services: One of the key areas where the National Rural Health Mission (NRHM) has been very successful in delivering the services to a large extent is in the matter of maternal and child health care services. One of the primary needs when a woman is pregnant is that she should goes for checkups initially in the first trimester, the union territory of Lakshadweep had the highest percentage
of women (91.9 %) who had the antenatal check up in the first trimester which was followed by Puducherry with 80.6% of women who had registered for antenatal check ups and Andaman & Nicobar Islands registering the lowest percentage at 68.4%. But again in case of the four antenatal visits as stipulated by WHO, the islands of Andaman and Nicobar were highest with 92.1 % coverage of women, in contrast Puducherry had 87.7% and Lakshadweep had 82.8%. In most of the indicators of maternal health it is observed that Lakshadweep is ahead of the other two union territories in terms of percentage of coverage that is mothers who consumed iron folic tablets during pregnancies is highest in Lakshadweep (82% as against 66% in Puducherry and 58 % in A & N Islands as well as in getting post natal care within two days of delivery). However when it comes to the question of mothers who received financial benefits for institutional delivery under the JananiSurakshaYojana it is observed that Puducherry though has a larger population than the other two union territories under the present study, happened to have a larger percentage of women who could avail this benefit (21%) as against just 1.4% in Andaman and Nicobar Islands, whereas it was only 17.5 % in Lakshadweep, this could be due to lack of awareness among people. In terms of nutritional status of children Puducherry stands ahead of the other union territories on most of the indicators used to assess the health status of children in the initial years after their birth.

Table 2: Maternal and Child Health (in percentages)

<table>
<thead>
<tr>
<th>Maternity Care (for last birth in the 5 years before the survey)</th>
<th>Andaman &amp; Nicobar Islands</th>
<th>Puducherry</th>
<th>Lakshadweep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothers who had antenatal check up in the first trimester (%)</td>
<td>68.4</td>
<td>80.6</td>
<td>91.9</td>
</tr>
<tr>
<td>Mothers who had at least 4 antenatal care visits (%)</td>
<td>92.1</td>
<td>87.7</td>
<td>82.8</td>
</tr>
<tr>
<td>Mothers who consumed iron folic tablets for 100 days or more when they were pregnant</td>
<td>58.4</td>
<td>66.3</td>
<td>82.1</td>
</tr>
<tr>
<td>Registered Pregnancies for which the mother received Mother and Child Protection (MCP) card</td>
<td>97.7</td>
<td>98.0</td>
<td>95.9</td>
</tr>
<tr>
<td>Mothers who received post natal care from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of delivery</td>
<td>75</td>
<td>84.9</td>
<td>92.6</td>
</tr>
<tr>
<td>Mothers who received financial assistance under JananiSurakshaYojana (JSY) for births delivered in an institution</td>
<td>1.4</td>
<td>21.4</td>
<td>17.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delivery care (for births in the 5 years before the survey)</th>
<th>96.6</th>
<th>99.9</th>
<th>99.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional births (%)</td>
<td>92.3</td>
<td>82</td>
<td>63.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutritional status of children</th>
<th>41.9</th>
<th>65.3</th>
<th>54.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child under 3 who are breast fed within one hour of their birth</td>
<td>14.2</td>
<td>31.1</td>
<td>11.3</td>
</tr>
<tr>
<td>Total children age 6-23 months receiving adequate diet</td>
<td>21.6</td>
<td>22</td>
<td>23.4</td>
</tr>
<tr>
<td>Children under 5 years who are underweight (weight for age)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The table on number and percentage of people living below poverty line it can be inferred that among the three union territories Andaman and Nicobar has the lowest number of persons living below the poverty line (1%), interestingly it is also the union territory with the lowest number of under five mortality rate registered in the period 2010-2013, with low birth rates too among the other three union territories indicating thereby that health indicators have a direct bearing upon the poverty lines. Studies in the past have also indicated that poverty and health are intertwined; there exists a vicious link between poverty and ill health 8, 9, 10. Looking at union territory of Puducherry, it becomes evident that with a higher percentage of people living under poverty line (9.69%), its health indicators such as birth rate and infant mortality rate are on the higher side as compared to Andaman and Nicobar islands. Lakshadweep Islands exhibit a drastic fall in percentage of people living below poverty line from 6.80% in 2009 to 2.7% people below poverty line in 2011-12, but with a comparatively higher under five (U5) mortality rate during the said period when compared to the other two union territories even though it has a very high percentage of overall literacy at 91.85%. Thus, it can be said that poverty line and health indicators are related though; there are other factors which needs to be considered as well.

Table 4: Number of Government Hospitals & Beds in Rural & Urban Areas of Union Territories.

<table>
<thead>
<tr>
<th>Union Territories</th>
<th>Rural Hospitals</th>
<th>Urban Hospitals</th>
<th>Total Hospitals</th>
<th>Average Population served per govt., Hospital</th>
<th>Average Population served per govt. Hospital Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; N Islands</td>
<td>31</td>
<td>625</td>
<td>1</td>
<td>450</td>
<td>32</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>9</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Puducherry</td>
<td>27</td>
<td>274</td>
<td>26</td>
<td>2997</td>
<td>53</td>
</tr>
</tbody>
</table>

Source: Directorate General of Health Services as mentioned in National Health Profile 2015.

Table 5: Monthly per Capita Household Out-of-Pocket medical Expenditure in three Union Territories.

<table>
<thead>
<tr>
<th>Name of UT</th>
<th>Per capita monthly Exp (Rs) %</th>
<th>Medical Institutional Expenditure as share of total Medical Exp (%)</th>
<th>Medical Institutional Expenditure as share of total non-food consumption expenditure (%)</th>
<th>Medical Expenditure as share of total consumption expenditure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>A &amp; N Islands</td>
<td>32</td>
<td>179</td>
<td>16.1</td>
<td>49.8</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>174</td>
<td>406</td>
<td>74.5</td>
<td>89.9</td>
</tr>
<tr>
<td>Puducherry</td>
<td>103</td>
<td>154</td>
<td>23.1</td>
<td>24.4</td>
</tr>
</tbody>
</table>

Source: National Health profile-2015, Central Bureau of health Intelligence, New Delhi.
Monthly per capita out – of- pocket expenditure is lowest in Andaman and Nicobar islands. Even looking at the table on monthly per-capita out of pocket expenditure what becomes clear is that over all whether it is institutional expenditure as a share of total non – food consumption expenditure or medical expenditure as a share of total consumption expenditure, Lakshadweep spends the most. Therefore, these anomalies among the union territories needs to be investigated because if population is taken to be the factor into consideration for the high out –of –pocket expenditure then, Pondicherry ought to have higher expenditure than the other two islands under study, but as is evident from the table, this is not the case, Lakshadweep has the lowest population when compared to the other two.

Conclusion

The report of the government of India assigning ranks to the states/ Union territories based on the health indicators have placed Lakshadweep among the best performing union territories, yet based on the data in the study it has come to light that on certain indicators such as under five mortality rate, Andaman and Nicobar Islands and Puducherry are ahead in the sense that these UTs have registered a lower mortality rate when compared to Lakshadweep. When it comes to benefit received under JananiSurakshaYojana, it is observed that in union Territory of Puducherry larger percentage of mothers were covered under this scheme when compared to Lakshadweep, even though the percentage of people living below poverty line is larger in Lakshadweep than in Puducherry. Whereas on the other hand Lakshadweep exhibits higher literacy rates and better sex ratio. Thus it can be said that on certain parameters Lakshadweep seems to be ahead of the other two Union territories. Therefore it can be concluded that there is some policy lapses in implementing health programmes.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: The article does not violate any ethical norms, as it does not deal with individual behaviour.

References

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Lymphangioma: A Case Report

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Abstract

Lymphangioma is a benign hamartomatous neoplasm of the lymphatic system with a marked predilection for the head and neck region. Most common location is submandibular region and in oral cavity tongue is commonly affected. Around half the cases are present since birth. Herein we report a case of lymphangioma in 25 year old female. The clinical and histopathological finding of the case with possible etiology, management are discussed.

Keywords: Lymphangioma, Hamartoma, Cystic hygroma.

Introduction

Lymphangioma is a benign hamartomatous neoplasm of the lymphatic system, with a marked predilection for the head and neck region and more commonly occurs in submandibular region1,2. Around half the cases are present since birth3. The lesion is assessed in the line with the vessels diameter into: microcystic or capillary, macrocystic or cavernous and hygroma or cystic hygroma4,5. Its prevalence in mouth is rare and is more often situated at the anterior two-third of the tongue; although cases in roof of the mouth, gingiva, mucous membrane, lips and alveolar process have been represented1,6,7. Clinically, its location is superficial, seen as clear and usually grouped vesicles, which may be red or purple because of secondary hemorrhage. The deep lesion are seen clinically as nodular masses of variable color and superficial texture5. There are many therapeutic modalities for the treatment of oral lymphangioma. Surgical excision is usually indicated once vital structures are not involved4,8.

Case Report: A 25 year old female patient reported with the complaint of pain and swelling on the right side of the tongue for the past 2 months. Intraoral clinical examination revealed the lesion was present as growth on the right lateral surface of the tongue measuring about 1 × 1 cm in size, erythematous and sessile in nature. There was no regional lymphadenopathy noted. Clinically such lesion was diagnosed either as hemangioma or lymphangioma. To confirm the diagnosis, an incisional biopsy was performed. The haematoxylin and eosin stained histopathogical section of the given specimen showed hyperplastic parakeratinized stratified squamous epithelium with underlying connective tissue stroma (Fig-1). The connective tissue was densely collagenized with moderate cellularity with diffuse dense chronic inflammatory cell infiltrate. Numerous endothelial lined blood vessels and lymphatic channels are seen (Fig-2). Therefore, the histopathological diagnosis confirmed it as lymphangioma.

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Fig 1: Histopathology image shows Parakeratinized Stratified squamous epithelium and underlying connective tissue stroma.
Discussion

Lymphangiomas are rare inborn malformations of the vascular system that may occur throughout the body with larger predilection for head and neck. Three theories are proposed to explain the origin of Lymphangiomas. The first theory suggests that a blockage or arrest of growth of the primitive lymph channels happens throughout embryogenesis. The second theory says that the primitive lymphatic sac doesn’t reach the blood vessel system, whereas the third theory advances the hypothesis that, throughout embryogenesis, lymphatic tissue lays within the wrong space as a result these cells don’t anastomose efficiently with larger lymphatic vessels, they then provoke areas of lymphatic blockage. Common within the neck region, the anterior triangle of the neck has been indicated because it is the commonest site, primarily bone, trapezius and sternocleidomastoid. The submandibular and salivary gland regions are the more associated areas to lymphangioma development. In oral cavity lymphangiomas occur in the anterior tongue but lip and alveolar ridge and buccal mucosa are involved. In our case, the lesion is present in the tongue.

The incidence of lymphangiomas has been reportable to vary from 1.2 to 2.8 per thousand newborns. The foremost outstanding sign or symptom of all lymphangiomas is the presence of a mass. In adult patients, tumor will switch to epithelial cell malignant neoplastic disease. The surface is granular as a result of clear vesicles and color is red or blue as a result of rupture of underlying blood vessels. The deeper lesion could cause higher respiratory tract disorder or incidental trauma at the location and problem in chewing, speech and deformity of the jaws.

Histologically, these lesions are composed of expanded lymphatic channels. These expanded lymphatics will vary in size, relying upon the situation and surrounding tissues and is that the basis for classification consistent with Yaita et al. Relying upon cystic area size, they’re classified as: macrocystic, microcystic and mixed.

Ultra-sonography, CT and imaging scans are often accustomed outline the link of the lesion with the neighboring structures and to assist arrange surgery. The clinical course of the pathology varies from a spontaneously regressive cyst to an aggressively invasive lesion. Spontaneous or traumatic hemorrhage of the cysts is the common complication.

While treatment of lymphangiomas includes surgical excision, cryotherapy, electro surgical procedure, sclerotherapy, steroids administration, embolization, and laser therapy. Surgical excision is the best treatment for lesions presenting localized growth.

Conclusion

Oral lymphangiomas are uncommon lesion occurring at the tongue. Superficial and localized lesion are often treated by conservative approaches like laser therapy, cryotherapy and surgical excision with less relapse rate. Therefore, proper diagnosis is important for proper therapeutic implications.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not required

References

Prevalence of Musculoskeletal Problems in Untrained Exercising Individuals

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Krishna Institute of Medical Sciences Deemed to be University, Karad.

Abstract

Objective: To find untrained exercising individuals and to find out which all musculoskeletal problems arises due to untrained exercising individuals.

Method: A total 100 subjects were included both males and females between age group 20 to 40 among which 51 were males and 49 were females. The subjects were explained about Mc. Gill questionnaire and were asked to rate the pain according to VAS in reference to before practising unsupervised exercise and after practising un supervised exercising.

Results: The prevalence rate of musculoskeletal problem in untrained exercising individuals is 84 %.

Conclusion: It is found that musculoskeletal problem increased after practicing untrained exercises and pain was increased in the individuals and the most affected area was low back area, type of pain found to be more was sensory and intermittent type in relation to time.

Keywords: musculoskeletal problems, untrained exercises.

Introduction

Musculoskeletal disorders are defined as musculoskeletal symptoms, musculoskeletal complaints or musculoskeletal pain that arises due to many conditions such as back pain, shoulder pain, neck pain, pain in limbs, myofascial dysfunction syndrome, carpal tunnel syndrome, atypical facial pain etc. In past few decades musculoskeletal disorders are found to be commonly increasing.

Common mechanism for musculoskeletal disorders is overuse of certain muscles which may be attributed to any of the factors like performing repetitive action with or without required located efforts, postures during work, short rest interval and stress imposed. Therefore, it must be aimed to verify influence of type of exercise, intensity, frequency, duration of training in reducing MSD.

Exercises are performed for various reasons, like for growth and development, preventing aging, strengthening muscles and cardiovascular system, honing athletics skills, weight loss and maintenance of health. They are also found to be effective in improving the mental well-being of general Public.

Exercises also help to improve neuromuscular control/coordination, balance/postural equilibrium, muscle performance, mobility/flexibility, stability, cardiopulmonary/endurance. Weight management is improved by performing regular exercise and also lowers blood pressure, improves c-reactive protein and CHD biomarkers, improve lipoprotein and enhance insulin sensitivity. Exercise also promotes strength and improve bone mass and therefore helps to prevent and slow down the loss of bone mass thus decreasing the risk of osteoporosis. The muscle weakness is proved factor for increasing risk of osteoarthritis and therefore the various resistance training exercises can be a useful to reduce it.

As the ultimate objective is improvement and maintenance of physical fitness, it should be planned and structured with desired repetition. Parameter such as power, endurance, strength should be added in graded manner as per required goals of the individual, even the frequency, intensity and rest interval should be properly looked for whether the exercise are performed under

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the guidance of therapists or self-practised, safety should be considered as fundamental aspect of programme. The patient who is not familiar with physical exertion may be at risk of developing adverse effect due to exercise.\textsuperscript{5} The safety is affected by performance of an individual in performing exercise, the body alignment and the posture of the body is also included, the speed of performance, and duration. Signs of fatigue should be informed to the individual, risk of injury and its relationship with fatigue. The rest importance during recovery and after an routine of exercise. Under guidance therapist can control these variable, but when exercise program independently are carried out by patient at home or at a community fitness facility, safety is enhanced of an individual and patient is at risk of injury or re-injury.\textsuperscript{5} The multiple factors are associated with variation in training like characteristic of training regimen environmental and individual factor habit for physical activity fitness level physiological and genetic variability social and psychological factors.\textsuperscript{6} Today’s society has enormous impact from Social media. survey showed that people’s lifestyle and as they compare themselves on social media is influenced by fitness related content on social media. The most common Sources from which people are influenced are newspaper, magazines, media and person to person communication but nowadays more negative body image is found in women as they compare themselves on social media. Even body image issues are experienced by men and feel social media pressure. Workouts are encouraged by Online communities.\textsuperscript{8}

**Materials and Method**

**Inclusion criteria:**
- Young individuals between age group 20 to 40.
- Individuals practicing untrained exercise.
- Individuals with or without existing musculoskeletal problem.
- Individuals practicing exercises form more than 15 days.

**Exclusion criteria:**
- Individuals practicing exercises under advice.
- Any pain due to secondary to pathology.

**Materials used**
- Data Collection sheet
- Consent form
- Pen
- Pencil

**Study Procedure:** An approval for the study was obtained from the protocol committee and institutional Ethical Committee of Krishna Institute of medical Sciences Deemed To be University. The study was conducted in Krishna Hospital campus to study prevalence of musculoskeletal problems in untrained exercising individuals. Both the males and females subjects were included between age group 20 to 40. The subjects were selected according to the inclusion and exclusion criteria. Prior consent was taken. They were explained with the necessary information before handing them with forms. Subjects were told about the McGill questionnaire and they were explained that the description fall into four major groups sensory(s) 1-10; affective (A), 11-15; evaluative (E)16; and miscellaneous (M), 17-20. The sum of the rank value is the pain rating index (PRI). The present pain intensity (PPI) is based on a scale of 0-5 and were asked to rate the pain according to VAS in reference to before exercising and after exercising. Survey was done according to the results obtained. Conclusion was made according to the results obtained.

**Description of outcome measures**
- McGill pain questionnaire.
- Visual Analogue scale.

**Statistics:** Statistical analysis was done manually and by using the statistics software INSTAT so as to verify the results derived. The statistical analysis between before exercise and after exercise pain was done by paired ‘t’ test. Unpaired ‘t’ test was applied between before exercise pain in females and before exercising pain in males, another unpaired ‘t’ was applied between after exercises pain in females and after exercise pain in males.

1) Gender distribution according the age group in the study:

The total number of females were 49 and males were 51.

**Table 1: Gender distribution according the age group.**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>mean</td>
<td>SD</td>
</tr>
<tr>
<td>21 to 30</td>
<td>38</td>
<td>22.23</td>
</tr>
<tr>
<td>31 to 40</td>
<td>11</td>
<td>35.36</td>
</tr>
</tbody>
</table>

2) Before exercise pain score in both the genders in the study.

Unpaired ‘t’ test was applied between before exercise pain in females and before exercising pain in males which was equivalent and the p value obtained was 0.1775 which is not significant.
Table 2: Before exercise pain score in both the genders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before exercise female score</th>
<th>Before exercise males score</th>
<th>t-value</th>
<th>p-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2.388±1.605</td>
<td>2.000±1.233</td>
<td>1.358</td>
<td>0.1775</td>
<td></td>
</tr>
</tbody>
</table>

3) After exercise pain score in both the genders in the study

Unpaired ‘t’ test was applied between after exercise pain in females and after exercising pain in males which was equivalent and the p value obtained was 0.8334 which is not significant.

Table 3: After exercise pain score in both the genders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>After exercise female score</th>
<th>After exercise male score</th>
<th>t-value</th>
<th>p-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>6.592±2.661</td>
<td>6.706±2.764</td>
<td>0.2109</td>
<td>0.8334</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

3) Before and after exercise pain score in both the genders in the study

Paired ‘t’ test was applied between before and after exercising and the p value obtained was <0.0001 which is extremely significant and the pain was increased after practicing unsupervised exercises.

Table 4: Before and after exercise pain score in both the genders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before exercise score</th>
<th>After exercise score</th>
<th>t –value</th>
<th>p-value</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2.190 ± 1.433</td>
<td>6.650 ± 2.691</td>
<td>13.436</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
</tbody>
</table>

The prevalence of musculoskeletal problem in untrained exercising individuals was found to be 84%.

**Conclusion**

We found that musculoskeletal problem increased after practicing untrained exercises and pain was increased in the individuals and the most affected area was low back area, type of pain found to be more was sensory and intermittent type in relation to time.

**Discussion**

The present study “Prevalence of musculoskeletal problems in untrained exercising individuals” was conducted to find musculoskeletal problems in individuals who practice untrained exercises.

The objectives were to find untrained exercising individuals and to find out which all musculoskeletal problems arises due to untrained exercises in those individuals.

The study was conducted with 100 subjects both males and females were included. Prior consent was taken and were explained with necessary information before handing them with forms. Subjects were told about the McGill questionnaire and they were explained that the description fall into four major groups sensory(s) 1-10; affective (A),11-15; evaluative (E)16; and miscellaneous (M), 17-20. The sum of the rank value is the pain rating index (PRI). The present pain intensity (PPI) is based on a scale of 0-5 and were asked to rate the pain according to VAS in reference to before exercising and after exercising.
This study shows that 51 males and 49 female practiced untrained exercises.

Due to easy access towards social media in age group 20 to 30, 79 individuals were found to be practicing untrained exercises and in age group 31 to 40, 21 individuals were found to be practicing untrained exercises.

In the study conducted it was found that fitness related content on social media is influencing people’s lifestyles and as they compare themselves to other. Fitspiration provides many people with supportive online community, which encourage them to work out, to follow specific diets and online workout routines that are, and to strive for fit and toned body type this has been articulated by Makenzie Norton.(8)

Subject should take care while performing untrained exercises and should realize that exercises might be performed inaccurately in an unsupervised environment. 58 subjects experienced low back pain, 6 thigh pain, 9 calf pain, 26 knee pain and 5 subjects experienced shoulder pain. sensory type of pain was experienced by 45 subjects, affective by 19, evaluative by 26 and miscellaneous by 10 subjects. In relation to time the type of brief pain was experienced by 6, rhythmic by 1, continuous by 4, momentary by 24, periodic by 7, steady by 5, transient by 4, intermittent by 47 constant by 1 subject.

81 number of people practiced untrained exercise from You Tube and only 19 practiced self exercise.

The result show Extremely significant increase in pain in the individuals who practiced untrained exercises. This was confirmed by using statistical analysis by using ‘paired t-test’ p value found is <0.0001. This shows extremely significant increase in pain.

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of the present study.

Source of Funding: This study was self funded.

Ethical Clearance: The study was approved by the Institutional Ethics Committee of KIMSDU.

References
Comparative Study of Laparoscopic-assisted Appendectomy and Open Appendectomy

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Abstract

Out 60 patients aged between 12 to 50 years of both sexes. 30 were selected for laparoscopic appendectomy (LA) and 30 for open appendectomy post surgical complication were compared in both method. 7(23.3%) pain in LA patients and 15 (50 %) in OA, 9(30%) vomiting in LA patients and 12 (40%) in OA patients 6(20%) fever in LA patients 13(43%) in OA patients, 4(13.3%) constipation in LA patients 9(30%) in OA patients 5(16.6%) had paralytic Ileus in LA patients and 11(36%) in OA patients 10(33%) wound infection in OA patients and 0% in LA patients. Returns of Bowel sounds in LA patients was 42-43 hrs and 50-51 hours’ in OA patients 3 to 4 days hospital stay in LA patients and 7-8 days in OA patients. This comparative study of appendectomy will be quite useful to surgeon to evaluate the post-surgical complications and prevent the morbidity and mortality among such patients.

Keywords: LA= Laparoscopic Appendectomy, OA= Open Appendectomy, Appendicitis.

Introduction

As appendix and pharynx is the most constricted part of the gastro intestinal tract hence they are more to be infected. Moreover appendix is a soldier of the abdomen hence changes its position to tackle the antibodies hence frequently gets inflamed and infected. Acute appendicitis is the most common condition leading to emergency abdominal surgery in young adults. Traditionally the treatment for appendicitis has been a right lower quadrant incision with the removal of the appendix as described by MC Burney in 1894. However within the past decade, the introduction of laparoscopy has changed this approach. The laparoscopic appendectomy has allowed surgeon to diagnose and also treat appendicitis at the same time.

The advantages of laparoscopic appendectomy include less postoperative pain and faster return to work and laparoscopic procedure are longer operating time and greater cast but non-availability of costly laparoscopy instruments and laparoscopic expert, most of the patients prefer open appendectomy (MCburneys approach) as it is cost effective hence post-surgical complications of LA and OA has been compared.

Material and Method:

Out of 60 patients aged between 12 to 50 admitted at years surgery department of Mamata Academy of Medical Sciences, Bachupally. 30 were selected for laparoscopic appendectomy and 30 for open appendectomy with prior permission of the patients. USG, blood examination and history of each patient was recorded found fit to be surgery. The patients suspected to be malignancy; HIV and Co-existing CVS and CNS diseases were excluded from the study. The ration of male and females was 2:1.

The duration of study was about 2 years and 6 months.

Observation and Results

Table 1- Comparative post surgical study of LA and OA patients (30 Each)7(23.3%)LA patients had pain and 15(50%) OA had pain, 9(30%) of LA had vomiting and 12(40%) OA had vomiting, 6(20%) LA had fever and 13(43%) OA had fever 4(13%) LA had constipation and 9(30%) OA patients had constipation, 5(16.6%) had paralytic Ileus in LA patients 9(30%) OA paralytic Ileus 10(3%) OA patients had wound infections and 0% in LA patients.
Table-1: Comparative study of post surgical manifestation

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>LA No of patients</th>
<th>%</th>
<th>OA No of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pain</td>
<td>7</td>
<td>23.3</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Vomiting</td>
<td>9</td>
<td>30</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Fever</td>
<td>6</td>
<td>20</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>Constipation</td>
<td>4</td>
<td>13.3</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Paralytic Ileus</td>
<td>5</td>
<td>16.6</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>Infection wound</td>
<td>0</td>
<td>–</td>
<td>10</td>
<td>33</td>
</tr>
</tbody>
</table>

Table-2: 42-43 hours was taken to return of bowel sounds in LA and 50-51 hours in OA patients, 3 to 4 days hospital stay for LA patients and 7-8 days for OA patients.

Table 2: Comparative study of post surgical manifestation.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Particulars</th>
<th>LA Return of Bowel sounds</th>
<th>OA Return of Bowel sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Return of Bowel sounds</td>
<td>42-43 hours</td>
<td>50-51 hours</td>
</tr>
<tr>
<td>2</td>
<td>Duration of Hospital stay</td>
<td>3 to 4 days</td>
<td>7 to 8 days</td>
</tr>
</tbody>
</table>

Discussion

The present comparative study of laparoscopic assisted appendectomy (LA) and open appendectomy (OA) at different ages of Telangana populations 7(23.3%) post-operative pain in LA and 15(50%) at OA, 9(30%) vomiting in LA and 12(40%) in OA, 6(20%) fever in LA and 13(40%) in OA, 4(13.3%) constipation in and 9(30%) in OA, 5(16.6%) paralytic Ileus in LA and 11(36%) in OA patients 10(33%) wound infection in OA patients and 0%. In LA patients (Table-1) . Returns of bowel sounds 42-43 hours in LA and 50-51 hours in OA patients 3 to 4 days hospital stay in LA patients and 7 to 8 days in OA patients (Table -2) these findings were more or less in agreement with previous studies (6)(7)(8).

Laparoscopic Assisted appendectomy has not been accepted by surgeons as quickly because of longer operating time and greater cost of laparoscopic technique. However patients suffer less post operative pain and have shorter hospital stays with the laparoscopic technique. Thus in an era of cost conscious medicine, the choice of technique must be weighed carefully.

An additional advantage of laparoscopic is its use as a diagnostics tool. Diagnostic tests for suspected appendicitis including ultra sound, C T scan, and laboratory tests can be significant expense. The introduction of Laparoscopic surgery has allowed for a more accurate and less expensive method for diagnoses than was previously possible but it carries with it the risk of a surgical procedure and anesthesia (9). Many studies have shown that less length of hospital stay in LA was also reported as compared to OA (10). Moreover in LA patients have better tolerance to regular diet and early return to the normal activities.

Summary and Conclusion

The present study of comparison between LA and OA Patients and post surgical complications. LA was better than OA with regards to post operative pain, resumptions of bowel sounds post operative complications and duration of hospital stay. Even though duration of surgery was more than OA. But as India belongs to middle socio-economic status governments must install laparoscopic instruments and appoint laparoscopic experts in government hospital with minimum fees so that every patients can be benefitted.

This research paper was approved by ethical committee of Mamata Academy of Medical Sciences, Bachupally -500090 (Telangana)

No Conflict of Interest

No Funding

References

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Assessment of Mental Well Being among School going Adolescents Using GHQ-12

Antara S.1, Rahul Bansal2, ChhaviKiran Gupta3

1PG 3rd year, 2Prof & Head, 3Assistant Professor;
Department of Community Medicine, Subharti Medical College, Meerut

Abstract

Introduction: Adolescence is a transition period where many physical, social, emotional and psychological changes take place. As adolescents mature cognitively, their mental process becomes more analytical. The 12-Item General Health Questionnaire is the most extensively used screening instrument for common mental disorders, in addition to being a more general measure of psychiatric well-being.

Objective: To assess mental well being of school going adolescents of urban Meerut, UP.

Methodology: Purposive technique was used for the selection of schools and total enumeration of all the students belonging to age group of 12-19 years was done after obtaining clearance from institutional ethical committee and permission from schools making a total of 1185 sample size. This was followed by distribution of GHQ-12 questionnaire among all adolescents.

Results: Majority (80.9%) of adolescents had good mental well being and only 19.1% had poor mental well being with maximum score being 11 and minimum being zero. The mean score also lied in the range of good score representing good mental well being.

Conclusion: GHQ-12 score can be used to screen the mental health of the adolescents in the school so that the adolescents falling in poor score can be taken care of in school itself by proper counseling and appropriate behavior therapy.

Keywords: Mental Well Being, Adolescents, GHQ-12.

Introduction

Adolescence is a transition period where many physical, social, emotional and psychological changes take place1. As adolescents mature cognitively, their mental process becomes more analytical. They are now capable of abstract thinking, better articulation and of developing an independent ideology.2 Adolescence is a period marked by severe psychological and emotional stresses3. Adolescents have frequent mood changes reflecting feelings of anger, sadness, happiness, fear, shame, guilt, and love4. They are unable to understand the emotional turmoil happening within them and thus are unable to tackle effectively emotional pain, conflicts, frustrations and anxieties about the future which are often the driving force for high risk behavior5.

Today’s youth needs a lot of mental strength to cope with challenges and pressure. Poor tolerance towards criticism, lack of assertiveness and low self-esteem could cause neurotic breakdown6. In order for adolescents to achieve their life goals and obtain academic success, it is important to be in a psychologically healthy condition. As per Dwyer & Cummings, stressful atmosphere may create and/or elevate psychological distress and reduce adolescents’ academic performance7.

The 12-Item General Health Questionnaire (GHQ-12) is the most extensively used screening instrument for common mental disorders, in addition to being a more general measure of psychiatric well-being8. The GHQ was originally designed to be used in adult populations. However, it is noted in the GHQ manual that the scale has been used with adolescents9. The GHQ-12 is the shortest version and commonly used as a screening tool in a public setting10.

School is an appropriate place for screening mental well being as school plays an important role
in socialization of young people; access to children & adolescents on a large scale with experienced teachers & high credibility with parents & possibilities for short & long term evaluation. Thus, the present study was done to assess the mental well being of school going adolescents of urban Meerut.

**Methodology:** The present Cross Sectional study was conducted among school going adolescents of urban Meerut, UP. Total four schools were selected by purposive sampling technique. Total enumeration of all the adolescents belonging to age group of 12-19 years was done from each of the school making a total sample of 1185 adolescents. The study was conducted from March 2017 to February 2018 after obtaining clearance from institutional ethical committee of Subharti Medical College; permission from each school, consent from parents/ guardian and assent from each adolescent.

The inclusion criteria for the study included- Adolescents who were between the age group of 12 to 19 years; who were willing to participate in the study; whose parents gave consent for participation in the study and who were present in school on the days of data collection/ survey. The adolescents who were absent on the days of data collection but were in the age criteria were excluded as the data was not collected on any other subsequent days.

The tool used for data collection was General Health Questionnaire-12 (GHQ-12) scale. The questionnaire is comprised of twelve questions with four options each[9]. Higher the score obtained in GHQ-12, poor is the mental well being. A score of five or less indicates good mental well being and a score of six or more indicates poor mental well being.

**Statistical analysis used:** The collected data was entered and analyzed using SPSS software version 19.0. Chi square test was used to test the association between the dependent and independent variable and p-value <0.05 was considered as significant.

**Results**

**Table 1: Socio demographic profile of study participants (n=1185).**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;14 years</td>
<td>206</td>
<td>17.4%</td>
</tr>
<tr>
<td>14-16 years</td>
<td>755</td>
<td>63.7%</td>
</tr>
<tr>
<td>&gt;16 years</td>
<td>224</td>
<td>18.9%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>625</td>
<td>52.7%</td>
</tr>
<tr>
<td>Female</td>
<td>560</td>
<td>47.3%</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>951</td>
<td>80.9%</td>
</tr>
<tr>
<td>Muslim</td>
<td>70</td>
<td>5.9%</td>
</tr>
<tr>
<td>Christian</td>
<td>6</td>
<td>0.5%</td>
</tr>
<tr>
<td>Sikh</td>
<td>28</td>
<td>2.4%</td>
</tr>
<tr>
<td>Others*</td>
<td>130</td>
<td>11.0%</td>
</tr>
<tr>
<td><strong>Type of Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>678</td>
<td>57.2%</td>
</tr>
<tr>
<td>Joint</td>
<td>507</td>
<td>42.8%</td>
</tr>
</tbody>
</table>

*Others in religion includes Jain/ Agnostic/ Do not want to reveal their religion.

In the present study, majority of adolescents were from the age group of 14-16 years (63.7%); and adolescents of less than 14 years (17.4%) and more than 16 years (18.9%) were almost similar. Most of the adolescents were males (52.7%) and belonged to nuclear family (57.2%). Also, majority of adolescents were Hindus (80.9%) and least were Christian (0.5%). “Others” category in religion included those who were either Jain or agnostic or not willing to reveal about their religion (Table 1).
Table 2: Profile of adolescents’ parents (n = 1185)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Father’s Educational Qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate &amp; above</td>
<td>660</td>
<td>55.7%</td>
</tr>
<tr>
<td>Up to School Level</td>
<td>525</td>
<td>44.3%</td>
</tr>
<tr>
<td><strong>Mother’s Educational Qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate &amp; above</td>
<td>603</td>
<td>50.9%</td>
</tr>
<tr>
<td>Up to School Level</td>
<td>582</td>
<td>49.1%</td>
</tr>
<tr>
<td><strong>Father’s Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>1116</td>
<td>94.2%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>69</td>
<td>5.8%</td>
</tr>
<tr>
<td><strong>Mother’s Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>200</td>
<td>16.9%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>985</td>
<td>83.1%</td>
</tr>
</tbody>
</table>

More than half of adolescents’ fathers (55.7%) and almost half of the mothers (50.9%) were educated either up to graduate level or above. Also, 94.2% of the father’s were employed whereas only 16.9% of mothers were employed (Table 2).

Figure 1: Distribution of General Health Questionnaire (GHQ-12) score of study participants (n = 1185).

Majority (80.9%) of adolescents had Good GHQ-12 (score of 5 or less) indicating Good Mental Well being whereas only 19.1% of adolescents had Poor GHQ-12 (score of 6 or more) indicating Poor Mental Well being (Figure 1). The Mean GHQ-12 score of the adolescents was 3.47 which lied under Good Mental Well Being Score. Maximum Scored obtained by the adolescents was 11, which was Poor Mental WellBeing Score, the Minimum scored obtained was 0 which was Good Mental WellBeing Score and Range between them was 11. The value of Skewness (Sk) was 0.472 i.e. the frequency distribution of GHQ-12 Scores for the total sample was positively Skewed. The value of Kurtosis (Ku) was -0.263 i.e. the frequency distribution of GHQ-12 Scores for the total sample was Platy Kurtic.

Table 3: Association of Gender with mental well being using GHQ-12 (n=1185)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Good Score (5 or less)</th>
<th>Poor Score (6 or more)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>521 (83.4%)</td>
<td>104 (16.6%)</td>
<td>625</td>
</tr>
<tr>
<td>Female</td>
<td>438 (78.2%)</td>
<td>122 (21.8%)</td>
<td>560</td>
</tr>
<tr>
<td>Total</td>
<td>959 (80.9%)</td>
<td>226 (19.1%)</td>
<td>1185</td>
</tr>
</tbody>
</table>

Chi sq. = 5.067, df = 1, p-value = 0.024*
* Statistically significant association

Among all the poor mental well being scorers (19.1%), most of them were females (21.8%) as compared to males (16.6%) and among all the good
mental well being scorers (80.9%), most of them were males (83.4%) as compared to females (78.2%); and this association was found to be statistically significant as p-value calculated was less than 0.05 (Table 3). This indicated that females have poorer mental well being as compared to males.

Table 4

<table>
<thead>
<tr>
<th>Religion</th>
<th>Good Score (5 or less)</th>
<th>Poor Score (6 or more)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindu</td>
<td>789 (83.0%)</td>
<td>162 (17.0%)</td>
<td>951</td>
</tr>
<tr>
<td>Muslim</td>
<td>48 (68.6%)</td>
<td>22 (31.4%)</td>
<td>70</td>
</tr>
<tr>
<td>Christian</td>
<td>5 (83.3%)</td>
<td>1 (16.7%)</td>
<td>6</td>
</tr>
<tr>
<td>Sikh</td>
<td>21 (75.0%)</td>
<td>7 (25.0%)</td>
<td>28</td>
</tr>
<tr>
<td>Other*</td>
<td>96 (73.8%)</td>
<td>34 (26.2%)</td>
<td>130</td>
</tr>
<tr>
<td>Total</td>
<td>959 (80.9%)</td>
<td>226 (19.1%)</td>
<td>1185</td>
</tr>
</tbody>
</table>

Chi sq. = 14.366, df = 4, p-value = 0.006

*Other includes Jain/ Agnostic/ Do not want to reveal their religion, †Statistically significant association

Among all the poor mental well being scorers (19.1%), most of them were Muslims (31.4%) followed by Others (26.2%) and Sikhs (25%); and least were Christian (16.7%) and Hindus (17%). Among all the good mental well being scorers (80.9%), most of them were Christians (83.3%) and Hindus (83%) followed by Sikh (75%) and Others (73.8%) and least were Muslims (68.6%); and this association was found to be statistically significant as p-value calculated was less than 0.05 (Table 4). This indicated that Muslim adolescents had poorer mental well being compared to the other religions.

Conclusion

GHQ-12 score can be used to screen the mental well being of adolescents in the school itself so that the adolescents having poor mental well being can be taken care of at the school level by proper counseling, appropriate behavior therapy and referral to specialist if required. Such screening is required as mental well being is still neglected in developing countries like India. If the screening is done at adolescent age, the burden due to abnormal mental well being of the individual, their family, their social life and on the community as a whole can be reduced.

Acknowledgement: None
Conflict of Interest: None
Source of Funding: Self Funded

References

An Epidemiological Study of Diabetes Mellitus among Adult Population in an Urban Area of Odisha

Antaryami Sahoo¹, Archana Patnaik²

¹Postgraduate student, ²Professor, Department of Community Medicine, Hi-Tech Medical College, Bhubaneswar, Odisha.

Abstract

Introduction or Background: Type 2 Diabetes mellitus is the most common (85-90% of) non-communicable disease now a days in the World. It currently affects more than 62 million Indians with the average onset at 42 years. So the current study is carried out with the objectives of -1. To identify the prevalence of Type 2 Diabetes mellitus among adult population, 2. Assess the risk factors associated with development of Diabetes mellitus.

Materials and Method: A total of 170 adults were selected as study population after sample size calculation. During the study Fasting Blood Sugar (FBS) and post prandial blood sugar (PPBS) was estimated to identify diabetes mellitus. Information from the study population was collected through pre-designed and pre-tested questionnaire using different anthropometric measurements.

Results: Out of 170 study subjects, 105 were male and 65 were female. 27(15.9%) participants were having increased FBS and PPBS and are diagnosed as diabetes mellitus. Most of the diabetics are in the age group of 40 to 60 years. 11 (40%) diabetics in study population were found to be obese (BMI >30).

Conclusions: Prevalence of diabetes mellitus was higher (15.9%) in the study population. So repeated awareness campaigns with screening of diabetes mellitus are required in the community to decrease the complications arise due to the disease.

Keywords: Body Mass Index (BMI), Fasting Blood Sugar, Post prandial blood sugar.

Introduction

Diabetes mellitus (DM) is a disturbance in the metabolism of carbohydrate, fat, and protein that is caused due to loss of insulin producing cells in the pancreas or decreased tissues sensitivity to insulin that results in increased level of glucose in the blood[¹]. Asia will account the highest growth (42 million) with 4.9 million deaths per year due to diabetes mellitus[²]. Majority are progressing towards complications without awareness. Moreover, around 80% of the total numbers affected are living in low- and middle-income countries[³]. Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease[³]. In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively[⁴]. With this background, the present study was conducted with the objectives to find out the prevalence of Type 2 diabetes mellitus among adult population and to assess the risk factors associated with diabetes mellitus.

Materials and Method

This cross-sectional study was carried out in the urban field practice area of Hi-Tech Medical college and hospital, Bhubaneswar. This study was started on 1st February 2018 and completed on 31st May 2018. Age group 20 years and above was considered as adults in my study population. With the help of our paramedical staff health awareness campaigns are done in the urban field practice area like 8 hour fasting before blood sample collection for fasting blood sugar estimation. Informed consent was taken from all study participants after
thoughly describing the purpose of study. Sample size was calculated by applying the formula, \( n = \frac{4pq}{L^2} \). As per a study by Ramchandran et al.\(^5\), prevalence of diabetes mellitus in adults is 12.1% and on that prevalence our sample size was calculated as, \( n = 4 \times 12.1 \times 87.9/5^2 = 170 \). Clinical assessment, anthropological measurement and pre tested questionnaires were used for data collection. Fasting blood samples were collected from the study population after filling up the questionnaires. Fasting blood sugar and post prandial blood sugar was detected by using standardized Glucometer. A person was considered to be having diabetes if he/she were already diagnosed case of diabetes or on treatment or current fasting blood glucose ≥ 126 mg/dl or current post prandial blood glucose ≥ 200 mg/dl\(^6\). Data was collected by stratified random sampling method till the desired sample size was met. Body mass index (BMI) was calculated by applying the formula weight in kg /height in m\(^2\) to know the prevalence of diabetes in obese study subjects and BMI ≥ 30 is considered as obese. All the data collected were analyzed in SPPS software version 20.

**Results:** Out of 170 study participants, 105 (61.7%) were males and 65(38.2%) were females. 52(30.5%) participants were in the age group 20-40 years. 65(38.2%) participants were in the age group 40-60 years. In the age group 60-80 years there are 53(31.2%) participants. Data on diabetes mellitus status were collected from all of the study subjects by using rapid diagnostic method. 14(8.2%) of the study participants were previously diagnosed as diabetes mellitus, and 13(7.7%) were detected to be having diabetes mellitus during the study. So the total prevalence of diabetes mellitus is found to be 15.9% (27) in this study (Table-2). It is revealed from the Table no-3 that out of 170 study participants 27(15.9%) participants had diabetic mellitus after lab tests and 143(84.1%) had no diabetes. In the age group of 20-40 years 5(9.5%) participants had diabetes and 47(90.5%) had no diabetes. In the age group 40-60 years 13(20%) participants had diabetes and 52(80%) had no diabetes. In the age group 60-80 years 9(16.9%) had diabetes and 44 (83.1%) had no diabetes. To find out the association between age group and onset of diabetes Chi-square test was fitted. The value of \( \chi^2 = 4.78 \) with d.f. = 2 and the test was significant at 5% level of significance with p value < 0.05 indicating association of higher age-group with onset of diabetes. Table no-4 depicts data on risk of diabetes with that of body weight. As 27 nos. of participants had clinically diabetes from which 11(38.9%) participants were obese, 5(18.5%) had over weights, 9(35.2%) were normal weight and 2(7.4%) were of under weights. 143(84.1%) study participants were non-diabetic from which 26(18.2%) were obese, 40(28%) were having over weights, 61(42.3%) had normal weights and 16(11.5%) had under weights. A Chi-square test was applied which shows significant association between obesity and onset of diabetes mellitus.

**Table 1: Age distribution of the study participants**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th>Female</th>
<th>Number</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 40 years</td>
<td>33 (63.5)</td>
<td>19 (36.5)</td>
<td>52</td>
<td>30.5</td>
</tr>
<tr>
<td>40 – 60 years</td>
<td>41 (64.1)</td>
<td>24 (35.9)</td>
<td>65</td>
<td>38.2</td>
</tr>
<tr>
<td>60 – 80 years</td>
<td>30 (56.6)</td>
<td>23 (43.3)</td>
<td>53</td>
<td>31.2</td>
</tr>
<tr>
<td>Total</td>
<td>105(61.7)</td>
<td>65 (38.2)</td>
<td>170</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 2: Prevalence of diabetes mellitus among study participants.**

<table>
<thead>
<tr>
<th>Diabetes mellitus status</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentages out of total participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously diagnosed as diabetes mellitus</td>
<td>10</td>
<td>4</td>
<td>14</td>
<td>8.2 %</td>
</tr>
<tr>
<td>Currently diabetic</td>
<td>7</td>
<td>6</td>
<td>13</td>
<td>7.7 %</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>10</td>
<td>27</td>
<td>15.9 %</td>
</tr>
</tbody>
</table>
Table 3: Agegroup wise distribution of diabetes mellitus status among study participants.

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Diabetics</th>
<th>Non diabetics</th>
<th>Total</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 40</td>
<td>5 (9.5%)</td>
<td>47 (90.5%)</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 – 60</td>
<td>13 (20%)</td>
<td>52 (80%)</td>
<td>65</td>
<td>0.049</td>
<td>Significant</td>
</tr>
<tr>
<td>60 – 80</td>
<td>9 (16.9%)</td>
<td>44 (83.1%)</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27 (15.9%)</td>
<td>143 (84.1%)</td>
<td>170</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Association of Obesity with diabetes mellitus status of the study subjects.

<table>
<thead>
<tr>
<th>Body Weight as per BMI</th>
<th>Diabetics N (%)</th>
<th>Non diabetics N(%)</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>2 (7.4)</td>
<td>16 (11.5)</td>
<td>18</td>
<td>p&lt; 0.05</td>
</tr>
<tr>
<td>Normal</td>
<td>9 (35.2)</td>
<td>61 (42.3)</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>5 (18.5)</td>
<td>40 (28.0)</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>11 (39.8)</td>
<td>26 (18.2)</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27 (15.9)</td>
<td>143 (84.1)</td>
<td>170</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

In our study the prevalence of diabetes mellitus was found to be 15.9%. The National Urban Diabetes Survey showed an age-standardized prevalence of 12.1% for diabetes mellitus and 14% for IGT in six large metropolitan cities[7]. Two studies in Chandigarh, a very prosperous city in North India, showed high prevalence of diabetes mellitus. In the INDIA study, the city was found to have the highest prevalence of diabetes mellitus (13.6%) [8]. The Chandigarh Urban Diabetes Survey (CUDS) also reported high prevalence of diabetes mellitus and pre-diabetes i.e. 11.1 and 13.2% respectively[9]. Barik et al. in rural West Bengal, found that the prevalence of diabetes mellitus and pre-diabetes among adults >18 years was 2.95 and 3.34% respectively[10]. In another study, Little et al. reported a high prevalence of type 2 diabetes mellitus (10.8%) among adults population (>19 years) in rural parts of South India. These figures imply that though the prevalence of DM varies in different settings, it is certainly quite high and warrants immediate attention[11]. Majority(46.3%) of our study participants with diabetes were in the age group of 40-60 years. The most recent data from the International Diabetes Federation indicated that an estimated 415 million adults aged 20–79 years worldwide have DM in 2015 and the number will project to 642 million in 2040, with the prevalence increasing from 8.8 to 10.4%[12]. In this study, prevalence of type 2 DM in overweight subjects were 18.5% and in the obese population were 39.8%. The prevalence rates were relatively high because of overweight and obesity. In study conducted by Mandal et al found that the prevalence of type 2 diabetes mellitus, in the obese group of the study population were 20.2% and in the overweight population were 15.5%. They in their study also concluded that the prevalence of type 2 DM and increases with increasing weight of the individuals[13].

Conclusion

In the current study, prevalence of diabetes mellitus is very high. So regular screening method should be used to detect the undetected cases from the community. We found a significant association of diabetes mellitus with middle aged people i.e. 40 to 60 years, so screening program should focus on the middle aged people. The government sector could integrate non communicable disease like diabetes mellitus with the health packages which might help to create awareness in the community through health education. This will help in controlling diabetes mellitus through promote on early diagnosis and treatment.

Acknowledgement

I acknowledge all my study participants for supporting me in carrying out my research work.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: Taken from Institutional Ethics Committee For Human Research, Regd.no -ECR/273/Inst/OR/2013 issued under Rule-12 DD of Drugs and Cosmetics Rules 1945, Govt.of India vide letter no.HMCH/IEC/PG/16/3450 dated-06/02/2017.
References

Knowledge and Awareness of Oral Candidiasis among Dental Students

Roghithkannan¹, Archana Santhanam²

¹Department of Oral Pathology, ²Department of Oral Pathology, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University,

Abstract

Objective: To assess the knowledge and awareness amongst the dental students on oral candidiasis.

Method: This online based survey study was conducted among 100 students of Saveetha dental college. The questionnaire consisted of 10 questions which were based on knowledge, awareness and practices regarding oral candidiasis among the dental students in Saveetha Dental College. Results were analyzed and tabulated.

Results: Most of the students were aware of oral candidiasis. The knowledge on oral candidiasis caused by fungus (83%) is adequate. There was good adequate knowledge on risk factors (72%), chair side diagnostic aid (92%) and treatment (51%) of oral candidiasis.

Conclusions: Due to limited knowledge on oral candidiasis, the dental curriculum should include opportunities for structure interaction between students and patients with candidiasis both in classrooms and in clinical setting through objective structure clinical exam.

Keywords: Knowledge, Awareness, Oral candidiasis.

Introduction

There is limited literature showing the magnitude of oral manifestations and the extent of awareness on its occurrence in people. Oral manifestations are reported to have clinical significance across the globe. Oral candidiasis is a common infection of the oral cavity that is caused by an overgrowth of Candida species and is the most common human fungal infection especially in early and later life[1]. There are many types of Candida species, the ones seen in the oral cavity leading to oral candidiasis are: C. albicans, C. glabrata, C. guillermondii, C. krusei, C. parapsilosis, C. pseudotropicalis, C. stellatoidea, and C. tropicalis[2][3]. These species remain as a normal commensal micro-organism in humans and the occurrence of oral candidiasis varies depending on age and certain predisposing factors[4]. Risk factors include impaired salivary gland dysfunction, drugs, dentures and other immunosuppressive conditions. The diagnosis of oral candidiasis is predominantly clinical which can be confirmed by the microscopic identification of Candida which is based on the recognition of the lesions by the dental professional[5].

Limited knowledge on oral candidiasis results in delay in its diagnosis and treatment planning which affects the quality of life and cause further complications. To avoid this, it is important that health professionals especially dentists should not only be aware of the pathogenesis of the disease process but also the first clinical signs, its diagnosis and treatment. Hence, this study was undertaken to assess the level of knowledge, awareness and practices regarding oral candidiasis among the dental students in Saveetha Dental College.

Materials and Method: A cross-sectional, descriptive, questionnaire based survey method was carried out to assess the level of knowledge, awareness and practices regarding oral candidiasis among the dental students in Saveetha Dental College. The questionnaire was online based prepared in English and the content validity was assessed by distributing it among the faculty members from the Department of Oral Pathology.
The questionnaire comprised of 10 questions and was distributed among 100 undergraduate students in the internship phase. Informed consent was obtained from the students before proceeding with the survey. Results were analyzed and tabulated.

Questions presented in the questionnaire were as follows:

1) Have you heard of oral candidiasis before? Yes / no
2) Is candida a normal commensal? Yes / no
3) Oral candidiasis is caused by fungus? Yes / no
4) Is oral candidiasis a potentially malignant disorder? Yes / no
5) Is Oral candidiasis common in immunocompromised individual? Yes / no
6) Does oral candidiasis presents itself clinically as a white scrapable plaque? Yes / no
7) The main symptom observed in oral candidiasis is pain and burning sensation? Yes / no
8) Can oral candidiasis be misdiagnosed as burning mouth syndrome? Yes / no
9) Chair-side direct microscopy procedure for diagnosing oral candidiasis is through cytological smears? Yes / no
10) Can oral candidiasis be treated using nystatin? Yes / no

Result: Overall response rate was 100%. From the present study it was evident that 79% of undergraduate dental students were aware of oral candidiasis and 21% of students have not come across the term oral candidiasis. 54% of the students were unaware that candida is a commensal of the oral cavity. 83% of dental students think fungus as causative agent for oral candidiasis. However majority of the dental students (73%) consider oral candidiasis as a potentially malignant disorder and is common in immunocompromised individuals (72%). 92% of dental students said that oral candidiasis presents itself clinically as a white scrapable plaque, while 87% of students believe that pain and burning sensation is the common symptom associated with oral candidiasis. 91% of dental students considered Chair-side direct microscopy procedure was used for diagnosing oral candidiasis. 51% of dental students were aware that nystatin can be used to treat oral Candidiasis. Results are illustrated in Table 1

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you heard of oral candidiasis</td>
<td>79</td>
<td>21</td>
</tr>
<tr>
<td>Is candida a normal commensal</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td>Oral candidiasis is caused by fungus</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>Is oral candidiasis a potentially malignant disorder</td>
<td>73</td>
<td>17</td>
</tr>
<tr>
<td>Is oral candidiasis common in immunocompromised individual</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>Does oral candidiasis present itself clinically as a white scrapable plaque</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>Main symptom associated with oral candidiasis is pain and burning sensation</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>Can oral candidiasis be misdiagnosed as burning mouth syndrome</td>
<td>29</td>
<td>71</td>
</tr>
<tr>
<td>Chair-side direct microscopy procedure for diagnosing oral candidiasis is through cytological smears</td>
<td>91</td>
<td>9</td>
</tr>
<tr>
<td>Can oral candidiasis be treated using nystatin</td>
<td>51</td>
<td>49</td>
</tr>
</tbody>
</table>

Discussion

In healthy individuals, Candida exists harmlessly in mucous membranes such as ears, eyes, gastrointestinal tract, mouth, nose, reproductive organs, sinuses, skin, stool and vagina, etc. It is known as “beneficial flora” and has a useful purpose in the body. When an imbalance in the normal flora occurs, it causes an overgrowth of Candida albicans. The term is Candidiasis or Thrush. This is a fungal infection (Mycosis) of any of the Candida species, of which Candida albicans is the most common. When this happens, it can create a widespread havoc to our overall health and well-being of our body [6].

Impaired salivary gland function can predispose to oral candidiasis. Immunosuppressive drugs such as the antineoplastic agents have been shown in several studies to predispose to oral candidiasis by altering the
oral flora, disrupting the mucosal surface and altering the character of the saliva. Other factors are smoking, diabetes, Cushing’s syndrome, immunosuppressive conditions such as HIV infection, malignancies such as leukemia and nutritional deficiencies – vitamin B deficiencies increases the risk of oral candidiasis increases when there is suppression of cellular immunity and phagocytosis\(^7\).

Oral candidiasis presents in a variety of clinical guises and may affect one or more mucosal surfaces\(^8\). Mostly presents clinically as confluent whitish-yellow creamy plaques on the surface of the oral mucosa and tongue\(^9\). Usually asymptomatic but may be associated with pain and burning sensation based on the severity of the disease\(^10\).

Generally, the diagnosis of oral candidiasis is based on clinical signs and symptoms in conjunction with a thorough medical history. Provisional diagnoses are often confirmed through further laboratory testing of clinical specimens. A number of method for sampling the oral mucosa for the presence of candida have been developed. But the most commonly used chair side diagnostics aid is by exploitive cytological smears. Drug of choice is dictated by several factors, including the patient’s medical history and oral symptoms. Common regimes are topical anti-fungal agents especially nystatin.

Despite the fact the oral cavity is accessible for visual examination and also most of the oral lesions have well defined clinical and diagnostic features but they are left undiagnosed at early stages. Hence the practitioner, who deals with any kind of oral pathology must for this reason, is in a situation to identify all suspicious lesions and be prepared to ask for professional guidance when unsure. At the same time the dental practitioners should be able to refer the patient to the most appropriate discipline. There is limited literature showing the magnitude of oral manifestations and the extent of awareness on its occurrence in people.

In the present study it was found that 46% of the dental students were aware that candida is a common pathogen of the oral cavity. Most of the of dental students (83%) think that fungus is the causative agent for oral candidiasis. But to our surprise we found that many of the students were aware that oral candidiasis is associated with pain and burning sensation which is the common symptom associated with it.51% of participants knew that oral candidiasis can be treated using nystatin. It was also found in the study of Cross et al that the use of oral antiseptic and antibacterial rinses such as Chlorhexidine was very effective in patients with oral thrush and denture stomatitis\(^11\). The WHO Global Oral Health program has worked hard over the years to increase the awareness of oral health worldwide as an important component of general health and quality of life\(^12\).

These results revealed an inadequate level of knowledge on oral candidiasis among the study population and suggested a need for improvement of undergraduate curriculum in oral candidiasis and for the provision of postgraduate and continuing education on oral candidiasis.

**Conclusion**

Due to limited knowledge on oral candidiasis, the dental curriculum should include opportunities for structured interaction between students and patients with candidiasis both in classrooms and in clinical setting through objective structured clinical exam. It is important to ensure that future dentist attitude towards these patients is not a barrier to their receiving the best possible oral care.

**Conflict of Interest:** The authors declare that there is no conflict of interest regarding publication of this article.

**Source of Finding:** NIL

**Ethical Clearance:** The study was approved by the Institutional Review Board.

**References**


Brain Tumor Classification with Optimized Features using Firefly Algorithm

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Abstract

In present scenario tumor is a dangerous disease in the human life. In this study, the number of steps of medical image processing are used to process a Magnetic Resonance Image (MRI) to detect the brain tumor and also to define its type. Out of many steps, feature extraction and feature reduction is core of medical image processing. Different types of features like intensity, shapes and texture based features, are extracted from the segmented MRI images. Then, a machine learning model is developed by using the optimally selected features. Feature reduction approach is used to select the small subset of features which minimize redundancy and maximize relevance to the target. A bio-inspired Evolutionary computation (EC) based Firefly Algorithm (FA) has been used to reduce the size of feature set so that only key features will be used to classify tumor type using Support Vector Machine (SVM). At the end, classification accuracy has been compared results obtained with and without optimization.

Keywords: Brain tumor; Feature extraction and reduction; Firefly Algorithm; MRI; SVM

Introduction

Brain tumor is a very dangerous disease. When a tissue increases in unnatural manner it is called a tumor and when tumor occurs in the brain it is called a brain tumor1. Till now no conclusive report has been given by doctors, which can describe the main cause of brain tumor, but today’s life style of human being is surely one of the reasons for increasing the number of cases of brain tumor in urban areas. Various activities of the human body like thought, action and feelings are affected by the electrochemical impulses produced by the neurons after having a tumor in the brain. This type of harmful disease should be detected at the earliest stage accurately to save the life of patients by the physicians because most of the patients, which have brain tumor die within 1 year of having disease due to not proper diagnosis. A radiologist takes the help of MRI images to detect the brain tumor. By the high resolution of MRI images brain abnormal activities and changes are easily detected2. Brain tumors can be classified into primary and secondary, or in malignant or benign type. In a primary brain tumor, the tumor occurs in the brain and remains in the brain while in secondary tumor which is also known as metastatic, tumor may occurs in any body parts and then spread to brain3. Not all the tumor is cancerous some tumor is non cancerous which do not reoccur once they are removed. A benign tumor is one of them which have regular in shape and size while malignant tumors is cancerous in nature which may reoccur4. Although there are many types of brain tumor can be seen in patients all over the world, yet Meningioma tumor, Glioma tumor and Pituitary tumor are found commonly5. So we have associated the class with Type 1, Type-2 and Type-3 respectively, for each of the above discussed tumor types. All the discussed types are shown in Figure 1. Computer Aided Diagnosis system (CAD) can be designed which can take the MRI Image as input and diagnose the brain tumor area as output along with more accuracy in less time. Medical image processing field has great advancement in recent era which can be applied in designing this CAD system.

In this paper, we have designed a framework for a CAD system to classify 3 types of tumor with the implementation of bio-inspired EC algorithm known as the Firefly Algorithm (FA) along with SVM classifier. FA algorithm has been used for feature reduction. The rest of the paper has been organized as follows: section 2 contains the description of existing research; Section 3 describes the proposed method for the tumor
classification followed by an experimental set-up in section 4. The results of the study are dis-cussed in section 5 whereas conclusion and future scope is pro-vided in section 6.

(a)  (b)  (c)
(d) (e) (f)

Fig. 1: MRI images with (a) Normal brain (b) Benign tumor (c) Malignant tumor (d) Glioma tumor (e) Meningioma tumor (f) Pituitary tumor.

Related work study: The main work of the study is based on the feature reduction techniques. Jain AK et al. suggested lots of techniques for feature reduction for digital images like PCA, LDA, ICA, etc. but each have some advantages and disadvantages. Pydi V. et al. used PCA with SVM to detect brain tumors. RathiVP. et al. used LDA algo-rithm to reduce linear feature set. Raymer et al. proposed dimension reduction with genetic algorithm for the identification of favourable water-binding sites on protein surfaces which help in providing biochemical solution. With the help of a neural network and ant colony optimization (ACO) algorithm for feature selection (FS) was designed for image processing. Similarly, combination of Bee Colony Optimization and ACO was used in solving several optimization problems. Taie et al. used CSO, along with SVM to classify and detected brain diseases and compared the result with PSO. Another bio-inspired algorithm named FA was used for solution of non convex economic dispatch problem by Yang et al in 2012. Then many researchers also used FA with other combination after reducing features with FA for many applications.

So from this background work, it was observed that although there are so many method available for feature reduction, but each have some advantages and disadvantages both. As if in the case of PCA, LDA and ICA if we unswaveringly calculate all the subsets of features from a specified data then it will become an NP-hard problem because of the number of features grows very rapidly. Until now so many nature based Evolutionary Computing algorithms like PSO, GWO, BBO etc. have been used for feature reduction with successful results in many applications. However, we have used FA because of its effectiveness and simplicity.

Research methodology: Medical image processing is the backbone of this framework. Firstly the MRI image is pre-processed for the seg-mentation of brain tumor. Then features like space, intensity and texture based are extracted from that segmented image. After that-feature reduction process is done by optimizing algorithm named FA. The feature selection process of taking a small subset of features that minimize redundancy and maximize relevance to the target such as the class labels in classification. The SVM classifier have been used for the classification of tumor. The Final result has been compared with classification accuracy of SVM with and without feature optimization. Each subunit has been explained as below.

- MRI image pre-processing and segmentation

MRI image scanner always affected by the environmental conditions. Therefore filters are used for the noise reduction to improve the quality of the image. In case of an MRI image compression system, the tumor detection depends on the regions of interest which are full of noisy in nature and low contrast. Hence an image enhancement and de-noising may be required to preserve the image quality, highlighting the image features and suppressing the noise. The de-noising and feature enhancement techniques presented in this work will improve the reliability of image processing.

- Extract the feature from the MRI images

There are 14 features which are extracted from the MRI this work. Out of these 14 features; Area, Perimeter and Circularity are shapebased features. Mean, Variance, Standard Deviation, Skew-ness, Kurtosis are taken as intensity based features while Contrast, Cor-relation, Energy, Entropy, Homogeneity and IDM are taken as texture based features. Grey Level Co-occurrence Matrix (GLCM) techniques have been used for extracting these features.
• Firefly Algorithm and Feature Reduction

In 2010, Xin-She Yang developed Firefly Algorithm (FA) which was based on the sporadic patterns and activities of fireflies. In FA, firefly is attracted by another firefly based on the brightness because of their unisex. Less bright firefly always move towards brighter one, so as the distance between two firefly increases their brightness will decrease and if there is no brighter one found then they migrate randomly. The brightness of a firefly is determined by the landscape of the objective function in an artificial environment.

Variation of attractiveness $\alpha$ with the distance $d$ is given by (1).

$$\alpha = \alpha_0 e^{-\delta d^2} \quad (1)$$

Where $\alpha_0$ is the attractiveness at $d = 0$. From the movement of firefly, It will be determined that which features will be opted in optimal feature set after reduction.

• Classification of the features using SVM

Image classification is the process by which we categorizes any pixel of image to particular class e.g. in any remote sensing satellite image of earth we can classify any pixel that whether it belong to the water body area or land area depending upon its characteristics. Support vector machine (SVM) is a machine learning model which works on supervised learning models associated with adaptive learning algorithm that analyzed data used for classification and regression analysis. To evaluate the performance, we used Multi class SVM (support vector machine) and divided images with optimized features in 80:20 ratio, so 80% images is used as training data and remaining 20% is used as testing data. The performance of the feature selection is increased after applying FA.

**Experimental Setup**

Brain MRI images have been taken from online available data set BRATS-2015. The brain tumor data set consist of 3064 T1-weighted contrast - enhanced images. Out of these images after preprocessing total 1440 slices have been taken which contain 3 types of tumor as discussed in the first section. Label 1 represents the Meningioma tumor, which has 720 slices, label 2 represents the Glioma tumor, which have 466 slices and label 3 represent the pituitary tumor, which has the 254 slices. After that, tumor segmentation step is applied by morphological operation (opening and closing). Then total 14 features have been extracted by GLCM techniques. But instead of taking all these features for the classification process with SVM, the FA has been applied for feature reduction. Implementation of all the steps has been performed with MATLAB 2016a.

Current data has strings in the form of features and we need to first convert them to analytics. Many attributes has maximum number of zeros which don’t contribute in classification and bias the network training. So we select them programmatically and removed from the features set. FA optimization and feature selection are two isolated algorithms, but they work in a closed loop scenario. Both module functions in equilibrium, FA give the input as a binary matrix to ML module and gets the accuracy in its input from the ML module. This binary matrix is the set of features which must be included. The ‘1’ in the matrix represents the feature selected and ‘0’ represents that this feature is not selected. Features selected for a given input image are shown in Table 1. Features selected after optimization will vary with different type of tumor contained in image and rest of the features will be discarded.

### Table 1: Features Selected for classification by FA.

<table>
<thead>
<tr>
<th>Features</th>
<th>Selected features without optimization</th>
<th>Selected features with FA optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Perimeter</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Circularity</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Variance</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Skewness</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Entropy</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Contrast</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Correlation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>IDM</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Result and discussion:** The main aim of the study is to classify a tumor when MRI Images is given as input. Some samples of result have been shown in Table 2 which shows all 3 types of classification result. Figure 2 shows the accuracy comparison of result after optimization with FA and without optimization.

We find that features optimization with FA takes only those features which lead to increase the accuracy of the SVM classifier due to which the accuracy achieved...
in 76.77% when only 7 features are participating in a classification task in comparison to an accuracy of 67.77% when all 14 features are used for classification. Figure 3 shows the specificity, sensitivity and balanced accuracy of classifier for a particular input.

It has also been observed that as the number of features selected after optimization will change with different type of tumor MRI images but FA always selected less numbers of features than total features so that accuracy of SVM classifier can be increased. Accuracy of classifier also varied with the no. of features selected by the FA as observed that accuracy of SVM classifier was 73.01% when 6 features have been selected while the accuracy of the SVM classifier is decreased to 68.25% when total 8 features have been selected by the FA for a given image.

**Conclusion and future work:** In this study, a hybrid model is developed with the use of bio-inspired FA algorithm to classify different types of brain tumor when MRI image is given. FA selects less number of features than the total features which were extracted from the segmented brain tumor image. Fewer features take less memory and computation time is also less. Moreover, Accuracy of SVM classifier has been increased significantly with these less number of features because these are the only features which are decisive for classification tasks. In future, some more bio-inspired algorithm can be applied for feature reduction to further increase the accuracy. Another conclusion is that, the number of features selected by FA will vary with different class of tumor image taken as input and due to which, accuracy of SVM classifier also varies accordingly, but accuracy will always be higher than the accuracy of SVM when no optimization algorithm is applied.

For future work, other bio-inspired algorithms can also be applied and compared so that accuracy of SVM classifier can further be increased.

Table 2: SVM Classification result.

<table>
<thead>
<tr>
<th>Label on Brain Tumor MRI Image</th>
<th>Classification Resulted Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE-1 Tumor</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>TYPE-2 Tumor</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>TYPE-3 Tumor</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Conflict of Interest:** Authors do not have any conflict of Interest.

**Source of Funding:** Self.

**Ethical Clearance:** All the the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.
References


Study on Attitude of Co-Workers Towards Employees with Intellectual Disabilities

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Abstract

Employment plays crucial role for everyone’s life, in present investigation we try to understand attitude of co-workers about the employment of intellectually disabled individual working in open environment. For this sample of 30 coworkers working at different work places with intellectually disabled employee were undertaken through purposive sampling technique. Results shows: t-test value reveals that there is no significant difference between male and female coworkers in respect to attitude towards intellectual disable employee. The findings of the study are: intellectually Disabled employee are honest, sincere, sociable, regular, punctual about job and need special attention and training. Coworker recommended towards intellectually disabled employee that they can do their job best with support and supervision of experts.

Keywords: Attitude, Intellectual Disability, Employee, Working in Open Environment.

Introduction

Being adult every youth wants to be employed; employment provides an opportunity to cope up with economic, social needs, and feeling of worth and dignity. However people with disabilities are underrated in the field of job market. In India there is no any organized study to get data of disabled employment rate. In India and other developing country has big unemployment issues, due to unemployment youths faces many challenges as psychological, physical, social, and economical. According to PwDact¹, 4% reservation for disabled candidate in government sector employment. When we talks about employment of disabled employee it’s vary according to types and degree of disability. Hernandez etal.² work and employment play a central role in people’s lives and are essential factors in social inclusion and well-being.

Philip Burge etal.³ conducted a study on “public views on employment of people with intellectual disabilities”. In finding of this study indicates that poor employment skill training was a main barrier to increase inclusions with others. 87% individuals believed that appointing a person with intellectually disability will not negatively impact at work place. Hernandezetz et al.² conducted a study on and found that employer shows positive attitude about employees with disabilities and reported that employer shows more positive attitude towards physically disabled workers than workers with psychiatric or intellectual disabilities.

McFarlinet al.⁴ concluded that many business executives believe that more should be done in their company and in others to integrate people with disabilities into the workforce. The appropriate Government and the local authorities shall, within the limit of their economic capacity and development, provide incentives to employer in private sector to ensure that at least five per cent of their work force is composed of persons with benchmark disability. Mapuranga Barbra⁵ conducted a study and recommended that co-worker needed to change their attitude towards employed with ID. The ministry of labour needs to establish incentive packages for companies that employ persons with disabilities to encourage employment of more persons with disabilities. Blessing et al.⁶ found that 78% of employers described the employment of a person with an intellectual disability as predominantly a positive one.

In recent time there are mainly two types of work design for intellectually disabled individual first is sheltered setting⁷ and second is open setting. Sheltered setting⁷ is where intellectually disabled individual work with other intellectually disabled employee, and wherein open setting employment intellectually disabled employees work alongside with non-disabled employee.

Working in open environment: like every adult intellectual disable individual also has aspiration to be employee, however, due to their intellectual limitation they find more difficulty to achieve their employment aspiration. Facing these difficulty not only
limitation of intellectually disabled individual it’s also
get affected by lack of creativity, imagination and
stereotype tendency some of employer and co-workers
towards disability.

Objectives

- To assess the level of attitude on co-workers in open
  environment.
- To compare the level of attitude among male and
  female.
- To compare the level of attitude among age.

Hypotheses

1. There will be no significant difference in level of
   attitude of co-workers in open environment, among
   male and female employee.
2. There will be no significant difference in level of
   attitude of co-workers in open environment, among
   ages.

Methodology: Sample is collected by purposive
sampling technique of 30 co-workers of ID (11 female
and 19 male) from NIEPID Secunderabad, rehabilitation
centers and NGO’s where intellectually disabled employee
working independently in normal settings with regular
employee. Age range of co-workers is between 20-60
years.

Inclusion Criteria

- Co-workers of employee with intellectual disabilities
  in open environment.
- Co-workers should have above normal IQ range.
- Co-workers should have direct contact through
  employee with intellectual disabilities.
- Co-workers should not have any disabilities
  (physically handicapped. etc.).

Exclusion Criteria:

- Co-workers don’t have any intellectual disable
  member in family.
- Co-workers are not rehabilitation professionals.

Tool used in The Study

1. Demographic data sheet: consists name, age, gender,
rural/urban, education, occupation and monthly
income of the co-worker.
2. Scale of Co-workers attitude towards employee
with intellectual disabilities was developed. For
the development of the attitude scale, primarily
total 50 item were selected in which 38 item were
selected as final item, all 38 item was finalized by
4 rehabilitation professionals who are working
in the area of rehabilitation, vocational training
and academics field for intellectually disabled
individuals with minimum 10 years’ experience.
After obtaining their suggestions total 38 items
were selected and all the items categories in their
work situation, working habit, behaviour towards
others, attraction towards others etc. it also gives
total Attitude score which means high score indicate
positive attitude and low score indicate negative
attitude. Scoring pattern is 6 to 1, ‘6’ for ‘I agree
very much’ and ‘1’ for ‘I disagree very much’.

Procedure of Data Collection: Keeping In
mind the inclusion and exclusion criteria data was
collected by administering Scale on Co-workers
attitude towards employee with intellectual disabilities.
The sample was collected from National Institute of
Mentally Handicapped (NIMH) General services and
rehabilitation centers. After selecting the sample for
Attitude scale was administer by the research on the
subject. The Scale was administered on the sample of 30
selected employee subjects. The item in the answer sheet
was score accordingly to the scoring pattern. The data
obtained was analyzed and interpreted by using various
statistical techniques.

Data Analysis: The data was analyzed using SPSS.
Item analysis and t-test were used to understand whether
the co-workers having different attitude across age and
gender of co-workers towards employee with intellectual
disabilities.

Results and Discussion

Table 1: Mean, standard deviations and t value
on attitude of co-workers towards employee with
intellectual disabilities.

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>160.79</td>
<td>19.387</td>
<td>1.96NS</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>149.73</td>
<td>11.490</td>
<td></td>
</tr>
</tbody>
</table>

NS- Not Significant

Table 1 shows that mean score of attitude level of co-
workers towards employee with intellectual disabilities of
the male co-workers is 160.79 and female co-workers is
149.73. The t-test is used to find out significant difference
of co-workers towards employee with intellectual
disabilities. t-value shows that there is no significance
difference found in male and female co-worker.
Table 2: Mean, standard deviations and t value on attitude of co-workers towards employee with intellectual disabilities.

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 35</td>
<td>13</td>
<td>150.54</td>
<td>18.319</td>
<td>1.71NS</td>
</tr>
<tr>
<td>Above 35</td>
<td>17</td>
<td>161.47</td>
<td>15.871</td>
<td></td>
</tr>
</tbody>
</table>

NS- Not Significant

Table 2 shows mean score of attitude of co-workers towards employee with intellectual disabilities level of below 35 years co-workers is 150.54 and above 35 years co-workers is 161.47. the t-test is used to find out the level on attitude of co-workers towards employee with intellectual disabilities, and t-value shows that there is no significance difference found in regarding the age of the co-worker.

The present investigation was conducted to Study on attitude of coworker towards employee with intellectual disabilities in open environment. Sample size was 30 (19 male and 11 female) and selected through survey method, attitude scale was developed and used to collected sample. After analyzing the results, it can be said that the hypotheses of the present study that there is no significant difference in level of attitude among male and female employee is partially conformed. And indicate that there is no significance difference between male and female co-worker toward employee with Intellectual disabilities. Finding shows that male (160.79 mean) coworker have piety high positive attitude than female (149.73 mean) coworker. The studies conducted by “Paola Paez8 conducted a study on “Managers’ attitudes towards employees with disabilities in the hospitality industry” find no significant differences were noted in attitudes based on manager’s age, gender, or experience with disabled employees, Hardeep Aiden and Andrea McCarthy9, nearly 38% people surveyed think of disabled people as less productive than non-disabled people, less capable than non-disabled people.

The item analysis result reveal that toward coworker attitude that is employees are agree pretty much on these statement:

- Employer of intellectually disabled employees should be less strict than other coworker.
- It would be best for intellectually disabled employees to live and work in sheltered employment.
- Intellectually disabled employees people show as much enthusiasm as other coworker.
- Intellectually disabled employees are usually more sensitive than other co-worker.
- Intellectually disabled employees are usually sociable.
- Most Intellectually disabled employees are usually different from other non-intellectually disabled employees.
- Most physically intellectually disabled employees have different personalities than normal co-worker.
- Most intellectually disabled employees need special attention
- Most intellectually disabled employees need special Training
- Employers should not be allowed to fire intellectually disabled employees.
- Most intellectually disabled employees are different from other non-intellectually disabled employees.
- Most intellectually disabled employees want more affection and praise than other co-worker.
Employees are disagreeing little much on these statements:

- The way intellectually disabled employees function is irritating.
- Most Intellectually disabled employees has no need to supervision.

The total item analysis says that coworker has positive attitude towards employees with intellectual disabilities. Research by Opinium found that the majority of UK adults generally believe that disabled people face prejudice in Britain. In line with previous waves of the British Social Attitudes survey, well over half (57%) of respondents agreed that there is ‘a little’ prejudice and a quarter (28%) agreed there is ‘a lot’. Nearly four in ten (38%) people surveyed think of disabled people as less productive than non-disabled people, over three quarters (76%) think of disabled people as needing to be cared for, and 13% think of disabled people as getting in the way some or most of the time.

The Finding of the Study:

- There is no significant correlation between the male and female coworkers.
- There is no significance difference between the below35 and above 35 years of age coworkers.
- Item analysis shows positive attitude of coworker towards employee with intellectual disabilities.
- Item analysis Result shows that intellectual disabled employee are friendly, sociable and job oriented.

Limitation of the Study

- Because of the small sample size it was very difficult to obtain enough information to identify statistically significant correlations. The replication of the present study on a larger sample would help in generalization of the findings.
- Sex ratio of the sample was unequal.
- Scale was not standardized.

Ethical Clearance: (N/A)

Source of Funding: (Self)

Conflict of Interest: (nil).

References


Awareness of Medical Ethics among Undergraduate Students of Medical College in South Kolkata

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Abstract

A descriptive cross-sectional study was conducted to assess the awareness of medical ethics among 319 medical students in a medical college of West Bengal. A semi structured questionnaire that included questions on awareness of ethical principles and Medical Council of India code of Professional conduct, Etiquette and ethics was used. The data was analysed by descriptive statistical method. It was observed that MBBS undergraduate students didn’t have sufficient awareness on medical ethical principles and issues. There was no improvement in knowledge with seniority in medical college. The present study highlights the need of well-planned medical curriculum by multidisciplinary approach by different teaching modes to enhance cognitive, psychomotor and attitude towards medical ethics by trained teachers in subject of medical ethics.

Keywords: Awareness, medical ethics, undergraduate medical students.

Introduction

These days, we have been getting news of repeated attacks on medical professionals, because the confidence of public in health care professionals has been fading. The mistrust in doctors can be attributed to various causes like incompetency or inability to communicate or behave with patients or attendants. Lack of awareness about principles of medical ethics is the main reason of negative publicity against medical profession. Ethics has been defined as the moral principle that govern a person’s behaviour or how an activity is conducted and medical ethics as branch of knowledge concerned with moral principles(1). Medical ethics involved four principles i.e. respect for autonomy, beneficence, non-maleficence and justice(2).

Training in medical ethics have been made mandatory in UG training by MCI, that released MCI 2002, code of ethics which was regulatory document on professional conduct, etiquette and ethics of doctors(3). In present curriculum, medical ethics is taught in 2nd year MBBS by department of Forensic medicine and toxicology. Every medical student should be imparted knowledge and ways to imbibe it as attitude and practice these ethical values to safeguard patient and his interest as well.

The present study was planned to determine the awareness of medical ethics among medical students to collect baseline information along with comparison of students at different level of seniority in the college.

Material and method: A descriptive cross-sectional study was carried out from November 2017 to January 2018 among the medical undergraduates of different batches from first year to final year of ESIC Medical College Joka, Kolkata, after obtaining IEC clearance. A semi structured questionnaire was developed based on Medical Council of India code of Professional conduct, Etiquette and ethics guidelines and previous research publications(4,5). The questionnaire was pretested on 20 UG students and necessary modifications were done. The first section of questionnaire covered demographic information like age, gender and year of admission in medical college. The next section contained information on awareness of students about ethics and its importance, presence of IEC, source of information. Third section of questionnaire was based on principles of medical ethics. Fourth and fifth section comprised of knowledge regarding intimate physical examination, Medical Council of India code of Professional conduct, Etiquette and ethics respectively.
The investigators interacted with the MBBS students of 1st, 2nd, 3rd and 4th year, briefed them about the purpose of the study and requested them to participate, students were assured that participation was voluntary and their confidentiality would be maintained. Informed consent was taken from those who wished to participate. Of 380 students enrolled in institute, 339 participated. Once the data was collected the data frame was prepared using Microsoft office excel programme. Based on the objectives of the study, descriptive and inferential statistics was drawn. For categorical data, percentage along with frequency distribution was used and for quantitative variables mean and standard deviation was used to represent central tendency values in the dataset. Chi-square test and Fisher-Exact test was used to assess whether there is any association between awareness of medical ethics with different domains. Bar diagram and pie charts were used for graphical presentation of data. Knowledge of code of professional conduct, etiquette and ethics was assessed using standard MCI guidelines. Three-point Likert scale was used to categories the variables. A score of seventy percent and above constitute good knowledge, a score of fifty to seventy represent fair knowledge were as the score below fifty represent poor knowledge. The entire dataset was analysed using statistical software R Studio (R version 3.5.1).

**Results:** Among 339 participants, 184 (54.28%) and 155 (45.72%) were males and females respectively. Their age ranged from 17-28 years with mean age 21 years and standard deviation of 1.82. Number of students participated were 69, 48, 89, 78 and 55 from 1st, 2nd, 3rd, 4th and final years respectively.

Table 1: Percentage distribution of medical students according to their knowledge of medical ethics.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>Final Year</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How Important are Ethical Issues in medical profession?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>36.84 (42)</td>
<td>0.87 (1)</td>
<td>8.77 (10)</td>
<td>42.10 (48)</td>
<td>11.40 (13)</td>
<td>114</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>12.32 (9)</td>
<td>15.06 (11)</td>
<td>43.83 (32)</td>
<td>12.32 (9)</td>
<td>16.43 (12)</td>
<td>73</td>
</tr>
<tr>
<td>Important</td>
<td>6.00 (3)</td>
<td>28.00 (14)</td>
<td>36.00 (18)</td>
<td>6.00 (3)</td>
<td>24.00 (12)</td>
<td>50</td>
</tr>
<tr>
<td>Extremely Important</td>
<td>14.85 (15)</td>
<td>21.78 (22)</td>
<td>28.71 (29)</td>
<td>17.82 (18)</td>
<td>16.83 (17)</td>
<td>101</td>
</tr>
</tbody>
</table>

| From where do you learn the most? | | | | | | |
| Lecturer Classes | 18.55 (18) | 18.55 (18) | 29.89 (29) | 19.58 (19) | 13.40 (13) | 97 |
| Clinical training | 28.78 (38) | 9.84 (13) | 14.39 (19) | 33.33 (44) | 13.63 (18) | 132 |
| Ethical Books | 11.76 (10) | 14.11 (12) | 43.52 (37) | 12.94 (11) | 17.64 (15) | 85 |
| Media | 15.78 (3) | 21.05 (4) | 15.78 (3) | 21.05 (4) | 26.31 | 19 |
| Any other | *25.00 (1) | 25.00 (1) | *50.00 (2) | 4 |

| Does your Institute have Ethics Committee? | | | | | | |
| Yes | 22.00 (22) | 05.00 (5) | 29.00 (29) | 25.00 (25) | 19.00 (19) | 100 |
| No | 31.03 (27) | 6.89 (6) | 8.04 (7) | 34.48 (30) | 19.54 (17) | 87 |
| Don’t Know | 13.88 (20) | 25.00 (36) | 36.80 (53) | 15.97 (23) | 12.50 (18) | 144 |

*No observation

Clinical training followed by lectures and ethical books are considered to be prominent source of knowledge on medical ethics. Majority of students opining clinical training as source of information are from 4th year (44%) followed by 1st year (38%). Maximum number of students (29%) from 3rd year followed by 4th year (19%), 1st and 2nd year (18%) and final year (13%) are of view that lectures are source of information on ethics. Again majority of students (37%) of 3rd year followed by 10-15% of other batch think that ethical
books are source of information. However, very few students got information from media. Only 29% students from 3rd year, followed by 25% of 4th year and 19% from final year were aware of Institutional Ethics Committee. Table 2 depicts that majority (81%) of 1st and 4th year opine that ethical conduct is important not only to avoid legal actions whereas approximately 89% and 83% from final and 2nd year think that it is important to discuss ethical issues during clinical rounds along with clinical aspect. It has been observed that most of the students do not have knowledge pertaining to medical issues and knowledge isn’t improving with years of seniority.

Table 2: Percentage distribution of medical student’s attitude toward ethical issues.

<table>
<thead>
<tr>
<th>Statements on ethical issues</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>Final Year (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical conduct is important only to avoid legal action</td>
<td>18.2</td>
<td>20.5</td>
<td>40.3</td>
<td>47.7</td>
<td>52.3 28.7 (0.00)</td>
</tr>
<tr>
<td>It is important to discuss ethical issues during clinical rounds along with clinical aspect</td>
<td>36.8</td>
<td>83.3</td>
<td>74.7</td>
<td>88.6</td>
<td>11.4 60.6 (0.00)</td>
</tr>
<tr>
<td>Patient’s wishes must be always adhered during treatment</td>
<td>52.9</td>
<td>65.0</td>
<td>69.1</td>
<td>75.6</td>
<td>24.4 10.3 (0.24)</td>
</tr>
<tr>
<td>The doctor should do whatever is best irrespective of patients opinion</td>
<td>77.4</td>
<td>60.0</td>
<td>39.5</td>
<td>56.7</td>
<td>43.3 17.6 (0.12)</td>
</tr>
<tr>
<td>The patients should always be told if something goes wrong</td>
<td>77.3</td>
<td>68.3</td>
<td>82.5</td>
<td>76.0</td>
<td>24.0 90.9 09.1 21.6 (0.04)</td>
</tr>
<tr>
<td>Close relative must always be told about the patient’s condition</td>
<td>64.6</td>
<td>93.3</td>
<td>87.3</td>
<td>77.8</td>
<td>22.2 81.4 18.6 16.8 (0.16)</td>
</tr>
<tr>
<td>Children should never be treated without the consent of parents/guardian.</td>
<td>75.5</td>
<td>83.7</td>
<td>80.0</td>
<td>78.4</td>
<td>21.6 90.9 09.1 33.5 (0.00)</td>
</tr>
<tr>
<td>Refuse treatment to a violent patient</td>
<td>41.8</td>
<td>36.8</td>
<td>47.8</td>
<td>52.3</td>
<td>43.5 17.5 15.3 (0.05)</td>
</tr>
<tr>
<td>Patients who refuse treatment on religious/social ground should be instructed to find another doctor</td>
<td>63.8</td>
<td>52.5</td>
<td>47.2</td>
<td>52.8</td>
<td>34.3 77.8 22.2 62.4 (0.00)</td>
</tr>
<tr>
<td>Medical practitioner should take commission for introduction of patients to a specialist</td>
<td>70.7</td>
<td>29.3</td>
<td>22.3</td>
<td>21.6</td>
<td>78.4 70.8 29.2 51.1 48.9</td>
</tr>
</tbody>
</table>

Table 3 shows knowledge of ethics during physical examination of patients. Majority of students except from 1st year opined that male doctor should not examine female patient in his chamber without any female attendant or nurse. Many were of the view that intimate (rectal/vaginal) examination should not be performed without informed consent, privacy of one patient should not be ignored for benefit of large groups and during system examination, writing within normal limits without examination is acceptable for documentation.
Table 3: Comparison of Respondent’s Attitude Towards Physical Examination of Patients.

<table>
<thead>
<tr>
<th>Statements on ethical issues</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>Final Year</th>
<th>(P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it ethical if a male doctor examines a female patient in his chamber when no female relative is there</td>
<td>65.5</td>
<td>34.5</td>
<td>30.9</td>
<td>69.1</td>
<td>26.2</td>
<td>73.8</td>
</tr>
<tr>
<td>Intimate (rectal/vaginal) examination can be performed without informed consent</td>
<td>27.3</td>
<td>72.7</td>
<td>11.9</td>
<td>88.1</td>
<td>18.2</td>
<td>81.8</td>
</tr>
<tr>
<td>Privacy of one patient can be ignored for benefit of large group</td>
<td>30.2</td>
<td>69.8</td>
<td>24.3</td>
<td>75.7</td>
<td>45.5</td>
<td>54.5</td>
</tr>
<tr>
<td>During system examination writing “within normal limits” without examination is acceptable for documentation</td>
<td>21.6</td>
<td>78.4</td>
<td>10.8</td>
<td>89.2</td>
<td>35.0</td>
<td>65.0</td>
</tr>
</tbody>
</table>

Figure 1 show percentage distribution of knowledge of Medical Council of India code of Professional conduct, Etiquette and ethics. Majority of students of all batches had poor knowledge, 4th year students have relatively better knowledge about medical ethics.

Discussion

Our study revealed that majority of MBBS students feel that ethical issues are not at all important in medical profession. This can be attributed to lack of training on the subject in theory as well as practical classes.

The main source of ethics knowledge in present research, was quoted as clinical training and ethical books similar to the finding of studies done in Chennai in 2014(6) and New Mexico in 2004 (7) where respondents preferred clinical training involving multidisciplinary approach over traditional didactic approach and studies conducted in Karnataka in 2014 (8) and West Bengal in 2012 (4) where books on ethics are considered main source of information to the students. Most of students of different batches feel that it is important to discuss ethical issues during clinical rounds along with clinical aspects in accordance with other studies (4, 5).

Majority of respondents were not aware of presence of IEC, similar to the findings of other studies conducted
among MBBS students in other parts of country (4, 6 and 8). Majority of students disagree that ethical conduct is important only to avoid legal action similar to finding of other studies\(^5\,^9\). Students expressed contradictory view on different ethical issues. Most feel that patients’ wishes should always be adhered to during treatment, while majority also feels that doctor should do whatever is best irrespective of patient’s opinion. Similar contradictory views were also reported in other studies as well\(^4\,^5\). Similarly majority of respondents opine that patient and his close relatives should always be told truth about patient’s condition, children should never be treated without consent of guardian, medical practitioner should take commission for introduction of patient who refuse treatment on religious grounds\(^4\,^5\).

Regarding respondent’s awareness on MCI code of Professional conduct, Etiquette and ethics, it is observed that more than 50% of students of final year opine that a physician can prescribe drugs with brand names highlighting urgent need of orientation of students before they independently start practicing profession. A comparison of per cent score of respondents studying in different years shows that there is no proportionate improvement in awareness with increase in years of medical education a finding in accordance to similar studies\(^4\,^6\). This suggests that didactic and textbook teaching on ethics does not increase awareness of this subject. A three year cohort study conducted at Canada, found that students understanding of ethics didn’t improve substantially with education. Majority of respondents remained at same stage of moral reasoning in their 3rd year (mean scores of 3.48) of study as in their first year (mean score 3.46)\(^10\).

All our findings emphasise need of well-planned curriculum including medical ethics as a subject in multiple disciplines to be taught by trained faculty members throughout undergraduate, internship and post graduate period. MCI has developed a curriculum with emphasis on AETCOM (Attitude ethics and communication) for Indian medical graduate to be implemented from year 2019\(^11\) with goal to develop ethically sound doctors.

**Conclusions**

The present study highlights the need of well-planned medical curriculum by multidisciplinary approach by different teaching modes to enhance cognitive, psychomotor and attitude towards medical ethics by trained teachers in subject of medical ethics. It should be on-going process involving UG, PG, Govt. and private practitioners.

In response to similar observations by different studies and to improve the ethical knowledge, MCI has revised its MBBS curriculum, which will roll out nationally from 2019 session. AETCOM curriculum acknowledges the importance of ethics, responsiveness to need of patients and families and fine communication skills to engage the ailing. These will be assessed along with competencies and skills to prepare Indian medical graduate of global relevance\(^11\).

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**Reference**

Knowledge and Perception Regarding Pre Anaesthetic Check-up (PAC) among Patients in a Tertiary Care Hospital in Sub Urban South India

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Abstract

Background: Anaesthesiology branch has traded a long journey from a branch managed by physicians to a specialised branch which handles not just operative cases but also pain management and critically sick patients. Pre anaesthetic evaluation has long journey to go, the various roles of pre anaesthetic evaluation is still not well known to patients, which leads into wastage of resources and increased morbidity and mortality. The present study was done to assess the knowledge and perception of patients regarding pre anaesthetic evaluation in suburban area of coastal district of south India.

Methodology: Across sectional study, conducted in a tertiary care medical college and hospital in Dakshin Kannada district of India. The patients were inducted in the study by using convenience sampling technique. A pre tested, semi structured questionnaire were used as the data collection tool. Data were analysed using SPSS version 16.0 and results were expressed as frequency and percentage.

Results: The reason to go to PAC clinic as pre operative evaluation was known by 30.90% participants but that will help in optimisation and risk reduction was known by only 3.03%. Only an anaesthesiologist can conduct a PAC was known to 23.03% and it will help in anaesthesia and surgery risk reduction was known to 18.18%. Almost half 48.48% participants were willing to communicate about their co morbidities to anaesthesiologist but that need to be optimised before surgery was known by 16.16%.

Keywords: Pre anaesthetic check-up, Optimisation, Anaesthesiologist.

Introduction

Pre-operative check-up (PAC) is the first and a vital interaction of patient and anaesthesiologist. It helps in development of doctor and patient relationship and is crucial for both. During PAC anaesthetist get chance to discuss various anaesthesia techniques, possible options and their probable complications, whereas the patient get the opportunity to discuss their query with anaesthesiologist which helps in relieving their anxiety. It is very important for anaesthesiologist too to understand the patient’s health condition better, optimise them pre-operatively, developing a plan for the operative and post-operative care and give safer and effective health services. More and more patients these days understand the role of anaesthesiologist, however pre-anaesthesia check-up and its relevance with the outcome still remains a less cared aspect. Patients do not disclose their medical conditions during pre-operative evaluation and do not follow the pre-operative instructions properly which compromises the safety of the patient. This not only undermines the purpose of pre anaesthesia check-up, but also increases peri-operative morbidity and mortality.

The aim of this study was to assess the knowledge and perception of patients presenting for elective surgery to a Tertiary Care Hospital in sub urban India regarding value and importance of pre-anaesthesia check-up.
Methodology: The present cross sectional study was conducted in Srinivas Institute of Medical Sciences and Research Centre (SIMS&RC), Mukka, India. It is a tertiary care medical college and hospital, situated in the outskirts of coastal district, Dakshin Kannada of India. SIMS&RC is a tertiary care hospital which caters to the rural population in the outskirts of Mangalore city in Dakshin Kannada district which is one of the most literate district of the country. Although Mangalore has the best medical facility in the region but there is no good medical facility except SIMS&RC in the outskirts of Mangalore.

Approval from the Institutional Ethics Committee and permission from the Medical superintendent of SIMS&RC was obtained prior to the study. Patients who were admitted in SIMS&RC and posted for elective surgery were sent to pre anaesthesia clinic for pre-operative assessment by anaesthesiologist. In PAC clinic before conducting pre anaesthetic check-up, patients who were in age group of 18-70 years, were explained about the purpose of the study in the language best known to them by using a patient information sheet. Written informed consent was obtained by all the patients before inducting them in the study and was assured of anonymity throughout the study. The patient information sheet, consent form and questionnaire were made available in the languages known to the patient. Patients who did not consent for the study, who had some psychiatric disorder, were unable to answer questions due to poor medical condition and illiterate were excluded from the study. It was explained to the patients that the questionnaire was only for the assessment of their knowledge and the results will be used only for research purpose. The total number of patients recruited for the study was calculated to be 330 using prevalence 27.4%. The patients were inducted in the study by using convenience sampling technique. A pre tested, semi structured questionnaire were used as the data collection tool. The questionnaire consisted of two sections, section A and B. Section A dealt with the demographic details of the study participants and section B consisted of questions to assess knowledge and perception regarding pre anaesthetic check-up. Patients were asked to tick the option which was most appropriate according to them.

Results: Table 1 show that maximum patients were in the age group of 45 – 70 years with 39.09%, and minimum in the age group of 30-45 years with 27.57%. Male patients were 59.69% among the study participants. Maximum patients were graduate with 40% followed by approximately 32% who did secondary schooling. For 73.33% participants it was their first exposure to pre anaesthetic clinic for evaluation whereas 26.66% had been to PAC clinic earlier.

Table 2 depicts the knowledge of the participants regarding pre anaesthesia check up. On being asked the reason to come to pre anaesthetic clinic 102(30.90%) patients correctly affirmed for pre anaesthesia assessment, 132(40.00%) participants answered that they came to comply with surgeons instructions while 15(4.54%) were unaware of the reason to go to PAC. Assessment and optimization are done in PAC clinics were correctly known to 10(3.03%) participants, whereas maximum patients 161(48.78%) considered it for some test which were needed for anaesthesia fitness.

Correct knowledge that only anaesthesiologist can perform pre anaesthesia check-up was known to 76(23.03%) participants while 127(38.48%) knew that any doctor in PAC clinic can perform it. When the question was asked about the importance of PAC before surgery, 60(18.18%) correctly said it reduces the risk of anaesthesia and surgery, 103(31.21%) responded that to get the date for surgery whereas 122(36.96%) did not know the importance of pre-anaesthesia check-up before surgery.

Almost one half, 160(48.48%) knew that heart disease, breathing difficulties and renal problems had to be revealed during PAC whereas 82(24.84%) knew that if these diseases are under control then it was not needed to be revealed whereas the rest did not know that they have to reveal the morbid condition. Pre-existing medical conditions need to be optimised before surgery was correctly known by 53(16.06%), while 54(16.36%) were unaware of it.

Habits of drinking and smoking affect the outcome of anaesthesia and surgery was correctly known to 116(35.15%) patients whereas rest were not sure of the outcomes. Pre anaesthesia check-up was required only if surgery has to be performed under anaesthesia was known to 117(35.45%), whereas 213(64.55%) had a negative response to it. Only 41(12.42%) patients wanted to discuss about their anaesthesia related fear and queries in PAC clinic, 205(62.12%) patients knew that it has to be discussed with surgeons in ward.

Table 3 shows that 158(47.87%) participants had no idea whether pre anaesthetic evaluation was required or not before surgery, 31.82% thought that PAC was not needed and 20.30% thought that it was required. 30.9% thought that PAC was wastage of time and money, 24.84% were against it and 44.24% had no idea. 21.12% patients were ready to follow advices given in PAC clinic for their own good, 26.96% were willing to continue till surgery gets over, 33.03% wanted to be instructed by surgeons to follow orders, and 18.78% were clueless.
Discussion

The anaesthesiology has evolved over years from a branch handled by physicians to specialist who handles operative cases, pain management and intensive care. The awareness about role of anaesthesiologist has been increasing over time. In a study conducted by Jathare et al. in Mumbai, found that only 38% patients were aware of the role of anaesthetist in pre anaesthetic clinic. A study conducted by Leite et al. in Brazil found that 79.1% patients were aware that anaesthesiologists are specialized physicians.

Pre anaesthesia evaluation is the process of clinical assessment by an anaesthesiologist, which precedes the delivery of anaesthesia care for surgery and non-surgical procedures. The goals of adequately conducted pre anaesthetic evaluations are to develop a rapport with the patient and their relatives, reduce the morbidity of the surgery, increase the quality, reduce surgical delay, reduce case cancellation and decrease the cost of pre-operative care. It consists of history taking, general physical evaluation, relevant investigations, optimization, if needed consult from other super specialties to optimise patient better for the surgery. Adequate pre anaesthetic evaluation is important to reduce morbidity and mortality of the patients. The knowledge about PAC clinic, preoperative evaluation and its role is still not well known to people. In developing countries especially in rural population the knowledge about the need of pre anaesthetic evaluation is even more limited.

Traditionally patients who gets admitted one day prior to surgery were to be seen by anaesthesiologist. But later this method was found not to be cost effective, so in an attempt to make PAC more effective cost and outcome wise, the new planning is to get PAC done immediately after taking decision for surgery. It helps in reducing case cancellation on the day of surgery due to inadequate optimisation. There are various studies which have been done to plan effective set up of PAC clinic and to sensitise patients about its need. A study conducted by D Singla et al in rural population of developing country found that 27.4% of study participants were aware that PAC clinic was for preoperative evaluation, while in the present study the awareness level was 30.90%.

The fact that pre anaesthetic evaluation is for assessment and optimization before surgery was comparable in both the studies, which was 3.2% in Singla et al study and 3.03% in present study. Only an anaesthesiologist can conduct a pre anaesthetic evaluation was known to 18.11% in Singla et al study and 23.03% in present study. The information that a well conducted pre anaesthetic evaluation helps in decreasing the risk of surgery and anaesthesia was known to 15.6% of study participants in Singla et al study while in present study it was found to be 18.18%.

Associated comorbidities like heart disease, renal disease, and breathing difficulties needs special care by anaesthesiologist pre operatively for optimisation, operative plan and even for postoperative care. The mortality and morbidity directly depends on it so if patients do not reveal it during pre-anesthetic check-up, the outcome may get affected. In the present study 48.48% participants understood the importance of informing about associated co morbidities while 24.84% did not considered it important if it is under control. The pre-existing medical conditions need to be optimised before surgery was known by 21.3% patients in Singla et al study while in present study it was known by 16.06%.

Smoking and hazardous drinking increases post-operative morbidity in dose-response relationship. The harmful effects of smoking on cardiorespiratory and immune system significantly reduce by abstinence of 3-8 weeks, so it is mandatory for the anaesthesiologists to know about habit of smoking and drinking of the patient. In our study 35.15% participants knew that smoking and drinking habits can affect the outcome of anaesthesia and surgery, while majority 43.93% had no idea of such correlation. A study done in rural India concluded that 23.7% patients were only aware of correlation between smoking and drinking habit. The patients should be evaluated before the surgery to develop a database upon which risk assessment and perioperative decision management will depend. Pre anaesthetic evaluations are done only before surgery was known by 36.9% patients in Singla et al study, in present study 35.45% study participants knew that PAC has to be done pre operatively. A study conducted by Chew et al to assess the patient knowledge about anaesthesia concluded that the main fear of surgery was pain, only 23.5% correctly knew that anaesthesiologist are responsible for analgesia in post-operative period. In Singla et al study 58.6% of the study participants wanted to discuss their fear related to pain and anaesthesia with surgeons, 16.5% wanted to discuss it with anaesthesiologist during PAC. In the present study 62.12% participants wanted to discuss their fear of pain with surgeons and 12.42% with anaesthesiologist in PAC clinic.

In a study conducted on orthopaedic patients, they found that there should be better and close communication between surgical, anaesthesia and operation theatre team to avoid case cancellation. During PAC, the advices given to the patients need to be properly followed for
optimisation of the associated medical condition. In a study conducted in rural populations 20.3% patients were willing to follow the advices which were given in pre anaesthesia clinic, while 21.21% participants were willing to follow advices for their own good in present study.

Some of the limitations of the present study were that the study was conducted in single medical college and so the results cannot be generalised to a bigger geographical distribution. Illiterate patients were excluded from the study to avoid any influence on knowledge of patient while explaining the questionnaire to them.

**Conclusion**

Awareness of patients regarding anaesthesiologist have increased but the need of pre anaesthetic check-up and its importance for surgery is still limited, especially in sub urban population even in a part of Dakshin Kannada district which has 91% female literacy rate and 96% male literacy.

**Conflict of Interest:** none

**Source of Funding:** self funded

**Ethical Clearance:** the approval from Institutional Ethics Committee (IEC) was obtained prior to the study

**References**

1. Singla D, Mangla M. Patient’s knowledge and perception of preanaesthesia check-up in rural India. Anesth Essays Res. 2015 December;9(3):331-336
A Study on Successful HR (Human Resource) Strategies for Past, Present and Future Business Environment

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Abstract

The Indian economy had undergone significant policy shifts in the early 1990s. The human resource is very important in the field of organisation because of all the action taken only by the HR manager. The strategies are to be followed in the business organisation for future development. The developmental process is to be imparting in the organisation. This article has contained all the information about the organisational activities. The HR strategies are followed in past at the same time present and also the future. Initially study was conducted among few respondents and changes were brought in the questionnaire. Analysis and interpretation is done using Chi-square method. Based on the findings, appropriate suggestions have been made for increasing the HR strategies.

Keywords: HR, business environment, HR strategies, HR Evolution, Virtual Reality, Future Leaders.

Introduction

The HR strategy is usable for the newly started business and also the existing, the real meaning of the HR is how to safer the organization from the unwanted problems. The HR practically followed by the organisation its will give good positive into our business¹. The human beings are ready to work inside and also outside the organisation is very interesting and also the eagerly. The organisation think about the future, they should be followed certain rules and regulation in the presently. The present norms are to be succeeding in the past one; it gave a certain type of ideas to the organisational authority³. The norms are framed by certain expert person is called as HR manager.

What Are the Work Done By Hr in A Company:

The HR in the organisation has to perform very well because of this is no only job it’s a mannerism of the authority. This type of person is an important asset in the organisation, these asset are utilized at very well it gives a expected result. These are the important part of the organisational promotional activities². So, every organisation must give priority to this type of people. These kind of peoples are concentrate only on the basis of organisational up gradation

What Is The Role of A Hr In A Company?⁶

Recruiting: Finds, hires, and onboards new employees.

Training and Development: The training programs are to given by the organisational authority for the purpose of clarifying the doubt and getting some ideas by the trainees.

Union Negotiations and Labor Relations: Instead of taking the CEO away from leading the company, HR will represent the executive team and deal with any complaints unions have about the enterprise.

Compensation and Benefits: The compensation not only for monetary level it gives some of the extra benefits, perquisites and family benefits to the employees and then labour.

Employee Relations: Baby sitting adults, unfortunately this is needed in companies.

Organizational Development: Determines who reports to who and why. They also determine if problems in the company are coming from, people, rewards, processes structure or strategy⁵.

Legal Compliance: Making sure that a company is doing everything the government says a company is supposed to be doing. I-9’s, W-4’s, Affirmative Action Plans, etc.

Employee Engagement: Figuring out how to make employees work more hours while being paid less money and having them be happy about it.

Human Resources Information Systems (HRIS): They run the computer system that keeps track of all the people records⁴.
Health and Safety: Creating and maintaining a working environment that humans can function and thrive in.

Most Important Characteristics of Human Resource Management

Every individual person must have the same of the character in his life, so character is very essential. The HR character is very needed on in the organisation. The HR in the organisation is one of the important roles playing activity; this activity is based on the following:

- It is pervasive
- Interdisciplinary and fast changing
- Focus on results
- People-Centered
- Human relations philosophy

Real Challenges Facing Hrm In The Future:

The challenges are ready to taken by the HR in his organisation, the activities of an of the HR can be pre-analysis and also predicted. The HR performance is based on future oriented because of organisation goes to shine in the long term. The long term life of organisation is fully based efficient work given by the HR. The HR is an important part and also the asset of the organisation, these asset are used at effective level it will gives better result in the organisation. The working manner is differ on the basis of effective step taken by the HR, the HR people is to interested to participate all the activities of the organisation in future oriented. The future of the organisation is in the hands of the HR.

Hr Evolution: Past, Present & Future: As the HR function continues to undergo rapid development and changes due to technology and globalization, it might be interesting to take a short trip to the past and discuss how the role has evolved and what implications it holds for the HR professional in the present and the future.

The Past: A Backend Support: The modern form of Human resources has arguably started from the early days of the industrial revolution in the 18th century where factories first introduced programs to enhance the satisfaction of workers so as to increase their productivity. It was only another century after that that organizations introduce the Personnel Management department to take care of employee related issues and compliance to labor laws. Human resources at this point in time played a largely administrative and supportive role. With globalization and the emergence of MNCs in the 70’s, personnel process and procedures revolving around the globalized workforce became more complex and the demand for increasing competent and skilled knowledge workers intensified, culminating into what was coined the war for talent by Steven Hankin of McKinsey & company.

This ushered in time of HR Management and Development where human resources managed complex HR information systems across the globe, ensured competitive and equitable compensation and benefit systems and orchestrated the training, development and placement of the right talents in the right position and the passing of the leadership baton through its talent management and succession planning strategies.

The Present: a Strategic Ally: As HR continued to add value to the organization and deliver better results, its position slowly morphed into what is more commonly known as a HR business partner role where HR professionals add greater value through a strategic focus with their business knowledge. Instead of a purely supportive role, HR now partners the business to provide holistic, long term and results focused solutions as a strategic ally. As a case in point, we can look at the recruitment or talent acquisition function. It’s no longer about filling headcounts now. It’s not even about finding good people. It’s about finding the right people who are not only good in their job but can also fit into the organization culture. It’s about finding the right people who are passionate and have the potential to take on bigger roles in the future. It might even mean tweaking the job sometimes to fit the job to the talent in certain cases. And this can only be done by a HR professional who knows the business demands well by working closely with the line managers.

As the expectation gets higher, naturally, the demand for the tools, skills and knowledge of the HR professional scales up accordingly, as its role becomes more collaborative and advisory. HR might even need to take the lead at times, such as when driving cultural changes or during implementation of new business processes and models like shared service centers.

The Future: Accelerated Changes: If past trend was anything to go by, we can all be sure that the HR function will evolve at a more accelerated rate. While it took more than a century for when employee welfare program started to the launch of the Personnel Management function in companies, it only took several decades for the metamorphosis of the Personnel Management into the Human Resource Management and Development functions. And subsequently, for its evolution into the current variation as a strategic business partner, it took barely two decades. As digitalization, technology, internet and social media continue to shape the world, it is certain that HR will continue to play a more strategic role and manage more complex functions. This present diverse opportunities for HR to add and create value...
through its data analytics, management of a generational changes in workforce to Gen Y & Z and also the advent of new learning technologies such as e-learning, mobile learning and gamification, just to list a few.

Thus, it is timely and heartwarming that a website such as ThriveInAsia.com came to fruition as HR professionals alike now have a very useful platform, community and resource centre to share ideas and thereby accelerate their learning to keep up with the accelerating evolution of the HR function.

Objectives of the study

4 Main Objectives of HR

1. To find out the reason for organisational development.
2. To give some of the suggestion to the HR people in the organisation.
3. To understand the HR is an assets in the organisation.

Research Design: Descriptive Research Design

Sampling Method: Since the population is large in number, the researcher undertook a sample survey. Convenient sampling method has been adopted to collect data from customers.

Sample Size: 500

Method of Data collection: Surveys questionnaire method and Personal Discussion.

Scope of the Study

• The HR strategies are used for the promotion of organisational improvement in the top level.
• HR practices provide a expected result in the future at effective utilisation of organisational resources.
• The promotion of organisation into the next level is based on efficient work given by the HR people.
• The inter-disciplinary action are taken by the management only for the purpose of organisational improvement.

Limitations of the Study

The HR peoples are working effectively but the same time they need equal rights to bargain his basic necessity.

The compensation is not favour for his work, so they are expecting additional benefits with properly.

The organisational performance is based on his own limit not for interpreting the other organisational performance.

Framework of Analysis and Analytical Tools

Chi-Square Test

Table No 1: Quality of the Work Versus Literacy Level of the Employees Chi Square Table

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**CHI SQUARE**

Df: (r-1)(c-1)

Table value: 31.41

Calculated Value: 66.30

**Result:** Since the calculated value of Chi Square is greater than the table value of $X^2$, $H_0$ is rejected. So the Respondent literacy level is influenced by the quality of work.

Hence there is evidence of association between literacy level and by the quality of work.

**Table No 2: Salary Package System Versus Age Group of the Employees**

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**CHI SQUARE**

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Table value: 21.03

Calculated Value: 63.33

**Result:** Since the calculated value of Chi Square is greater than the table value of $X^2$, $H_0$ is rejected. So the employee’s age group is influenced by the package system.

Hence there is evidence of association between age group of the respondent and Salary package system.

**Implication:** The implication HR strategies in the business organisation it must be promote from lower level to the top level. This type of participation will increase the environmental conditions at knowing the general people. Organisational strategies may give a positive approaches from the management level and also the labour level. Cooperation between the management and labourers its based on HR strategies. HR performance not a recently developed it is newly updated one, so we have to give a concentration about the HR strategies.

**Findings**

1. Majority of the people are willing do the duty with effective managerial functions.
2. Most of them felt under the HR strategy are based on learning process.
3. From the above most of them feel about present working conditions not well in the personal and business.
4. The modern business world needs a support of digitalisation, so we have to follow the HR strategies in present and also a future.

**Suggestions:** From the above details we have to give some suggestion to the HR people in the organisation. The strategies are not followed continuously these only for time duration. The organisational people thinking is
only for improve the organisation with support from the management. The management are to give a full support they are working effectively. The monetary and non-monetary benefits are liked by the most of them in the organisational side.

**Conclusion**

Finally the organisation must to develop only by the way of support the human resources. This type of supporting system will give unexpected result from the HR level, give a good salary, remuneration, increments, allowances, family packages, entertainment facility and other type of monetary benefits. The HR is very important role playing character inside the organisation, so we have to give certain liberalisation to him. They are working with effective and also the efficient manner in the organisation improvement.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Reference**

Work Related Burnout among Software Professionals in India: A Questionnaire Study Using Maslach’s Burnout Inventory

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Abstract

Aim: The present study is designed to assess the work related burnout using Maslach Burnout Inventory among software professionals working in Chennai city.

Methodology: A cross-sectional study was conducted to evaluate the work related burnout among 900 software developers belonging to different companies in Chennai city. Burnout self test developed by Maslach was used to assess the burnout. Data collected was subjected to statistical analysis using Chi square test.

Result: Among the sample, 61.2% were males and 38.8% were females. More females suffered moderate burnout compared to male. Comparison between job designation and burnout showed that there is no statistically significant difference in the burnout experienced. Comparison between gender and burnout showed that, more females suffer moderate burnout compared to males and the difference is statistically significant.

Conclusion: More female software professionals are experiencing moderate level of burnout compared to their male counterparts.

Keywords: Software developers, Job burnout, Software professional, personal health, Stress.

Introduction

In recent years, the term burnout was used to refer to a state of emotional and psychological exhaustion from work¹. The term burnout is usually applied to strain symptoms in psychosocial professions. Among most definitions, burnout is depicted as an individual’s negative emotional experience leading to a long term phenomenon²,³. The definition of burnout has three components: emotional exhaustion, depersonalization and diminished personal accomplishment⁴. Most definitions include detachment and diminishing interest in the job, especially by persons who were more committed to their work. If wide concept of burnout is used, including physical and psychological exhaustion⁵, it becomes obvious that burnout symptoms also occur in skilled professionals. There are studies showing burnout to exist outside the field of human and social service⁶,⁷.

The consequences of burnout have been classified into physical consequences, emotional consequences, interpersonal consequences, attitudinal consequences and behavioural consequences⁷. Physical consequences include health issues such as poor appetite, headaches, fatigue, sleeplessness and may even lead to chest pain, gastrointestinal problems⁸,⁹. Emotional consequences include decrease in self-esteem, depression, irritability, helplessness or anxiety⁹,¹⁰. Interpersonal consequences include negative impact on personal, home and family lives like reduced socialization, withdrawal from friends¹⁰, greater impatience, moodiness and less intolerance¹¹, and also lower levels of organizational commitment¹²,¹³. Behavioral consequences include work related behaviors like turnover¹⁴, absenteeism¹⁵ and decrease in the quantity and quality of job performance¹⁶.

The possibility that burnout also occurs in software profession is suggested by studies¹⁷ which reported that stress levels of software engineers to be greater than those in other professions. In addition, work in software profession claims high intellect from the employees¹⁸. It is very demanding and requires constant learning and updating of knowledge¹⁹. Rubin and
Hernandes reported high inherent impulse to work in software professionals, and with addition of stressful circumstances, they are more prone to the development of burnout.

The present study is designed to assess the work related burnout using Maslach Burnout Inventory among software professionals working in Chennai city.

**Methodology:** A cross-sectional questionnaire study was conducted to evaluate the work related burnout among software professionals working in Chennai city. A pilot study was conducted to calculate the sample size which was found out to be 900. The study population was selected by convenient sampling methodology.

The study participants should be able to understand and communicate in English and those who were willing to participate were included. Informed consent was obtained from all the participants. Individuals who refused to give consent were excluded from the study. The research protocol was approved by the Institutional Review Board of Sathyabama Dental College and Hospital, Chennai.

The present study was conducted among 900 software professionals working in Chennai city. Among the sample, 61.2% were males and 38.8% were females. Their age ranged from 25-35 years. 34.2% of the participants were qualified with Bachelors degree in Engineering while others had degree in bachelors in arts and science (17.8%), masters in engineering (19.6%), masters in arts and science (14.8%).

Based on duration of work as software engineers: 40.2% of the study sample had work experience as software engineer for <2 years, while 15% had work experience of >15 years.

Designations of the study participants were listed as, data processor (30.1%), Team Leader (26.2%), Subject Matter experts (17%), Project Leader (15.1%), Supervisor (11.6%).

| Table 1: Comparison between job designation and the section of burn out using Chi square test. |
|-----------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Burnout                                      | Grading         | low | moderate | High | Total | Chi-Square | p value |
| Project leader                               | 72              | 62  | 2        | 136  |
| Supervisor                                   | 72              | 30  | 2        | 104  |
| subject matter experts                       | 85              | 67  | 1        | 153  |
| team leader                                  | 127             | 105 | 4        | 236  |
| Processor                                   | 152             | 113 | 3        | 271  |
| Total                                       | 509             | 377 | 12       | 900  |
| De-personalization                           | low | moderate | High | Total | Chi-Square | p value |
| Project leader                               | 2              | 17  | 117     | 136  |
| Supervisor                                   | 3              | 17  | 83      | 104  |
| subject matter experts                       | 1              | 19  | 132     | 153  |
| team leader                                  | 1              | 26  | 208     | 236  |
| Processor                                   | 7              | 40  | 223     | 271  |
| Total                                       | 14             | 119 | 763     | 900  |
| Personal achievement                         | low | moderate | high  |      | Chi-Square | p value |
| Project leader                               | 0              | 0   | 134     | 136  |
| Supervisor                                   | 0              | 0   | 101     | 104  |
| subject matter experts                       | 0              | 0   | 151     | 153  |
| team leader                                  | 0              | 0   | 233     | 236  |
| Processor                                   | 0              | 0   | 269     | 271  |
| Total                                       | 0              | 0   | 888     | 900  |
Comparison between job designation and burnout showed that there is no statistically significant difference in the burnout experienced.

Table 2: Comparison between Gender and the section of burn out using Chi square test.

<table>
<thead>
<tr>
<th>Burnout</th>
<th>Gender</th>
<th>low</th>
<th>Moderate</th>
<th>High</th>
<th>Total</th>
<th>Chi-Square value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>male</td>
<td>332</td>
<td>210</td>
<td>8</td>
<td>551</td>
<td>8.53</td>
<td>0.036*</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>177</td>
<td>167</td>
<td>4</td>
<td>349</td>
<td>1.67</td>
<td>0.643</td>
</tr>
<tr>
<td>Depersonalization</td>
<td>male</td>
<td>7</td>
<td>69</td>
<td>473</td>
<td>551</td>
<td>0.043</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>7</td>
<td>50</td>
<td>290</td>
<td>349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal achievement</td>
<td>male</td>
<td>0</td>
<td>0</td>
<td>544</td>
<td>551</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>0</td>
<td>0</td>
<td>344</td>
<td>349</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison between gender and different sections of burn out showed that, there is no significant difference based on gender with Depersonalization or Personal achievement. Whereas comparison between gender and burnout showed that, more females suffer moderate burnout compared to males and the difference is statistically significant.

Discussion: A moderate level of stress is a significant driving factor which is considered normal and essential. If stress is extreme, continuous, and frequent, it becomes a negative event which can lead to physical and psychological issues.

Software development is one among the mentally demanding jobs. As a part of their job, employees often encounter unrealistic deadlines. It is common for Indian software professionals to spend 12 to 14 hours a day working on projects. Combined with inefficient facilities and infrastructure, they spend less time with the family. Over time, they tend to identify themselves personally with their job. Whilst lack of specific studies, informal evidence suggest that burnout, stress and risk of health problems are becoming common employment issues affecting the software industry.

In our study sample, males (61.2%) were more in number than females (38.8%). Other studies on IT professionals reflect similar findings. Studies in Europe reported that females represent only 25% of the software workforce and it was 20% in U.S. The gender difference may be largely due to cultural and social influences. Because of the variety of roles that women play, it might lead them to choose professions which are less time consuming and less stressful unlike software profession.

In this study it was found out that, irrespective of job designation, burnout was experienced among the software employees. Many previous studies too reported the levels of stress experienced by software professionals. In an online survey done among South Indian software engineers reported that 32.4% of their study sample to be distressed and 8.1% had severe psychological stress.

Another study done on IT professionals in Delhi reported that 35% of their study subjects to be stressed.

In the present study, it was also found out that more females suffer moderate burnout compared to males.

Study done on women software professionals in Chennai reported 55.22% of their study subjects to be experiencing moderate levels of stress, 28% of the study subjects had high overall stress and 1.6% had very high overall stress.

Studies have found that work family interference is experienced more often by women than by men. Depression is found to be one of the most consistent and strongest outcome of work family conflict.

In the Indian context, as women are expected to handle household duties, women software engineers might experience more work family interference, increasing the risk for developing depression.

Although, our study threw some light on burnout experienced by Indian software professionals, there are some limitations. In this study only screening questionnaires were used and screening was performed only for work related burnout. No other causal factors
for burnout were assessed. We have not assessed other possible triggering factors other than work related burnout.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Ref No: Sathyabama Dental College and Hospital/ IHEC/Study No: 060

**References**


Effectiveness of Informational Booklet on the Level of Knowledge Regarding the Effects of Junk Food on Health

Bhavna Sharma
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Abstract
Junk food is a pejorative term for food containing a large amount of calories from sugars or fats with little fiber, protein, vitamins or minerals.

Objectives: To assess the pre and post-test level of knowledge regarding the effects of Junk Food on health. To evaluate the effectiveness of an informational booklet on the effects of Junk Food on health in terms of gaining knowledge. To find out the association between the post-test level of knowledge regarding the effects of Junk Food.

Method: A quantitative evaluative research approach and pre-experimental design one group pre and posttest research design was used to conduct the study. Samples were 40 students studying in B.Sc. Nursing 1st Year in School of Nursing Science & Research, Sharda University were selected through non probability convenience sampling technique. A structured self-administered questionnaire was used to collect the information regarding eating habit. Results:-The data was analyzed by descriptive and inferential statistics. The obtained pre-test overall mean score was 8.675, SD 2.47435, mean percentage was 78.86% and range was 10. The obtained post-test overall mean score was 15.2, SD was 2.37724, mean percentage was 84.44% and range was 7. The mean difference between the pre-test and the post-test is 0 and the obtained “t” value was significant at 2.02269092. The correlation between the pre-test and post-test is 0.020051996. It was evident that compared to pre-test knowledge score there is significant increase in the post-test knowledge scores.

Keywords: Effectiveness, Informational booklet, Knowledge, Junk Food, Effects, Health.

Introduction
Junk food is defined as processed food with little nutritional value. It is often high in salt, sugar and fat. It includes convenience foods as well as fast foods. These foods are high in calories, without the benefit of providing you with minerals, vitamins or fiber that are needed to maintain a healthy mind and body. However, these items are made with the intention of being appealing or enjoyable so you are chemically programmed to crave more.1

Consumption of these foods in an un-controlled manner and over a prolonged period of time may result in obesity their by increasing the risk of other non-communicable diseases like Diabetes Mellitus, hypertension, coronary artery disease etc.2

The Effects of Fast Food on the Body:- While an occasional night of fast food won’t hurt, a habit of eating out could be doing a number on your health.

Digestive and cardiovascular systems:- When your digestive system breaks down these foods, the carbs are released as glucose (sugar) into your bloodstream. As a result, your blood sugar increases.

Sodium: Sodium can elevate blood pressure and put stress on your heart and cardiovascular system.

Respiratory System: Excess calories from fast-food meals can cause weight gain. This may lead toward obesity. Obesity increases your risk for respiratory problems, including asthma and shortness of breath.

Integumentary system (skin, hair, nails): Children and adolescents who eat fast food at least three times a week are also more likely to develop eczema, according to one study. Eczema is a skin condition that causes irritated patches of inflamed, itchy skin.

Skeletal system (bones): Sugar in fast food and processed food can increase acids in your mouth. These acids can break down tooth enamel. As tooth enamel
disappears, bacteria can take hold, and cavities may develop.

**Effects on society:** Today, more than 2 in 3 adults are considered overweight or obese. More than one-third of children ages 6 to 19 are also considered overweight or obese.

**Research Methodology**

**Research approach**
The research approach used for this study was quantitative evaluative approach.

**Research design**
Pre-experimental design one group pre and posttest design was selected to evaluate the effectiveness of informational booklet on knowledge regarding the effects of junk food on health.

**Independent variables**
In this present study the independent variable is informational booklet.

**Dependent variables**
In this present study the dependent variable is knowledge.

**Population**
The accessible population for the present study was students of B.Sc. nursing 1st year who were present on the day of data collection.

**Sample**
The sample selected for the present study was the students studying in B.Sc. nursing 1st year, SNSR, Sharda University, greater Noida.

**Sample size**
In this study the sample size was 40 students studying in B.Sc. nursing, SNSR, Sharda University, Greater Noida.

**Sampling technique**
In this study non probably convenience sampling technique was used to select the sample.

**Description of the tool**

**Section A**
It consists of demographic characteristics of students like gender, age, religion, place of residence, type of family, family monthly income, food habits, previous knowledge and source of health information.

<table>
<thead>
<tr>
<th>Scoring Procedure S. No</th>
<th>Score</th>
<th>Level of Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-10</td>
<td>Inadequate knowledge</td>
</tr>
<tr>
<td>2</td>
<td>11-15</td>
<td>Moderately adequate knowledge</td>
</tr>
<tr>
<td>3</td>
<td>16-20</td>
<td>Adequate knowledge</td>
</tr>
</tbody>
</table>

**Data Collection Procedure:** Before collecting the data, permission was obtained from the concerned authority. Keeping in mind the ethical aspect of research, the data was collected after obtaining the informed consent of the sample. The samples were assured anonymity and confidentiality of information provided by them. The researcher collected the data from the subjects. Pretest was conducted, followed by distribution of informational booklet regarding effects of junk food on health. Posttest was conducted to evaluate the effectiveness of distribution of informational booklet.

**Results**

**Table 1:** The frequency and percentage distribution of pre and post-test level of knowledge regarding the effects of junk food on health.

<table>
<thead>
<tr>
<th>Level of knowledge</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Level of knowledge</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate</td>
<td>26</td>
<td>65%</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Moderately adequate</td>
<td>14</td>
<td>35%</td>
<td>20</td>
<td>20</td>
<td>50%</td>
</tr>
<tr>
<td>Adequate</td>
<td>0</td>
<td>0%</td>
<td>20</td>
<td>20</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100%</td>
<td>40</td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 2:** Shows the Mean and Standard Deviation of Pre and Post Test Level of Knowledge Scores.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Experimental Group</th>
<th>Mean</th>
<th>Sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-Test</td>
<td>8.675</td>
<td>2.47435</td>
</tr>
<tr>
<td>2</td>
<td>Post-Test</td>
<td>15.2</td>
<td>2.37724</td>
</tr>
</tbody>
</table>
Table 3: Mean, Standard Deviation, Range, “T” Value Regarding Level of Knowledge on Effect of Junk Food on Health before and after Distribution of Informational Booklet on Effect of Junk Food on Health.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Experimental Group</th>
<th>Mean</th>
<th>Mean Percentage</th>
<th>Sd</th>
<th>Range</th>
<th>Mean Difference</th>
<th>“T” Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-test</td>
<td>8.675</td>
<td>78.86</td>
<td>2.47435</td>
<td>10</td>
<td>0</td>
<td>2.0226909 df=39 P&lt;0.0922 S</td>
</tr>
<tr>
<td>2</td>
<td>Post-test</td>
<td>15.2</td>
<td>84.44</td>
<td>2.37724</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Findings

The data was analyzed by descriptive and inferential statistics. Majority 29 (72.5%) were girls followed by 19 (47.5%) were in the age group of 19 years, 29 (72.5%) of respondent Hindu, 29 (72.5%) of respondent were day scholars, 22 (55%) of respondent lives in nuclear family, 17 (42.5%) had their family income Rs.61,000 and above, 21 (52.5%) were vegetarians, 31 (77.5%) had knowledge regarding the effects of junk foods, 14 (35%) gained knowledge by themselves and through TV/Radio. It was inferred that among 40 participants 16 (40%) had inadequate knowledge and 23 (57.5%) had moderately adequate knowledge and 1(2.5%) of had adequate knowledge. The post test was conducted after distribution of informational booklet regarding the effects of junk food on health among students of B.Sc. nursing 1st year. The obtained pre-test overall mean score was 8.675, SD 2.47435, mean percentage was 78.86% and range was 10.

The obtained post-test overall mean score was 15.2, SD was 2.37724, mean percentage was 84.44% and range was 7. The mean difference between the pre-test and the post-test is 0 and the obtained “t” value was significant at 2.02269092. The correlation between the pre-test and post-test is 0.020051996. It was evident that compared to pre-test knowledge score there is significant increase in the post-test knowledge scores. Hence the research hypothesis (H1) is accepted. Therefore it can be interpreted that the informational booklet was effective in improving the knowledge of B.Sc. nursing 1st year students regarding the effect of junk food on health.

Conclusion

On the basis of the finding of the present study, the following conclusion can be drawn:

“Informational booklet method was an effective method of giving information to students. This method helps for easy understanding and gives more awareness about effects of junk food on health.”

Ethical Clearance: Ethical clearance has been taken from Principal of school of nursing.

Source of Funding: Self

Conflict of Interest: Nil

Reference

Practice of Self Medication and its Effects among Nursing Students

Blaze Asheetha Maria Rosario, Amitha Thomas, Chisale Roselyn Dukru, Christy Mary Jose, Meenu Michael, Rinu Varghese and Suby Rose Baby (IV B.Sc N Students)

Abstract

Background: Self medication or dosing oneself without prescription is actually an abuse which individuals often fail to confess. The menace becomes even more dangerous when knowledge received regarding medication is incomplete. The nursing students are one such population endangering themselves.

Methodology: A survey research approach, using a descriptive design, was adopted. Data was collected from 105 nursing students who were selected through a probability disproportionate stratified random sampling using a self administered structured self medication practice Checklist. The data gathered was analyzed and interpreted using descriptive and inferential statistics.

Results: The findings revealed that the nursing students had moderately satisfactory practice of self medications. The study recommends the need for awareness programs among Nursing students and general population.

Keywords: practice, selfmedication, effects, nursing, students.

Introduction

Self-medication is a problem that exists worldwide. The practice of taking medications to treat without consulting a doctor is hazardous to man and an apparent public health problem. In a developing country like India the system of self-medication is flourishing due to various factors like socioeconomic factors, lifestyle, previous experience of treating a similar illness, ready access to drugs and the increased potential to manage mild illness through self-care. Self-medication is a problem that has the potential to harm society at a large as well as individual patient. Self-medication provides a lower cost alternative for people who cannot afford the cost of clinical services which all contribute to the spread of self-medication.

Self medication is the use of medication without prescription, orientation or supervision of a physician or dentist. Self medication is a common practice worldwide and irrational use of drugs is a cause of concern. It assumes a special significance among nursing students as they are the future practitioners in the health field.

In several studies it has been found that inappropriate self medication results in wastage of resources, increases resistance of pathogens and generally entails serious health hazards such as adverse drug reactions, prolonged suffering and drug dependence. On the other hand if done appropriately, self medication can readily relieve acute medical problems, and can save time spent in waiting to see doctor, may be economical and can even save lives in acute conditions.

Self-medication begins in early adolescence, often during the middle school years. By the age of 16, nearly all adolescents have taken medicine independently.

A study conducted among the youth in Karnataka it is found that the prevalence of self-medication was 88.6%, which is very high. The above statistical burden and observation of the researchers led to the present study.

Statement of the Problem: “A descriptive study to assess the practice of self medication and its effects among nursing students in a selected institution, Bengaluru.”

Objectives:

- To assess the practice of self mediation and its effects among nursing students.
- To associate the practice scores regarding self medication and its effects with selected sample characteristics.
Hypothesis:

At 0.05 level of significance

H₁: There is a statistically significant association between practice scores regarding self medication and its effects with selected sample characteristics of Nursing Students.

Operational Definitions

- **Practice:** In this study it refers to the action of consuming over the counter drugs as measured in terms of practice scores using a self administered structured practice checklist.

- **Self medication and its effects:** In this study it refers to the act of consumption of drugs by the nursing students themselves, without the prescription of a physician and the resultant adverse effects related to the same.

Methodology: A descriptive study was conducted in the nursing student’s hostel of St. Philomena’s College of Nursing. A sample of 105 nursing students were selected using a probability disproportionate stratified random sampling technique. They were stratified based on the year (four from B.Sc (N) and three from GNM) of study. Data was collected from nursing students using self medication practice checklist (r = 0.83). The collected data was analyzed using suitable descriptive and inferential statistics. Thereafter the analyzed data was presented using tables.

Results and Interpretation

Sample characteristics of nursing students.

Majority of nursing students belonged to 18-23 year of age (93.4%), and most of them were Christians (82.8%).

With regard to educational qualification a little more than the half sample (57.2%) were from the B.Sc (N) stream and 42.8% were doing their G.N.M course. All most all 104(99.1%) the nursing students were residing in the hostel within the campus, 24(22.9%) of nursing students were residing for 1 year, 29(27.6%) of nursing students were residing for 2 years, 28(26.7%) of nursing students were residing for 3 years and 24(22.8%) of nursing students were residing in the hostel for 4 years and above.

According to sickness rate 38(36.2%) of nursing students fell sick often. Among the nursing students who fell sick often 57.9% of nursing students fells sick once in 6 months, 13(34.2%) of nursing students fell sick once in a month and 3(7.9%) of the nursing students fell sick once in a week..

Among 105, nursing students, 15(14.3%) of the nursing students had their family member working in health sector.

Based on the data collected 42(40%) nursing students took self medication due to non serious illness, 47(44.6%) of students got information from prior prescriptions, 72(41.9%) of nursing students were using fever relieving drugs and 39(35.8%).

### Table 1: Frequency and Percentage distribution of nursing students based on the determination of dosage.

<table>
<thead>
<tr>
<th>SI .No</th>
<th>Determination of Dosage</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Leaflet accompanying the package</td>
<td>30</td>
<td>27.5</td>
</tr>
<tr>
<td>2.</td>
<td>Consulting a doctor</td>
<td>39</td>
<td>35.8</td>
</tr>
<tr>
<td>3.</td>
<td>Consulting a pharmacist</td>
<td>10</td>
<td>9.2</td>
</tr>
<tr>
<td>4.</td>
<td>Consulting with friends</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>Previous experience</td>
<td>25</td>
<td>22.9</td>
</tr>
<tr>
<td>6.</td>
<td>Guessing dosage by oneself</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>From the internet</td>
<td>5</td>
<td>4.6</td>
</tr>
</tbody>
</table>

A little more than a quarter, (Table 1) 30(27.5%) nursing students knew the dosage by checking the leaflet accompanying the package, 39(35.8%) of students knew the dosage by consulting doctors, 10(9.2%) of students knew the dosage by consulting pharmacists, 25(22.9%) of nursing students knew the dosage from previous experience and 5(4.6%) of nursing students knew the dosage from internet.

Section 2: Practice of self medication and its effects among nursing students.

Among the nursing students, much more than half of the nursing students (61.9%) had average practice, 36.2% had good practice and 1.9% had poor practice.
Table 2: Aspect wise practice scores of nursing students regarding self medication and its effects.

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Aspects Wise</th>
<th>Max score</th>
<th>Mean</th>
<th>Mean Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prescription</td>
<td>5</td>
<td>2.06</td>
<td>41.2%</td>
<td>1.15</td>
</tr>
<tr>
<td>2.</td>
<td>Side effect</td>
<td>2</td>
<td>1.84</td>
<td>92%</td>
<td>0.36</td>
</tr>
<tr>
<td>3.</td>
<td>Characteristics</td>
<td>6</td>
<td>4.73</td>
<td>78.83%</td>
<td>0.92</td>
</tr>
<tr>
<td>4.</td>
<td>Consultation</td>
<td>3</td>
<td>2.14</td>
<td>71.33%</td>
<td>0.93</td>
</tr>
<tr>
<td>5.</td>
<td>Self awareness/ Knowledge</td>
<td>6</td>
<td>4.19</td>
<td>69.83%</td>
<td>1.21</td>
</tr>
<tr>
<td>6.</td>
<td>Practice</td>
<td>8</td>
<td>6.43</td>
<td>80.37%</td>
<td>1.33</td>
</tr>
</tbody>
</table>

The aspect wise mean percentage scores computed showed (Table 2) that out of the six aspects, nursing students scored the highest, 92% for side effects and the least of 41.2% for prescription. Non judicious use of prescription is now the area of concern.

The above findings were supported by a similar study conducted on ‘evaluation of the practice of self-medication among college students, in west Uttar Pradesh’ to describe and examine the branded medicines used by college students, awareness, trust in medicine system, reasons behind self-medication, drug information resources, danger findings and knowledge of drug profile. Sample of 253 young students belonging to different regions of west Uttar Pradesh were randomly selected. Major reasons which was found as the reason of self-medication at student level were time saving, did not need advice from prescriber for minor illness, economic, fear from crowd at clinic. Most of the respondents had positive attitude in self-medication in minor illness and the majority of professional students had a poor knowledge about appropriate self-medication while the knowledge of the benefits and risks was not adequate.5

Table 3: Association between the practice scores regarding self medication and its effects with selected sample characteristics.

<table>
<thead>
<tr>
<th>Sample characteristics</th>
<th>Chi square/Fischer Exact**</th>
<th>df</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>4.03 #</td>
<td>1</td>
<td>significant</td>
</tr>
<tr>
<td>Religion</td>
<td>0.66</td>
<td>1</td>
<td>Non significant</td>
</tr>
<tr>
<td>Course</td>
<td>1.07</td>
<td>1</td>
<td>Non significant</td>
</tr>
<tr>
<td>Year of study</td>
<td>12.04 #</td>
<td>6</td>
<td>Non significant</td>
</tr>
<tr>
<td>Place of residing</td>
<td>0.54**</td>
<td>1</td>
<td>Non significant</td>
</tr>
<tr>
<td>Tendency of falling</td>
<td>1.36</td>
<td>1</td>
<td>Non significant</td>
</tr>
<tr>
<td>Residing duration</td>
<td>7.28</td>
<td>3</td>
<td>Non significant</td>
</tr>
<tr>
<td>Frequency of sickness</td>
<td>2.05 #</td>
<td>3</td>
<td>Non significant</td>
</tr>
<tr>
<td>Family member</td>
<td>0.11</td>
<td>1</td>
<td>Non significant</td>
</tr>
<tr>
<td>Reason for self medication</td>
<td>10.80**</td>
<td>3</td>
<td>significant</td>
</tr>
<tr>
<td>Source of information</td>
<td>4.48 #</td>
<td>4</td>
<td>Non significant</td>
</tr>
</tbody>
</table>

The association between self medication and its effects with the selected baseline variables such as religion, course, year of study, place of residing, residing duration, tendency to fall sick, frequency of sickness, family members and source of information were found to be non significant at 0.05 level as the obtained chi-square or fisher exact values for these variables were less than their respective table values. Hence the research hypothesis (H1) was rejected for these selected baseline variables, whereas the computed chi square and fisher exact for age (4.17) and reason for self-medication (10.80)respectively were found to be significant at 0.05 level .Hence the research hypothesis (H1) is accepted only for these two baseline variables.

Nursing Implications

Nursing Practice: Nurses, empowered with pharmacological knowledge are expected to act in a matured way while handling medications. Practise nurses should be encouraged to follow drug hygiene which
includes updating knowledge and skills being proactive in following rights and principles during administration of medications. Every nurse should make sure that he or she thoroughly knows about the drug she is going to administer to her patients and explain it appropriately.

**Nursing Research:** Enormous studies have been conducted on the topic and to a great surprise self medication is very much prevalent among health care students and personnel. Many more interventional studies should be done to stop menace of Over The Counter (OTC).

**Nursing Education:** Though nursing curriculum includes pharmacology for nursing students the knowledge and skill in administering medication is still an issue. The tutors and the senior nurses should thereby encourage rationalized medication practice than merely a procedure for finishing nursing duty. Nursing teachers handling the students in clinicals should ensure creative method of their own to encourage students remain interested towards drug. Thus if a complete knowledge is taken care of, practice of self medication will remain a “caution”.

**Nursing Administration:** Nursing administrators should make sure that competent recruitment and selection policies for nurses include either a written test or oral interview regarding drug policies. Periodic short term transforming, training sessions, refresher courses must be arranged to make the staff nurses sharpen their drug knowledge. Record and issues pertaining to errors of any kind should be taken care off.

**Limitations:** The study was limited to:

- Student nurses studying in the selected College of Nursing, Bengaluru.
- Period (2 days) of data collection.
- Knowledge of the sample regarding self medication was not assessed, as the area of study was very minimum and found to be overlapping with practice.
- The data which was collected using self administered practice checklist. The practice was not assessed by the researcher themselves.
- The proposal of the study was not presented for ethical clearance.

**Recommendations**

- The effectiveness of the poster on ill effects of self medication can be assessed.
- Similar studies can be conducted among the healthcare personnel to assess the level of practice.
- Similar study can be conducted on large sample for generalization.

**Conclusion**

The study findings revealed that much more than half of the nursing students had moderately satisfactory practice and a very negligent percentage had unsatisfactory practice of self medication. The figures reported may be alarming as the occurrence is being reported in a medically literate group, the nursing students. There is an urgent need for awareness to be created, to ensure medications are handled safely and judiciously. For the current setting a poster creating awareness about ill effects of self medication was considered to be appropriate as almost all the nursing students resided in the same hostel.

**Ethical Clearance:** Not taken

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


Effect of Rood’s Approach in Diabetic Polyneuropathy

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³Intern, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed
to be University, Karad, Maharashtra, India.

Abstract

Objectives: The objectives of the study were as follows: (1) To find effect of rood’s approach in sensory abnormalities. (2) To find effect of rood’s approach in muscle weakness.

Method: Ethical clearance was obtained from the institutional ethical committee. A total of 23 diabetic neuropathy subjects were assessed and 20 were included in this study based on inclusion criteria, the individuals were allocated in one group: This group received Rood’s Approach, depending upon patients condition either facilitatory or inhibitory techniques were given. Diabetic neuropathy was diagnosed using Michigan Neuropathy Screening Instrument Questionnaire and Pre - and post – test were done for assessing severity of diabetic neuropathy using Visual Analogue Scale (VAS), Quantitative sensory testing (QST) and Walking impairment questionnaire (WIQ) and the outcome measures were analysed after 3 months.

Results: Within the group statistical analysis, Pre-Post V AS score was 6.43±1.628 and was extremely significant, Pre-Post QST score was 1.900±1.553 and result was extremely significant and Pre-Post WIQ score was 19.150±2.978 was also significant.

Conclusion: We found that facilitatory techniques of Rood’s Approach (Heavy joint compression and quick stretch) were effective in improving decreased sensations and improving motor performance in patients with painful diabetic polyneuropathy. We found that inhibitory techniques of Rood’s Approach (maintained stretch and light joint compression) were effective in decreasing hypersensitivity in patients with painful diabetic polyneuropathy. We found significant improvement in pain measure (VAS), Sensory measure (quantitative sensory testing) and Motor performance measure (walking impairment questionnaire.)

Keywords: Diabetic Neuropathy, Rood’s Approach, VAS, QST, WIQ.

Abbreviations: Visual Analogue Scale (VAS), Quantitative sensory testing (QST) and Walking impairment questionnaire (WIQ).

Introduction

Diabetic Neuropathy: It is the commonest complication of DM, affecting 20% patients with painful neuropathy. Cutaneous sensation is mediated by superficial receptors and deep sensation is mediated by deep receptors. Touch pressure sensation of non hairy skin is mediated by Meissner corpuscles and Pacinian corpuscles respond to vibratory stimuli.¹ Mechanism of injury / pathological process: Total hyperglycaemic exposure, Elevated lipids, blood pressure, Hypertension, Smoking, Increased Height, High exposure to neurotoxic agents, Genetic Factors.²

Clinical Presentation: Motor symptoms – In upper limbs– Distal motor symptoms which include fine hand co-ordination, In lower limbs – Mild drop foot or frequent tripping due to lower limb weakness. Sensory symptoms –Slow, sudden onset sensory neuropathy showing stocking and glove distribution in distal extremities. Negative sensory symptoms – feeling of numbness or deadness, loss of balance, especially with eyes closed and painless injuries due to loss of sensation. Positive sensory symptoms – burning, prickling pain, tingling, aching, tightness.

Diagnostic procedures - Testing includes assessment of gross light touch and pinprick sensation. First clinical
sign develops in diabetic symmetrical sensorimotor polyneuropathy is reduction of vibratory and pinprick sensation over the toes. Sensory loss occurs in stocking and glove appearance. Vibratory sensation is tested. Deep Tendon Reflexes are assessed.\textsuperscript{1,3,4}

Staging of diabetic polyneuropathy:
- NO – No Neuropathy.
- N1a – Signs but no symptoms of neuropathy.
- N2a – Symptomatic mild Diabetic Polyneuropathy.
- N2b – Severe symptomatic Diabetic Polyneuropathy.
- N3 – Disabling Diabetic Polyneuropathy

Medical management: Anticonvulsant – Pregabalin, Antidepressant – Duloxetine, Opioids - Dextromethorphan.

Physiotherapy Options Available For Diabetic Neuropathy: TENS, Infra Red Lamp, Aerobic and Resistance Training, Lifestyle changes. It is found in earlier studies that TENS is effective in reducing pain in Diabetic Neuropathy. Research also shows that aerobic and resistance training causes significant reduction in pain in painful diabetic neuropathy.\textsuperscript{6,7} However, there is limited research in physical therapy options in painful diabetic neuropathy treating both motor and sensory components.

Rood’s Approach: Rood’s Approach is a neurophysiological approach which is based on reflexes of central nervous system. Basic concept of Rood’s is that the motor patterns are developed from primitive reflexes through proper sensory stimuli to appropriate sensory receptors in normal sequential developmental pattern to improve motor performance. The basic principles of Rood’s approach are normalisation of tone, ontogenic developmental sequence, purposeful movement and repetition or practice.

Rood’s Approach includes of various facilitatory and inhibitory techniques. The facilitatory and inhibitory techniques used in this study are:

Facilitatory techniques – Quick stretch and heavy joint compression (in cases with decreased sensation)

Inhibitory techniques – Maintained stretch and light joint compression (in cases with increased sensation)

Facilitatory Techniques

1. Quick Stretch: Stretch is a physiologic stimulus which is used to activate the proprioceptors in selected muscles of the body. Quick stretch employs principles of reciprocal innervation. The muscle undergoing stretch was facilitated. Quick stretch was applied by holding the proximal bony prominences of the limb to be stretched while moving the distal joint in one direction.

2. Heavy Joint Compression: Heavy joint compression is defined as joint compression greater than applied through the longitudinal axis of the bone. The amount of force was more than that of the normal body weight above the supporting joint. It was used to facilitate co contraction at the joint undergoing compression. This approach can be combined with developmental patterns.

Inhibitory Techniques

1. Maintained Stretch: Positioning hypertonic extremities in the elongated position for various periods to cause lengthening of the muscle spindles. Rood recommended maintained stretch in the lengthened position for the stronger agonist muscle to increase the threshold of muscle spindle and antagonist muscle was then facilitated by cutaneous stimulation to offset the muscle imbalance.

These contractions were done repeatedly with no resistance and with gravity eliminated, spasticity was reduced.

2. Light Joint Compression: Joint compression of body weight or less than body weight was used to inhibit spastic muscles around a joint.\textsuperscript{8}

In diabetic neuropathy, there are positive as well as negative sensory symptoms. Negative sensory symptoms include feeling of numbness or deadness, loss of balance, especially with eyes closed and painless injuries due to loss of sensation. While positive sensory symptoms include burning, prickling pain, tingling, aching, tightness. Even there is muscle weakness along with these sensory loss. As Rood’s Approach is a neurophysiological approach which is based on reflexes of central nervous system and basic concept of Rood’s is that the motor patterns are developed from primitive reflexes through proper sensory stimuli to appropriate sensory receptors in normal sequential developmental pattern to improve motor performance.\textsuperscript{10} It even includes facilitatory and inhibitory techniques and including the principle motor output is dependent on sensory input there are chances that facilitatory techniques will be beneficial in improving sensory loss and inhibitory techniques will lead to decreased hypersensitivity and this sensory output will inturn improve motor performance.

Thus, there is a need to find effectiveness of Rood’s Approach on sensory as well as motor complaints in individuals with diabetic neuropathy.
Method

Ethical clearance was obtained from the institutional ethical committee. A total of 23 diabetic neuropathy subjects were assessed and 20 were included in this study based on inclusion criteria, the individuals were allocated in one group: This group received Rood’s Approach, depending upon patients condition either facilitatory or inhibitory technique was given. Diabetic neuropathy was diagnosed using Michigan Neuropathy Screening Instrument Questionnaire and Pre - and post – test were done for assessing severity of diabetic neuropathy using Visual Analogue Scale (VAS), Quantitative sensory testing (QST) and uWalking impairment questionnaire (WIQ) and the outcome measures were analysed after 3 months. Sampling Method: Cluster Sampling Method.

The study included only one group. Pre-intervention Michigan Neuropathy Screening Instrument Questionnaire score was used to diagnose patients with diabetic neuropathy. Pre-test and post-test pain measure (VAS score), Quantitative Sensory Testing and Walking Impairment Questionnaire was used to assess the patients. Rood’s Approach - (3 days/week for 3 months) (5 reps) : Facilitatory techniques – Quick stretch and heavy joint compression, Inhibitory techniques – Maintained stretch and light joint compression.

Results: Primary outcomes used for the result were VAS, QSTand WIQ.

GENDER DISTRIBUTION IN THE STUDY

Graph No 1: The pie diagram represents that out of 20 subjects, 20 males and 0 females have participated in this study.

AGE:

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>74</td>
<td>58.5</td>
<td>9.288</td>
</tr>
</tbody>
</table>

The age group included in this study is 40-75 years. The table shows that minimum age group in the study is 44 years and maximum is 74 years. The mean of the age group is 58.5 years and standard deviation is 9.288.

Age Groups:

<table>
<thead>
<tr>
<th>Age group</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 60</td>
<td>11</td>
<td>55 %</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>9</td>
<td>45 %</td>
</tr>
</tbody>
</table>

The table indicates that out of 20 males, 11 males are in the age group ≤ 60 years and remaining 9 males are in age group > 60 years.

Chief Complaint:

Table No. 3: The above table and graph indicates the frequency of each chief complaint in the entire study.

<table>
<thead>
<tr>
<th>Chief Complaint</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty in walking</td>
<td>1</td>
<td>5 %</td>
</tr>
<tr>
<td>Difficulty in moving hand</td>
<td>1</td>
<td>5 %</td>
</tr>
<tr>
<td>Pain in left leg</td>
<td>2</td>
<td>10 %</td>
</tr>
<tr>
<td>Pain in right leg</td>
<td>5</td>
<td>25 %</td>
</tr>
<tr>
<td>Pain in right foot</td>
<td>1</td>
<td>5 %</td>
</tr>
<tr>
<td>Burning sensation</td>
<td>2</td>
<td>10 %</td>
</tr>
<tr>
<td>Pain in both legs</td>
<td>6</td>
<td>30 %</td>
</tr>
<tr>
<td>Numbness</td>
<td>1</td>
<td>5 %</td>
</tr>
<tr>
<td>Tingling sensation</td>
<td>1</td>
<td>5 %</td>
</tr>
</tbody>
</table>

Duration of Chief Complaint:

Table No. 4:

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>100</td>
<td>36</td>
<td>29.151</td>
</tr>
</tbody>
</table>
The above table represents the duration since chief complaint has occurred. Minimum duration is 5 days and maximum duration is 100 days. Mean of duration of chief complaint since it has occurred is 36 days and standard deviation is 29.151.

### Table No. 5

<table>
<thead>
<tr>
<th>Paired Sample t Test</th>
<th>Paired Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre VAS–Post VAS</td>
<td>6.43</td>
</tr>
</tbody>
</table>

**ES : Extremely Significant**

**Interpretation:** The above table shows pre and post comparison of VAS score. The paired mean difference between pre and post VAS scores is 6.43 and standard deviation is 1.628. T- value is 4.053 and p value is 0.0007 and there was extremely significant decrease in pain score.

### Quantitative Sensory Testing:

#### Pre-Post QST Score:

### Table No. 6

<table>
<thead>
<tr>
<th>Paired Sample t Test</th>
<th>Paired Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>QST</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre QST–Post QST</td>
<td>1.900</td>
</tr>
</tbody>
</table>

**ES : Extremely Significant**

**Interpretation:** The above table indicates pre and post comparison of QST score. The paired mean difference between pre and post QST scores is 1.900 and standard deviation is 1.553. T- value is 5.473 and p value is <0.0001 and there was extremely significant improvement in sensation.

#### Walking Impairment Questionnaire:

#### Pre-Post WIQ Score:

### Table No. 7

<table>
<thead>
<tr>
<th>Paired Sample t Test</th>
<th>Paired Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIQ</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre WIQ–Post WIQ</td>
<td>19.150</td>
</tr>
</tbody>
</table>

**ES : Extremely Significant**

**Interpretation:** The above table indicates pre and post comparison of WIQ score. The paired mean difference between pre and post QST scores is 19.150 and standard deviation is 2.978. T- value is 28.754 and p value is <0.0001 and there was extremely significant improvement in walking post treatment.
Discussion

Painful neuropathy is the most disabling complication of diabetes and it occurs due to peripheral nerve damage. Peripheral Nervous system is affected in both types of diabetes mellitus. Pathophysiology of painful diabetic polyneuropathy is unknown but trials have shown that good glycaemic control reduces occurrence of complications.4

Several studies have shown that conventional treatment did not show any improvement in painful diabetic polyneuropathy.

In 2016, Kamaljeet Singh reported that D1 and D2 patterns of PNF for 3 days/week for 3 months were effective in treating both motor and sensory components. It improved sensorimotor control in patients with diabetic polyneuropathy.14

In 2013, Patricia M K reported that 10-week of aerobic and strengthening exercise training caused significant reduction in pain (-18.1+ 35.5 mm) , neuropathic symptoms (-1.24+1.8) and increased intraepidermal nerve fiber branching (+0.11± 0.15).19

In this exercise intervention study, we found that while the participants perceived pain, sensory abnormalities and muscle weakness from diabetic peripheral neuropathy did not change with medications, but they felt less hindered in certain aspects of their life by the painful neuropathy after 8 weeks of facilitatory or inhibitory techniques of Rood’s Approach. The small size of our sample limits interpretation of this study. This successful engagement of previously inactive and chronically debilitated population in a routine 8 week exercise programme suggests that supervised treatment are viable in people with diabetic polyneuropathy, while also posing a question regarding whether results have differed with greater adherence to intervention of greater duration.

Our findings show significant reduction in how the participants reported that their diabetic neuropathy pain interfered with their daily activities. A significant reduction in average pain interference scale reveals that the intervention may have played role on the impact of pain on quality of life. The participants may have experienced improvement in sensory abnormalities and muscle strength and have experienced less distress and increased confidence in walking.

This study did not address any physiological changes that occurred during or after the intervention.

We observed significant changes after giving Rood’s approach for 3 days/week for 3 months in VAS score (pain intensity), Quantitative sensory testing (sensory abnormalities) and Walking impairment questionnaire (motor performance). The therapeutic method studied here were well tolerated associated with any serious adverse effects. The results of this study support previous findings and indicate Rood’s approach is effective in treating both motor and sensory components. Large multi-center randomised, controlled trials with longer duration of treatment are needed to evaluate the efficacy of these procedures.

Conclusion

We found that facilitatory techniques of Rood’s Approach (Quick stretch and heavy joint compression) were effective in improving decreased sensations and improving motor performance in patients with painful diabetic polyneuropathy.

We found that inhibitory techniques of Rood’s Approach (Maintained stretch and light joint compression) were effective in decreasing hypersensitivity in patients with painful diabetic polyneuropathy.

We found significant improvement in pain measure (VAS), Sensory measure (quantitative sensory testing) and Motor performance measure (walking impairment questionnaire.)

Acknowledgement: We would like to acknowledge the guidance and support of Gayatri Pataneand Ankita Patil from faculty of physiotherapy.

Conflict of Interest: The author declares that there are no conflicts of interest concerning the content of the present study.

Source of Funding: Self.

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5. Dianna Quan,Helen C Lin ; Diabetic Neuropathy Clinical Presentation; http://emedicine.medscape.com/article/1170337-clinical#a0256


Awareness Regarding Heart Diseases among Middle Aged Adults in a Rural Area of Rupandehi District

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Abstract

Cardiovascular diseases (CVDs) are the number one cause of death globally. Lack of awareness about CVDs risk can lead to delays in seeking treatment and increased risk for sudden death. This study was conducted to assess the awareness on heart diseases among middle-aged adults in a rural area of Rupandehi district, Nepal. Descriptive cross-sectional study was conducted among 107 middle-aged adults of Shudhodhan rural municipality, Rupandehi district. The samples were selected by non-probability purposive sampling technique. Pretested and pre validated semi-structured questionnaire was used for data collection. The data was analyzed using SPSS 16.0 version. More than half of the respondents (55.14%) had high level awareness on heart disease. About 71.03% had family history of heart diseases. Regarding risk factors of heart diseases cent percent respondents were aware of alcoholism, 98.13% were aware of smoking, 47.66% were aware of family history and 14.02% were aware of menopause. 99.07% respondents were aware of elevated blood pressure and chest pain as cardinal symptoms of heart diseases. The study reveals that respondents had low awareness on family history as risk factor of heart diseases whereas there is statistically significant association between family history of respondents and level of awareness regarding heart disease (p=0.002). Respondents (14.02%) also had low awareness on lifestyle changes with medicines as management of heart disease. Hence it is necessary to educate people about heart diseases risk factors and lifestyle changes for management and prevention of heart diseases.

Keywords: Awareness, heart disease, middle-aged adults.

Introduction

Cardiovascular diseases (CVDs) are disorders of the heart and blood vessels and they include coronary heart disease, rheumatic heart disease, congenital heart disease and other conditions. Triggering these diseases-which manifest primarily as heart attacks and strokes-are tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol. An estimated 17.9 people died from CVDs globally in 2016, representing 31% of all global deaths and 85% of all CVD deaths are due to heart attacks and strokes. Over three quarters of deaths take place in low- and middle-income countries.¹

In Nepal from 2005 to 2015, the ischemic heart disease increased around 25.3% and Coronary heart disease reached 10.79% of total deaths.² About 40% of non-communicable admissions are due to CVDs.³ These facts create an enormous social burden reducing labour productivity and creating an overcharge of public fees, in a country with a poor healthcare system and a feeble economy. The earthquakes of 2015 also imposed critical social and epidemiological effects to the population resulting in lifestyle changes.⁴

A government data has shown that 99.6% of the Nepali population is at the risk of contracting cardiovascular diseases. The national survey carried out by the Health Research Council has recently found that a majority of people has one or more risk-factors including tobacco use, alcohol consumption, low fruit and vegetable consumption and physical inactivity that pose a threat for disease. Biological factors such as obesity, high blood pressure, high blood glucose level and abnormal lipids also contribute to the risk of the disease.⁵

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e-mail: chanda.sah08@gmail.com
The aim of the study was to assess the awareness on heart diseases among middle-aged adults in a rural area of Rupandehi district, Nepal.

**Material and Method**

Descriptive cross-sectional design was used for the study to find out awareness regarding heart disease in middle-aged adults. The study was conducted in Shudhodhan rural municipality, ward number 2, Rupandehi district, Nepal. The total population residing in this rural municipality is 8,865. Total 105 samples were selected using purposive sampling technique. Interview schedule was used for data collection with use of pretested and prevalidated semi-structured questionnaire, developed by researchers. There were 22 questions regarding heart diseases. Data was collected in between April to September, 2017. Administrative and ethical approval was obtained from concerned authorities prior to data collection. The researchers contacted each respondents, written informed consent for the study was obtained and interviewed. Descriptive statistical method was used with SPSS 16 version to analyze data using frequency, percentage and mean.

**Results**

As shown in table 1, out of 107 respondents, 40.19% of respondents belong to 40-46 years and 21.50% belong to 54-60 years of age. Similarly 56.07% respondents belong to female gender. Regarding educational status, 50.47% respondents are literate. As regard to occupation, 40.19% of respondents are homemakers. Majority of respondents (71.03%) had family history of heart diseases.

<table>
<thead>
<tr>
<th>Table 1: Respondents' Socio-demographic Variables.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n=107</strong></td>
</tr>
<tr>
<td><strong>Variables</strong> &amp; <strong>Frequency</strong> &amp; <strong>Percentage</strong></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>40-46 years</td>
</tr>
<tr>
<td>47-53 years</td>
</tr>
<tr>
<td>54-60 years</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Educational Status</td>
</tr>
<tr>
<td>Literate</td>
</tr>
<tr>
<td>Illiterate</td>
</tr>
<tr>
<td>Occupation</td>
</tr>
<tr>
<td>Business</td>
</tr>
<tr>
<td>Farmer</td>
</tr>
<tr>
<td>Service holder</td>
</tr>
<tr>
<td>Homemaker</td>
</tr>
<tr>
<td>Family History</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

From the table 2 below, more than half of the respondents 59 (55.14%) had high awareness and others 48 (44.86%) had low awareness regarding heart diseases.

<table>
<thead>
<tr>
<th>Table 2: Respondents’ Overall Awareness Regarding Heart Disease.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of awareness</strong> &amp; <strong>Frequency</strong> &amp; <strong>Percentage</strong></td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Average</td>
</tr>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

Mean awareness score=14.35  
Total score=20
Out of 107 respondents, cent percent answered alcoholism, 98.13% answered smoking and minority answered family history (47.66%) and menopause (14.02%) as risk factors of heart diseases as shown in graph 1 below.

Graph 1: Respondents’ Awareness Regarding Risk Factors of Heart Disease.

Regarding to cardinal symptoms awareness, majority of respondents (99.07%) answered elevated blood pressure and chest pain and minority (44.86) answered extreme fatigue as shown in table 3.

Table 3: Respondents’ Awareness Regarding Cardinal Symptoms of Heart Diseases.

<table>
<thead>
<tr>
<th>Cardinal symptoms**</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated blood pressure*</td>
<td>106</td>
<td>99.07</td>
</tr>
<tr>
<td>Chest pain*</td>
<td>106</td>
<td>99.07</td>
</tr>
<tr>
<td>Palpitation*</td>
<td>56</td>
<td>52.34</td>
</tr>
<tr>
<td>Back pain</td>
<td>10</td>
<td>9.35</td>
</tr>
<tr>
<td>Muscle rigidity</td>
<td>9</td>
<td>8.41</td>
</tr>
<tr>
<td>Extreme fatigue*</td>
<td>48</td>
<td>44.86</td>
</tr>
</tbody>
</table>

*Correct response  **Multiple responses

As regard of management of heart diseases shown in graph 2 below, out of 107 respondents, 85.98% answeredonly medicine and minority (14.02%) of respondents answered medicine with change in life style. 17.6% of respondents answered there is free treatment of heart disease from Government.

Graph 2: Respondents’ Awareness Regarding Treatment of Heart Disease.

Table 4 below shows the association between family history and awareness level on heart diseases. It shows that there is statistically significant association between family history of respondents level of awareness regarding heart disease.

Table 4: Association between Family History of Respondents and Level of Awareness Regarding Heart Disease.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level of awareness</th>
<th>$X^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family history</td>
<td>High(%)</td>
<td>Low(%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>36(47.37)</td>
<td>40(52.63)</td>
<td>6.47</td>
</tr>
<tr>
<td>No</td>
<td>23(74.19)</td>
<td>8(25.81)</td>
<td></td>
</tr>
</tbody>
</table>

Significance level at 0.05

Discussion

The findings of the present study reveal that more than half of the respondents that is 55.14% had high level of awareness on heart disease which is consistent with the findings of study conducted by Tecla et al. (2015) in Western Kenya which showed that 58% of the respondents had knowledge regarding heart disease.

The findings of the study showed that 68.22% of respondents had awareness about sex, 87.85% were aware about age as non-modifiable risk factors of heart disease which is not consistent with the findings of study conducted by Acharya et al. (2012) in Kathmandu which showed 13.8% knew about sex and 46.9% knew age as risk factors of heart disease.

The findings of the study showed that 47.66 % of respondents had awareness about family history as risk factors of heart disease which is consistent with the findings of study conducted by Aharya et al. (2012) in Kathmandu which showed 46.9% respondents knew about family history as risk factor of heart disease.

The findings of the study showed that 98.13% respondents are aware about smoking, 66.36% are aware about obesity and 72.9% knew stress as risk factors of heart disease which is not consistent with the findings of study conducted by Acharya et al. (2012) in Kathmandu which showed that 70.4% respondents are aware of smoking, 58.8% knew obesity and 63.7% knew stress as risk factors of heart disease.
The findings of the study showed that 99.07% of respondents had awareness regarding chest pain as cardinal symptoms of heart disease which is not consistent with the findings of study conducted by Aharya et al. (2012) in Kathmandu which showed 24% knew about chest pain as cardinal symptoms of heart disease.7

The findings of the study showed that 24.30% of respondents had awareness regarding medicine with change in lifestyle as treatment of heart disease which is not consistent with the findings of study conducted by Ingvar et al. (2007) in Sweden which showed 48% knew medicine with change in lifestyle as treatment of heart disease.8

Conclusion

More than half of the respondents had high level awareness on heart disease. The study reveals that respondents had low awareness on family history, menopause as risk factor of heart diseases whereas there is statistically significant association between family history of respondents and level of awareness regarding heart disease (p=0.002). Respondents also had low awareness on lifestyle changes with medicines as management of heart disease. Hence it is necessary to educate people about heart diseases risk factors and lifestyle changes for management and prevention of heart diseases.

Conflict of Interest: Authors of this manuscript declare that there is no conflict of interest.

Source of Funding is self.

Ethical Clearance: It was taken from concerned authority that is Institutional Review Committee, Universal College of Medical Sciences and Teaching Hospital, Tribhuvan University.

References
Abstract

The financing pattern of the health care system in a country largely determines the volume of health care available to the population and also the extent and ease of access of the poor to health care. Objectives of the paper are to examine the trend in public health expenditure; to observe the pattern of inpatient and outpatient treatment and to assess the impact of implementation of MukhyaMantriNishulkDawa Yojana (MNDY) scheme on outpatient care. Data is obtained from secondary sources such as various budget documents and reports of government of Rajasthan. Pre and post scheme growth rate have been calculated and chow test is also employed to see whether structural changes are found in the number of people seeking outpatient treatment after the introduction of MNDY scheme. Because of the state government’s free medicines and diagnostics schemes, the number of patients seeking medical care from public health system increased between 2010 and 2014. It is quite evident from the analysis that the number of patients accessing public health facilities had doubled since 2010. It should be strengthened and made more comprehensive.

Keywords: MNDY, Outpatient Care, Financing, Public health expenditure.

Introduction

It is widely acknowledged that health is a pre-requisite for development. Sen,1stated that empowerment of people comes from the freedom they enjoy, and this includes, among others, freedom from poverty, hunger, malnutrition and freedom to work and lead a healthy life. Ensuring access to health care helps to minimize absenteeism, enhance labour productivity, and prevents misery as highlighted by Rao and Mita,2. Also supported by Economic Research Foundation (ERF)3, that Government intervention in health is also argued for, due to the presence of high degree of asymmetric information and externalities in the health sector. The greater reliance on private delivery of health infrastructure and health services in turn implies that these will be socially underprovided by private agents, and also denies adequate access to the poor. Further, this has adverse outcomes not only for the affected population but for society as a whole. It adversely affects current social welfare and labour productivity and also harms future growth and development prospects.

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Health care expenditure is very necessary for the social expenditure of any country. Like any other social expenditure, health expenditure also requires a significant contribution from the government. Whether it is developed or developing country the state’s role in developing a good health infrastructure and assuring good health to everybody becomes very critical and important. Health is a concurrent subject under the Indian constitution, but state governments are dominantly responsible for most health provision, both curative and public health aspects. State government accounts for about two-third and the centre government about one-third of the total public spending on health. Health spending by government would remain a key policy tool for achieving low out-of-pocket (OOP) spending on health. Public health financing is characterized by an emphasis on tertiary rather than primary care, urban rather than rural populations, medical officers rather than paramedics. Despite the rhetoric of primary health care, the structure of provisioning was largely curative, biased towards urban areas and in the secondary and tertiary levels of care as studied by Baru,4Mita,5 and Rao & Mita,2 found that Indian healthcare system is characterized by low levels of public spending; poor quality of health care services, with adverse effect on the population health status; a lack of focus on preventative health care; and dependency of the population, particularly the poor, on
the private health care providers and consequently high OOP spending and immiseration. Thus, the reforms in the health sector will have to address the issue of increasing the allocation to health care, focusing on preventative care, ensuring greater access to health care by the poor and significantly improving the productivity of public spending.

**Health Expenditure Scenario in Rajasthan**

State’s expenditure accounts for around 90 per cent of all public expenditure on the health sector. Central funds for the states are in the form of grants to particular programmes, e.g. family planning or as sponsored schemes. Thus, the state government provides the health care services to the community through the teaching and research based hospitals, district hospitals, sub-divisional hospitals, community health centres, sub-centres, primary health centres and health personnel etc. Further, beyond the health care services, a substantial portion of state health spending is used for the recurrent capital, health personnel, administration and direction, machinery and equipment, maintenance, drugs supplies and health education including medical education, training and research etc. The state government works as key monitoring actor and it distributes funds into main accounts via revenue and capital accounts. This chapter examines the allocations for health in the budget and the trend in state government’s expenditures.

Capital/Revenue expenditure on Public Health- As a welfare state, the state government spends a large amount in the provision of medical health services such as the construction of hospitals, promotion of medical education, establishments of Primary health centres and Sub-centres in the villages, etc. Such expenditures are expected to improve the productive capacity of the economy. On the other hand, revenue expenditure has a dominant role in the state government expenditure due to increase in programmes of social and economic development. The graph depicts the overview of total public health expenditure along with the revenue and capital health expenditure from 1984 to 2013. In the mid eighties, marginal growth was seen in the public health expenditure. However, with the beginning of the 20th century, a spurt in growth was seen and ever since the positive acceleration has been witnessed. Similarly, for the revenue expenditure the slow pace of increment is visible in the eighties. However, in 2001-02 there was a big dip seen in revenue health expenditure. But after this period, it began moving upward with the rapid rate of increase. Allocation of resources to capital expenditure for health has always been less which is reflected in Figure 1.

**Figure 1: Health Expenditure in Rajasthan.**

*Source: Various Budget documents of Government of Rajasthan.*

It clears that most of the health expenditure around 90 per cent is financed through revenue expenditure and a minor percentage of resources have been allocated to capital expenditure for health. Health expenditure includes three account heads ‘Medical’, ‘Public Health’ and ‘Family Welfare’ the sum of revenue and capital account of these head in total health expenditure. A large proportion of expenditure on medical and public health and family welfare comes from the revenue account (Figure 2).

**Figure 2: Revenue and Capital Health Expenditure on Medical and Public Health and Family Welfare.**

*Source: Various Budget documents of Government of Rajasthan.*

The achievements of the public health sector in improving health outcomes during 1980’s received a setback with the economic crisis of 1991 and the subsequent economic reforms which followed the Structural Adjustment Programme (SAP) strategy commandeered by World Bank. The public expenditure on health as a percentage share of Gross State Domestic Product (GSDP) is low in Rajasthan (0.98 per cent). Sen et al.7 conceded that Share of public spending on
health has been declining over the years (Figure 3), yet it is the highest among the low-income states of India. The public expenditure on health as a share of state expenditure is also on the lower side (4.91 per cent). The actual public expenditure on health is Rs. 1128.3 crore although the per capita public expenditure on health is high in Rajasthan i.e. Rs. 186.

The share of expenditure directed towards the health sector (both as a proportion of total budgetary expenditure and as a percentage of GSDP) has been declining over the years. While a bulk of the expenditure on health and family welfare is accounted through the budget, about three per cent is spent outside the budget under various centrally sponsored schemes like the disease control programmes and Reproductive and Child Health Programme (RCH) revealed in IIHMR. The state directs a significantly higher share towards tertiary and lower shares towards primary and secondary health care services than those suggested by the National Health Policy 2002; GoI.

Provision for good health is a merit good as health is generally regarded as an asset. In terms of protecting public health, Honorable Chief Minister Ashok Ghelot took a major step on the occasion of Birth anniversary of Mahatma Gandhi on October 2, 2011 towards providing social security to the citizens of his state in the form of supply of free medicines and free diagnosis to everyone. The MukhyaMantriNishulkDawa Yojana (MNDY), scheme ensures free generic medicines for all indoor and outdoor patients. The rationale for this scheme is that a large number of people in the state are not able to afford the expenditure on their treatment. High expenditure on health care is the major cause of rural indebtedness. Thus the scheme is providing qualitative medicines and surgical diagnosis free of cost. The Rajasthan Medical Services Corporation has been constituted and a centralised system of purchase of medicines has been developed, which is supplying medicines to all Government health institutions through District Drug Warehouses. Commonly used essential (generic) medicines and surgical (approximately 300) are being provided free of cost to the patients visiting any type of Government health institution. The quality of drugs is ensured by testing drugs through empanelled drug testing laboratories. There is an overwhelming response among the people regarding the scheme.

**Results**

Indoor patient care is that rendered to patients who occupy beds in the hospitals and outdoor patient care does not require their being placed in bed. Outdoor Patients (OPD) will get the medicines in hospital time; the Indoor Patients (IPD) will get this facility round the clock. From three crore in 2010-11, the number of patients accessing OPD services increased to nine crores in 2014-15. Similarly, visitors to IPD increased from thirty one lakh to thirty five lakh. During the 1984 to 1999 period, the number of indoor patients increased depicting growth rate of 1.92 per cent. On the other hand, with the beginning of the new millennium, growth rate propelled to 3.25 per cent during 2000-2015. Taking a composite view of the three decades (1984-2015), the cumulative growth rate was found to be 2.12 per cent (Figure 4).

**Figure 3: Health Expenditure as Percentage of Total Expenditure.**

**Figure 4: Number of Indoor Patients Treated (In lakhs)**

Similarly, with reference to outdoor patients, their pool during the fifteen year period (1984-99) showed a growth rate of 0.40 per cent. Its growth rate leaped from 0.40 per cent to 2.94 per cent, over the next fifteen years (2000-15). From an eagle’s eye view, the total growth rate for the three decades is recorded at 0.90 per cent for the same (Figure 5).
Therefore, it is clear from the figures that the number of patients seeking inpatient and outpatient treatment increased after the introduction of the MNDY scheme. Although the analysis is only limited to outpatient care because this scheme provides free medicines and drugs to these people and hence they do not get admitted to the hospitals. Therefore, vast improvement is seen in accessibility of outpatient care. Pre and post scheme growth rate have been calculated and chow test is also employed to see whether structural changes are found in the number of people seeking outpatient treatment after the introduction of MNDY scheme. For this, two time periods have been taken; one is from 2000 to 2010 and another is from 2011 to 2014. A growth rate of 2.13 per cent is seen in the number of outdoor patients during the period of 2000 to 2010. While the growth rate of 37.12 per cent is found in post scheme period (2011-2014) for the same. To assess the impact of implementation of MNDY scheme on outpatients growth, a semi-log model has been used with a dummy variable, which takes zero (0) value for the pre-scheme period and one (1) for the post scheme period. Results based on the semi-log-linear model with dummy variables discussed under methodology have been presented in Table 1a.

Table 1a: OLS estimates using the 14 observations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUMMY</td>
<td>-3.509145</td>
<td>0.523085</td>
<td>-6.708559</td>
<td>0.0000</td>
</tr>
<tr>
<td>DT</td>
<td>0.298749</td>
<td>0.039260</td>
<td>7.609578</td>
<td>0.0000</td>
</tr>
<tr>
<td>TIME</td>
<td>0.021166</td>
<td>0.008186</td>
<td>2.585521</td>
<td>0.0253</td>
</tr>
<tr>
<td>C</td>
<td>17.16338</td>
<td>0.055522</td>
<td>309.1303</td>
<td>0.0000</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.959644</td>
<td>Mean dependent var</td>
<td>17.47243</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.948638</td>
<td>S.D. dependent var</td>
<td>0.378843</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.085858</td>
<td>Akaike info criterion</td>
<td>-1.849075</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>0.081087</td>
<td>Schwarz criterion</td>
<td>-1.660262</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>17.86806</td>
<td>Hannan-Quinn criter.</td>
<td>-1.851086</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>87.19225</td>
<td>Durbin-Watson stat</td>
<td>2.099381</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Based on calculations

On the basis of table, the estimated results of model are as follows:

\[
\text{Ln Outdoor Patients} = 17.16338 - 3.509D + 0.0212t + 0.2987Dt \quad (1b)
\]

The above regression result shows, both the differential intercept and slope coefficient are statistically significant strongly suggesting that the growth of outpatient patients with respect to time for the two time periods (2000-2010 and 2011-2014) has been different. It indicates that MNDY scheme has affected number of patient seeking outpatient care manifold.

From (1b), derived equations are:

\[
\text{Ln Outdoor Patients} = (17.16338-3.509) + (0.0212+0.2987)t \quad (1c)
\]

Here it is clear through the value of induced factors i.e. β1 and (β1 + β2) in the corresponding equations of pre and post scheme period that launch of MNDY scheme have positively affected the growth of outpatients. It grew with an average growth rate of 2.12 per cent during pre- scheme period (2000-2010) while it accelerated in the post-scheme period (2011-2014) and reached to 31.99 per cent. It is quite evident from the analysis that the number of patients accessing public health facilities had doubled since 2010.
Conclusion

Public expenditure on health is an effective tool to improve the socio-economic welfare of the people. Stagnating government health expenditure, skyrocketing prices of drugs and rising cost of other health services, and increasing unregulated privatization of the health care sector raises serious concerns of the health scenario in the country. With rapid improvements in health particularly of the poor, “vicious circle” of poverty can be converted into “virtuous circle” of prosperity. Moreover, there exist very high inequalities in health and human development across states; between rural and urban areas and across economic and gender divisions. Relative performance differs across states and this is due to differences in not only in the health sector endowment but also on its efficient use. Public spending has the potential of bringing down the OOP expenditure and also entailing substantial health gains. The analysis clearly indicates that most of the state health spending comes from revenue account. The health spending on medical and public health is measured almost four times to family welfare which, follows the conclusion that most of the state health budget is allocated to the curative and clinical services, medical education, disease control programmes etc. while much less health budget is allocated for maternal, child health and immunization services (or primary and outreach services) GoI10. The state spends a higher proportion of its income on healthcare, but the absolute amounts are still low with a comparison of state’s health care needs, therefore more allocations should be made for the health sector to run more cost-effective health care programmes. But better use of existing funds-reforms as well as expansion has to be given higher priority, especially eying on the fiscal imbalance of the state. The low level of utilization of public services suggest that large increases in spending will not necessarily ensure positive results unless the management pattern is improved. In an era of Liberalisation-Privatisation-Globalisation (LPG) and the diminishing role of government in the health provision, the emphasis should be on improving the performance of the health sector.

Source of Funding: Self

Conflict of Interest: Nil

Ethical Clearance: I hereby declare that this is my original piece of research and I give my consent to publish it.

References

A Rare Case of CNS Limited B-Cell Acute Lymphoblastic Leukemia Presenting as Acute Onset Psychosis

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Abstract

We report a case of a 52-year old male who presented with acute onset psychosis without any systemic symptoms or signs, with normal routine blood biochemistry, peripheral smear and radiological imaging of the brain. Diagnostic lumbar puncture and Flow cytometry of CSF revealed evidence of B-cell Acute Lymphoblastic Leukemia with 44.2% blast cells. Further workup with bone marrow examination was surprisingly normal. PET-CT did not reveal evidence of any malignancy in any organ system other than CNS. B-ALL presentation limited to CNS is rare, and with sole psychiatric manifestation without any focal neurological deficits, meningeal and or systemic signs is even rarer. This case will definitely widen the scope of differential diagnosis of a case of acute-onset psychiatric symptoms in middle to late age.

Keywords: CNS limited B cell ALL, Psychosis, flow cytometry.

Case

A 52 years old male serving in a paramilitary battalion engaged in anti-insurgency operations presented with complains of withdrawn from environment, not eating or sleeping well and talking very little for about 25 days. There was no history of headache, vomiting, seizures, fever, loss of consciousness, respiratory or cardiovascular symptoms or GI symptoms. He had history of loss of his 22yrs old son in a road accident 8 months back. He was not a known case of hypertension or diabetes and had no contact with or pasthistory of tuberculosis. There was no history of psychiatric or personality disorder in the past. He was a social drinker (120-180 ml of rum 2-3 times a month) and a smoker (5-6 cigarettes per day for last 30 years). He had last consumed alcohol about 30 days ago and had reduced smoking significantly for last 30 days. Family history was negative for any known malignancy, cardiovascular or neurological diseases.

Examination revealed an average built and average nutritional status with a GCS of E4V4M6, BP 110/60 mmHg, Pulse 80/min regular, Temp 98°F and resp 18/min. He had no pallor, ecchymosis, icterus, edema, lymphadenopathy, thyromegaly, or testicular enlargement. Cardiovascular, respiratory and gastrointestinal system examination were normal. Examination of CNS revealed no papilledema or other cranial nerve deficits, no motor, sensory, cerebellar, meningeal or autonomic signs. Gait was normal. He was remaining silent, apathetic, occasionally responding to questions or speaking out spontaneously with clear speech but irrelevant mono or bisyllables. He was often not recognizing his colleagues. At times, he was restless and irritable but would suddenly become quiet, completely cut off from the environment. His Abbreviated mental test score (AMTS) was 6/10[3].

Routine investigations including complete blood count, comment on peripheral smear, fasting and post prandial blood sugar, basic electrolyte and liver panel, urine routine and microscopy, ESR, thyroid profile, chest X-ray, ECG and ABG were all normal. NCCT Scan of brain was normal. USG abdomen was suggestive of Grade-1 fatty infiltration of liver. Peripheral Smear Comment revealed normocytic normochromic RBCs with frequent band forms and no parasites with no evidence of immature cells. Vitamin B12 levels were within normal range. VDRL and HIV tests were negative.

Considering the scenario of late onset psychosis, six-D’s approach was used to rule out delirium, drugs, dementia, depression, delusion or disease[4].
Subsequently, contrast enhanced MRI was done which was normal. Lumbar Puncture was done for CSF study to rule out early CNS Koch’s, Toxoplasma or viral etiology which revealed 135 cells/mm3 with 100% lymphocytes, numerous large atypical cells with increased NC ratio, irregular distinct nucleoli & deep eosinophilic cytoplasm [figure 1]. CSF protein was 1399 mg/dl, glucose was 46 mg/dl with ADA of 36 U/ml. Viral Markers for HSV, CMV, Japanese B encephalitis were negative. ZN stain for AFB was negative. A strong suspicion of some lymphoid malignancy was raised and bone marrow aspiration cytology was done which showed erythroid cells 14%, Neutrophils 38%, Lymphocytes 22.5%, Myelocytes with Metamyelocytes 19% with normoblastic maturation with varyingly cellular marrow with focal areas showing mild lymphocytosis without any leukemic involvement.

![Figure 1: Cytosmear showing lymphoblasts (Diff-quick stain × 1000)](image)

Flow cytometry of CSF for Leukemia panel was done next. This showed 44.2% Blast Cells with following positive markers: CD10, CD38, CD19 and CyCD79a. The negative markers were CD20, CD34, CD66c, CD58, CyCD3, smCD3, CD7, cyMPO, CD13, CD33, CD14, CD64, CD117, CD11c, HLADr. Tdt status was positive (nuTdT positive 2.2%) in cell block preparation of the CSF sample. This was suggestive of B-cell Acute Lymphoblastic Leukemia.

We also documented negative serologies for HIV, Ebstein-Barr Virus, Cytomegalovirus and HTLV-1. Serum LDH was 284 U/L, Uric Acid was 8.60 mg/dl. Positron emission tomography-CT (PET-CT) was done to look for other sites of leukemic involvement which revealed leptomeningeal disease.

A final diagnosis of CNS- limited B-Cell Acute Lymphoid Leukemia was made and the case was taken over by Department of Clinical Hematology where he was started on methotrexate, dexamethasone, daunorubicin and vincristine both systemically and intrathecally. He showed good response with multiple repeat CSF studies showing clearance of leukemia cells and recovery from psychotic symptoms within 8-10 Days of starting induction therapy. Patient was later discharged from clinical hematology unit and has been lost to follow-up.

**Discussion**

Malignancies of lymphoid cells do involve Central Nervous System (CNS) in various stages with varying severity. The estimated annual incidence of Acute Lymphoblastic Leukemia (ALL) worldwide is 1-5 cases/100,000 population and more than two-thirds of cases of ALL are B cell phenotype[1]. Primary CNS lymphoma (PCNSL) accounts for less than 3% of all primary CNS neoplasms[2].

Our case presented as a late onset psychosis (Paraphrenia), without any other clinically significant signs and symptoms[4]. Lack of systemic signs and mild cognitive impairment as suggested by Abbreviated Mental Test Score (AMTS) prompted us to consider i). Depression (association with history of loss of his son), ii) Sub-dural hematoma (SDH) (associated with alcohol, paramilitary personnel), iii) Multi-Infarct Dementia iv) Intra Cranial Space Occupying Lesion as differential diagnosis.

Since the possibility of appearance of symptoms and signs of severe depression after 8 months of loss of his son was thought to be remote, it was considered prudent to look for possibilities of CNS Koch’s and other infectious etiologies which could have evaded detection in imaging studies. CSF study suggested CNS malignancy which was confirmed to be a case of B-cell ALL with flow cytometry.

B-ALL/LBL is primarily a disease of children, with three-quarters of cases occurring in children <6 years old; there is a second peak of incidence in adults >60 years old[5]. B-ALL occurs slightly more frequently in males than females. Majority of the clinical manifestations in ALL is due to accumulation of poorly differentiated malignant lymphoid cells within blood, bone marrow and extra-medullary sites. Constitutional signs of bone marrow failure, B- symptoms such as fever, night sweats and weight loss along with easy fatigability, bruising, and susceptibility to infections are a few important manifestations of the disease. Involvement of extramedullary sites results in lymphadenopathy,
splenomegaly or hepatomegaly which is seen in 20% of patients[6].

CNS being a sanctuary site, its involvement is a common event during active or hematological remission phase of acute lymphatic leukemia. Much less common is isolated CNS symptoms and signs in systemic ALL. CNS involvement in ALL at diagnosis is uncommon (5-7%) which present as cranial nerve deficits or meningeal signs[7]. 60-70% of these patients present with a solitary intracranial mass and 5-7% have leptomeningeal involvement alone[8][9]. Around 43% of patients present with neuropsychiatric manifestations during the course of a primary CNS lymphoma[10]. But psychiatric symptoms being the sole initial manifestation with normal peripheral smear picture, normal brain imaging and normal bone marrow cytology is extremely rare[11]. To our knowledge, this is the first ever case being reported.

Our case was definitely a case of acute lymphoid malignancy, with 44.2% blast cells and positive markers on flow cytometry. But in absence of bone marrow involvement, it was difficult to stamp this diagnosis. As the PET scan revealed, most likely, leukemic process involved the leptomeninges and there being no evidence of mass lesion, we arrived at a diagnosis of CNS limited B-cell ALL/ Primary B-cell CNS Lymphoma. Primary leptomeningeal lymphoma is a rare form of primary CNS lymphoma[12]. Cranial and spinal MRI with contrast medium can evidence enhancing lesions in about 70–80% of cases[13]. In recent years, the use of F-FDG PET and PET/CT together has a diagnostic sensitivity of 76%–100%[14]. It is also known that the margin between lymphoma and leukemia is not very sharp always and the clinical pattern can change in the course of an illness[15].

**Conclusion**

Our case highlights the workup and consideration of lymphoid malignancy as a differential diagnosis in a case of acute onset psychosis and mutism as a presenting feature of a more sinister disease in a middle to old age individual.

**Ethical Clearance:** taken from ethical committee

**Conflict of Interest:** nil

**References**


An Epidemiological Study of Cataract Patients: Findings From a Hospital-based Study

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Abstract

Background: Cataract, which refers to a clouding of the crystalline lens of the eye, stands out as the first priority amongst the major causes of blindness. Cataract is one of the important causes of low vision in both developed and developing countries. Cataract occurs more frequently with advancing age. Knowledge regarding magnitude and socio demographic factors will be helpful for healthcare managers. Therefore, the present study was conducted among the patients in ophthalmology department of a tertiary health center to study the epidemiological profile and causes of cataract.

Method: A Hospital based Cross Sectional Study conducted from July 2017 to December 2017 in a tertiary health center in central India. Total 336 patients who availed services from ophthalmology department during study period were included in the study and relevant data was collected from them. Data analysis was done by percentages, proportions, and tests of significance (Chi-square test).

Results: A total of 181 patients were investigated in the study with gender distribution of 67.7 % male. Most of the patients were above 60 years. Left eye was more commonly involved in cataract. Marital status, educational status and occupation of the patients were found to be statistically significant.

Conclusions: The present study concluded with the findings highlighting the huge burden of cataract in central India and the role of multiple factors in cataract genesis pointing towards a multi-factorial causation.

Keywords: CNS limited B cell ALL, Psychosis, flow cytometry.

Introduction

Cataract, which refers to a clouding of the crystalline lens of the eye, stands out as the first priority amongst the major causes of blindness. Today, an estimated 20 million people are blind from this condition. Cataracts are not generally amenable to prevention but currently available surgery can restore near normal vision in a large proportion of the cataract blind.¹ Cataract is one of the important causes of low vision in both developed and developing countries. Population-based studies and previous meta-analyses performed in different regions worldwide have reported that cataract is responsible for 47.8% to 51% of all global blindness.²³ In South East Asia, cataract is single most common cause of blindness being responsible for 50-80% of all blindness.⁴ In India, according to a recent survey in the Rapid Assessment of Avoidable Blindness (RAAB) study, cataract was responsible for 77.5% of avoidable blindness.⁵ The principle cause of blindness in India today is cataract, responsible for about 62.6% of all cases.⁶ Cataract occurs more frequently with advancing age. In the year 1991, the 60+ population which was around 56 million that has doubled in the year 2017.⁷ This means that the “at-risk” population for blinding cataract is increased exponentially.⁸ Senile cataract occur a decade earlier in India relative to Europe and America. Since cataract is a major cause of avoidable blindness in the developing countries, the key to the success of the Global Vision 2020: The right to sight initiative is a special effort to tackle cataract blindness.⁹ To deal with such a major problem of curable blindness it is necessary to know its magnitude where health resources are scarce in order to mobilize the resources and it is important to know about the knowledge of epidemiological factors associated with cataract. Knowledge regarding magnitude and socio demographic factors will be helpful for healthcare managers. Therefore, the present study was conducted among the patients in ophthalmology department of a tertiary health center to study the epidemiological profile and causes of cataract.

Materials and Method: This was a Hospital based Cross Sectional Study conducted in the Ophthalmology...
Department, Government Medical College, and Hospital Rajnandgaon (C.G).

**Study Population:** Patients of all age groups and gender admitted in ward and patients attending outpatient Department of Ophthalmology in GMCH, Rajnandgaon (C.G)

**Study Period:** Study was undertaken from the month of July 2017 to December 2017 for a period of six months.

**Inclusion Criteria:** All the patients attending Ophthalmology OPD in GMCH on the day of visit and willing to participate were included in the study.

**Exclusion Criteria:** Those who do not give consent to be a part of the study & seriously ill patients were excluded.

**Sample Size and Sampling Technique:** All patients who visited or admitted in ophthalmology department during study period. Total 336 patients, by applying universal sampling technique, investigated in the study.

**Study tool:** After obtaining verbal consent, data was collected by face to face interview of the patients using predesigned questionnaire which include patient identification data, socioeconomic status, Type of cataract, Stages of cataract, Causes of cataract, associated morbidities and visual function assessment.

**Data Collection and Procedure:** After the departmental and institutional ethical committee clearance. A structured self-administrative questionnaire was developed with the aid of available evidences by the researchers for data collection to fully meet the demands of this research. The developed questionnaire are corrected, revised and validated by clinicians. It was pretested before its use in this study. Examinations and interviews were carried out by an ophthalmologist and an epidemiologist with the help of trained ophthalmic assistants. After obtaining their informed consent the participants were interviewed using the basic parameters stipulated in our questionnaire. This was followed by General Physical Examination and ocular examination. Visual acuity was tested and lens opacities were graded at the slit lamp using the Lens Opacities Classification System (LOCS) III. Socioeconomic status was classified according to modified B.G. Prasad’s classification.

**Statistical analyses:** Data obtained were collated and analyzed statistically by Microsoft Excel and Epi Info 7.14 for proportions and Chi-square test was used as test of significance. The significance of the results was computed at the level of <0.05. Each completed questionnaire was coded on pre-arranged coding to minimize errors.

**Result:**

<table>
<thead>
<tr>
<th>Table 1: Symptoms Perceived by Patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. No</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>3</td>
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<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Etiological Distribution of Cataract.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.No</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Distribution of respondents on the basis of Stage of Maturity of cataract.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. No</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

**Result:** A total of 181 patients were investigated in the study with gender distribution of 67.7 % male and 32.3 % females. Most of the patients were above 60 years, married (87%), and Hindu (96%). About 87% of respondents were rural residents and illiterate. Most of the respondents belong to lower class. On examination of the patients it was found that majority of them had difficulty in reading small letters of Snellen chart. The patients did not have any difficulty while cooking but had discomfort in watching television. Majority of respondents did not have poor night vision but complained of color halos in the vision. The patients did not have discomfort with bright light, but all the respondent complained of blurred vision. Most of the patients did not have decreased low
light vision or any double vision (Table 1). As for the etiological distribution of cataract, it was seen that majority of patients had senile form of cataract followed by cataract associated with metabolic cause (Table 2).

On evaluating the stage of maturity, eye involvement, family history of the patients it was seen that most of the patients had mature form of cataract. Left eye was more commonly involved in cataract. Majority of patients were not previously operated for cataract and did not have a positive family history of cataract (Table 3). On calculating the association between maturity of cataract with various variables it was seen that age, gender, religion type of family and residence were not statistically with maturity of cataract. However marital status, educational status and occupation of the patients were found to be statistically significant.

Discussion

This hospital based study was aimed at finding the epidemiological profile of cataract patients. Total samples of 336 patients were screened for cataract by the ophthalmology and community medicine departments of government medical college Rajnandgaon(C.G). Of the screened patients 181 patients were diagnosed with cataract, of which 130 were males and 51 were females. In the present study male outnumbered female. Similarly, Singh et al. also mentioned that the prevalence of cataracts was more in males in their study. However; in the study conducted by Raizada et al., prevalence of cataract was more in female. In a similar study by Sobti et al. 547 respondents were enrolled, 59 were males and 77 females. Majority of patients were above 60 years old, while in a study by Anjana et al., most of the patients were between 50-59 years. Age was the commonest risk factor observed for the cataract in the study conducted by Chaterjee et al. Similarly, in a study conducted by Raizada et al., incidence of cataract increased with the age. Lower prevalence of cataract in elderly compared to this study reported by Sharma et al in their study done in Northern India reported that 30% of the elderly population had cataract. In this study 159 patients were married and 22 were unmarried, similarly in a study by Khan et al. more married patients were enrolled. Similar association of cataract with marital status was shown by Shankar et al in rural Varanasi. Majority of patients were Hindu in our study, while in the study by Khan et al. most patients were Muslims. Nuclear type of family or they were living alone was seen in 123 patients. These finding were similar to a study by Khan et al. Majority of patients had residence in rural areas, similar to a study by Bharath et al., where also majority of patients were rural area residents. In this study 147 patients were illiterate; where in a study by Avachat et al. most of the patients were also illiterate. Previous studies have reported lower educational levels to be associated with higher prevalence of age related cataract. About 139 patients were not working, similarly majority of patients in a study by Sumathi et al. were also not working. Whereas, Athanasiov PA et al (2010) and Athanasiov PA et al (2008) observed no such relationship between cataract and outdoor occupation. Majority of patients belonged to lower social class; while in a study by Sobti et al. lower middle class had more patients. The etiological distribution of cataract showed that 55% patients had senile cataract followed by metabolic cataract and mature cataract was more common than immature cataract. These findings are in agreement with findings of Avachat et al., Sumathi et al. In the present study 59.67% cataract patients had mature cataract and 27.62% patients had hyper mature cataract. This variation in the stage of maturity of the cataract could be explained on the basis of variation in awareness, availability, and utilization of healthcare services. These findings are in agreement with findings of Avachat et al., Raizada et al. mentioned the incidence of 7.1% in their study; while incidence was only 1.4% in study conducted by Chaterjee et al. This variation in the stage of maturity of the cataract could be explained on the basis of variation in awareness, availability, and utilization of healthcare services. Most of the patients had symptoms associated with cataract, i.e. difficulty in reading, watching TV, colored halos and blurred vision. While symptoms like difficulty in cooking, poor night/ low night vision, poor color vision and double vision were not experienced by most patients. Similar findings with variations of symptoms were also seen in the study by Bharatwaj et al.

Limitations of This Study: The present study being a cross sectional study, it was difficult to establish a causal relationship between the dependent and independent variables. Also as universal sampling was done, the confidence interval cannot be calculated, thus limiting the scope of the study.

Conclusion

The present study concluded with the findings highlighting the huge burden of cataract in central India and the role of increasing age, low literacy status, indoor activities, Nuclear or living alone families, family history of cataract, metabolic disturbances and ocular injuries in cataract genesis pointing towards a multifactorial causation. Therefore, these factors need to be addressed to reduce the burden of cataract among elderly population.
Ethical Clearance: Taken from institutional ethical committee.

Source of Funding: Self

Conflict of Interest: Nil

References


A Comparative Study on Perception Regarding Mentorship between Mentees and Mentors in a Selected College, Mangalore.

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1Final year UG students, 2Professor, Father Muller College of Nursing, Mangalore.

Abstract

Introduction: Being a mentor is not an easy task. It is multifaceted responsibility of taking up teaching, counseling, guiding and supervising altogether. Availability of time, resources, personality traits, commitment, skill all need to be in sufficient amount and it should be accessible to the Mentee at any given time of the day. The relationship between Mentor and Mentee is like a two delicate end of a seesaw, a slight mismatch can lose its essence. “Mentors support the students in the clinical area & acts as a role model, facilitates the learning experience on placement1”. This investigation is an eye opener for the authorities to further strengthen the existing mentorship program for the well-being of the students. The objectives of the study were: 1) to compare the perception regarding mentorship between Mentees and Mentors. 2) to find the association between level of perception regarding mentorship and selected baseline characteristics of the Mentors and Mentees.

Method and materials: The descriptive, comparative research design was used to compare the perception of the Mentors and Mentees towards mentorship. The sample consists of 193 Mentees and their 18 Mentors. The entire Mentors population was taken for the study. The data were obtained by using a five-point rating scale. Out of total Mentees 91.7% were happy with their Mentors, and only a small proportion i.e. 8.3% were unhappy with their Mentors. The larger proportion i.e. 94.4% of Mentors were happy to be the part of the mentorship program. The overall 63.7% Mentees had a negative perception and 36.3% of Mentees had a positive perception, the Mentors’ negative perception is about 27.8% and 72.2% had a positive perception toward mentorship.

Conclusion: Mentors perception was better than Mentees.

Keywords: program, Mentor, Mentee, perception, Students, Nurses.

Introduction

The Mentor is a more professional and expertise person who guides the less skilled or less sensible members. In an educational institution, mentorship will help to guide the students to resolve academic problems as well as personal issues. Nurturing students is not an easy task, one cannot embrace the age-old techniques to deal with the current generation. The existing problems in the student population are plenty and more complex and quite different from what was existing a decade ago. It’s a huge challenge for the head of the institution and the current study is conducted with the same intention to identify the lacunae’s and to refine the program for the benefit of the students.

Materials & Method

The data were collected from 193 mentees and 18 of their mentors. Ethical consent was taken from the institutional ethics committee before the data collection. The investigator explained the purpose of the study to the subjects. Informed consent was obtained from the participants. The tool of perception regarding mentorship was prepared in two parts. The first part had common items (10) for both the Mentee and Mentors. The second
part had 9 items for Mentees and 9 items for Mentors. The total items for each Mentor was 19 and the same number of items for their Mentor. It was a five-point scale with maximum scores of 95 and minimum scores of 19. The reliability of all 3 parts has been conducted separately to test the internal consistency by using Chronbach’s alpha. The reliability of the part I (Existing Mentorship program) was 0.758. The part II (Mentees perception on Mentor) was \( r = 0.70 \), the part III (Mentors perception on Mentee) was 0.840.

**Study design:** Descriptive comparative design.

**Selection & Description of participants:** The entire Mentees population from the institute and their Mentors were selected, who fulfilled the inclusion criteria.

**Criteria for the sample selection:**

**Inclusion criteria:** Those teachers are currently the part of mentorship for the 2nd and 3rd B.Sc. Nursing Students.

**Exclusion criteria:**

Those who are the part of a mentorship program as Mentees for less than 6 months and their Mentors.

**Statistics:** SPSS 23 Version was used for analysis.

**Results:**

**Table 1:** Grading of overall and component-wise perception of the Mentees and mentors towards mentorship: \( N = 193 + 18 = 211 \)

<table>
<thead>
<tr>
<th>Components</th>
<th>Grading</th>
<th>Mentees (193)</th>
<th>Mentors (18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Overall perception</td>
<td>70</td>
<td>36.3</td>
<td>13</td>
</tr>
<tr>
<td>Perception regarding ongoing program</td>
<td>123</td>
<td>63.7</td>
<td>5</td>
</tr>
<tr>
<td>Perception towards each other</td>
<td>58</td>
<td>30.1</td>
<td>10</td>
</tr>
<tr>
<td>Negative perception</td>
<td>135</td>
<td>69.9</td>
<td>8</td>
</tr>
</tbody>
</table>

The overall and component-wise perception indicates that a large number of mentors had a positive perception than the mentees regarding mentorship. With all components, the majority (above 50%) of the mentees had a negative perception regarding mentorship.

**Table 2:** Mean, Standard deviation of overall & component-wise perception scores of the Mentees/ Mentors regarding mentorship.

<table>
<thead>
<tr>
<th>Group</th>
<th>Component</th>
<th>Mean/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentees</td>
<td>Perception regarding existing program</td>
<td>33.48±5.60</td>
</tr>
<tr>
<td>Mentor</td>
<td></td>
<td>37.33±5.67</td>
</tr>
<tr>
<td>Mentees</td>
<td>Perception towards each other</td>
<td>31.95±5.19</td>
</tr>
<tr>
<td>Mentor</td>
<td></td>
<td>34.94±4.35</td>
</tr>
<tr>
<td>Mentees</td>
<td>Overall Perception</td>
<td>65.44±9.67</td>
</tr>
<tr>
<td>Mentor</td>
<td></td>
<td>72.8±9.37</td>
</tr>
</tbody>
</table>

From table 2, it can be said that the overall perception of the mentors was better than mentees i.e. mean% 76.07 and 68.88 respectively. The same observation was seen in component-wise also. The Mean percentages of the Mentors in all components were more than 74%, it shows their perception was positive towards mentorship and Mentees perception was negative.

**Table 3:** Comparison of overall & component wise mean perception scores of the mentors & Mentees regarding mentorship.

<table>
<thead>
<tr>
<th>Components</th>
<th>Mean difference</th>
<th>SE</th>
<th>t test</th>
<th>df</th>
<th>P-value</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall perception</td>
<td>7.36</td>
<td>2.38</td>
<td>2.88</td>
<td>209</td>
<td>.004*</td>
<td>11.53</td>
</tr>
<tr>
<td>Ongoing program</td>
<td>3.85</td>
<td>1.38</td>
<td>2.79</td>
<td>.006*</td>
<td>6.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Towards each other</td>
<td>2.99</td>
<td>1.26</td>
<td>2.37</td>
<td>.019*</td>
<td>5.49</td>
<td>.50</td>
</tr>
</tbody>
</table>

Note:* Significant

From table 3, it can be interpreted that there is a significant difference in the perception of Mentors and Mentees regarding the mentorship program. This is clearly depicted by P value .004, .006 and .019 in overall, component one and two. Hence, it can be interpreted that there is a significant difference between the mean perception scores of Mentor & Mentees. It also can be interpreted that only 04 out of 1000 subjects would expect, a group difference of 7.36 points by chance alone in their perception scores.

There is a significant difference between the level of perception and academic scores of the mentees, happy with Mentors and academic problems which is apparent at \( x^2(2) = 8.49, P \ value .02 \), \( x^2(1) = 4.26, P \ value .05 \), \( x^2(1) = 4.92, P \ value .05 \). However, the rest of the baseline variables had no significant association with level of perception regarding mentorship. There was small effect size of Phi 0.04 regard to happy with the mentor, .02 about academic problems, however, there was median effect.
size (Cramer’s V 0.2) between academic performance and baseline variables.

Found no significant association between Perception of mentors and their baseline characteristics.

**Discussion**

Mentees: In the current study, 16 students noted that they had academic problems and out of this total 87.5% had a negative perception of mentorship. Similarly, 18 of them had personal problems and 61.1% of this total had a negative perception. Out of total mentees, 158 had secured first class or distinction in their previous university examination, out of that 60.12% also exhibited a negative perception on mentorship. There were 17 of them unhappy with this program and 87.5% of them showed negative responses towards this program. Around 85% of the Mentees said that their mentors’ had a good interaction with them, there were 5.3% of them also felt that their mentors did not have a good interaction with them. The Nursing Students of Turkey felt that an effective feature of the clinical Mentor was communication ability. The overall mean perception scores of Mentees was 65.44±9.67 which is lower than Mentors total mean scores 72.8±9.37. The study conducted among Nursing students in Bijapur, out of 116 (65.5%) had a good attitude about their teachers behavior, 34.4% said that teachers’ behavior had a poor impact on them.

Mentors: The current study, 44.4% of the mentors were between 6-10 years of professional experience. The study conducted by Ellen indicated that the mentors were working on the study setup for 8.57 years. This indicates they were remained and quite familiar with the work routines of the organization. The current study, 94.4% of them had 1-5 yrs. of experience in mentoring. The study conducted by Ellen supports the study findings on average the mentors had 4.64 years of experience. A study conducted in 2006 among 336 students from 3 countries (UK, USA, Jordan) had shown the quality that students would look for in their Mentors was said to be “knowledge and skill”, which was ranked highest by the students of all 3 countries. The study conducted among doctoral students had indicated that they want to practice autonomously in the roles that will be expected of them, but valuable feedback and support from their mentors. From the study, it can be interpreted that the mentees value the mentors, but, expecting freedom to place their creativity.

**Strengths of the study:**

- The study has helped to know the perceived mentors’ qualities by Mentees, based on the findings, given an invitation in general to all mentors to refine their mentorship responsibilities.
- It has helped the organization to conduct annual short training sessions for mentors as well as to the mentees.

**Limitations:** The study was limited to one time data collection.

**Implication of the study:** A present study is a foundation to undertake an exploratory study to determine the various factors causing imbalance in the Mentor–Mentee relation.

**Suggestions:**

- Mentors should be allowed to participate in the annual mentorship training program.
- Students’ evaluation of teachers must be taken as one of the components for promotion.
- Personalities must be taken into consideration while promoting.
- Students should be given a choice to select their mentors.
- If mentee, prefers to have a same Mentee until her completion of her course to be considered.

**Future research directions:**

- A study can be undertaken to assess barriers in forming Mentor- Mentee relationship.
- The study can be replicated after a course of remedial actions.
- A similar study with multiple period data collected after several training & counseling sessions on mentorship can be useful.

**Ethical Clearance:** The ethical clearance was obtained from Father Muller Medical College Institutional Ethics Committee (Ethical Number: FMMCIEC/CCM/186/18 dated 12-3-2018)

**Source of Funding:** Self

**Conflict of Interest:** None

**References**


A Study to Assess the Professional Quality Life among Nurses of a Selected Institute in Mangaluru

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²Professor, Father Muller College of Nursing, Mangalore

Abstract

Introduction: An essence of work output is more or less lies in the quality of professional life. The members of the nursing fraternity have learned, realized and strongly believe in the concept that says the nursing is a noble profession and patient satisfaction is utmost important. The patient and their relatives at the time of vulnerable situation completely depend on nurses as they are available for them all 24 hours of the day. To give the best possible, efficient and effective care delivery we need to have a conducive work environment. Keeping these views in mind the investigators have conducted this study. The Objectives of the study were: 1) To determine the professional quality of life among nurses. 2) To find the association between the professional quality of life and selected baseline variables.

Method and material: A descriptive study was conducted among 80 nurses working in various wards and intensive care setups of a super specialty hospital at Mangalore. The data were conducted from 80 subjects who were selected by convenience sampling technique. The Instrument Used for the data Collection were five- point rating Scale prepared by Hudnall Stamm 2009-2012 version 5–Prof QOL.

Results: The mean scores of overall professional quality of life among the nurses were 94.33 ± SD 9.03 with mean% 62.88. The mean scores in the component of satisfaction was 36.8 ± SD 6.52 with mean% 73.6; The mean scores in the component of burnout was 30.9 ± SD 3.94 with mean% 61.8; The mean scores in the component of secondary traumatic stress was 26.5 ± SD 5.92 with a mean% 53.0; The findings revealed that subjects professional quality of life in the component related to secondary traumatic stress was low compared to the rest of the two components.

Conclusion: The study reveals that the intervention required directing towards the nurses to bring up job satisfaction, to reduce burnout and traumatic stress among the nurses.

Keywords: professional quality of life, burnout, secondary traumatic stress, fatigue.

Introduction

Nurses are the largest work force in the health industry, the long working hours, frequent night shifts, home and work responsibilities, ever-changing technologies are very challenging and it has a greater impact on their professional quality of life. The compassion fatigue, burn out and secondary trauma can endanger their workout put. The realisation of existing facts on these issues is essential to guard the work spirit of the nurses. Keeping this intention in mind to make the life of these little angels at ease the above mentioned study was conducted in a selected hospital at Mangalore.

Materials and Method

The data was collected from 80 nurses. Ethical consent was obtained & prior permission was taken from the concerned authorities before the data collection. The investigators introduced them and the purpose of the study was explained to the subjects. Informed consent was obtained from the participants. The Instrument Used for the data Collection were five point rating Scale prepared by Hudnall Stamm 2009-2012 version 5–Prof QOL and socio demographic proforma with 11 items. The study results were informed to the highest nursing

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authority of the study setting to plan staff development program. The data collection was terminated by thanking the subjects for their participation.

**Study design:** Descriptive survey design

**Selection and Description of Participants:** 80 nurses were recruited using convenience sampling technique.

**Criteria for sample selection**

**Inclusion criteria**
1. Staff nurse and Ward In-Charges
2. Working in IP or OPD departments

**Exclusion criteria:**
1. The nurses working in the current hospital less than 1 month.
2. The middle level nurse managers such as Asst Nursing Superintendent, Nursing Superintendent, and Chief Nursing Officer.
3. ANMs (Auxiliary Nurse Midwives).

**Source of population:** In this study, population were all nurses working more than a month in the selected hospital at Mangalore.

**Statistics:** SPSS 23 version software was used for analysis.

**Results:**

**Table 1: Grading of professional quality of life of nurses.**

<table>
<thead>
<tr>
<th>Components</th>
<th>Grading</th>
<th>Scores</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compassion satisfaction</td>
<td>Low</td>
<td>≤ 22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>23-41</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>≥ 42</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Compassion Burnout</td>
<td>Low</td>
<td>≤ 22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>23-41</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>≥ 42</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Secondary Traumatic stress</td>
<td>Low</td>
<td>≤ 22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>23-41</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>≥ 42</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

From the above table it can be interpreted that none of the nurses were with high job satisfaction. It is seen average burnout and secondary traumatic stress among the nurses. The mean scores of all 3 component were between 23-41 indicates the subjects were with moderate compassion satisfaction and moderate compassion fatigue. From the results it can be interpreted that the subjects were at moderate risk for burnout. It also can be interpreted that the subjects derive moderate amount of satisfaction from their job.

**Table 2: Mean and Standard Deviation of professional quality of life of nurses.**

<table>
<thead>
<tr>
<th>Components</th>
<th>Mean / SD</th>
<th>Mean %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compassion satisfaction</td>
<td>36.80±6.52</td>
<td>73.60</td>
</tr>
<tr>
<td>Compassion burnout</td>
<td>30.90±3.94</td>
<td>61.80</td>
</tr>
<tr>
<td>Secondary traumatic stress</td>
<td>26.50±5.92</td>
<td>53.0</td>
</tr>
</tbody>
</table>

From the above table it can be interpreted that the mean score of 26.50±5.92 in the component of secondary traumatic stress over mean scores of 30.90± 3.94 in the component of secondary traumatic stress that the subjects had experienced burnout more than secondary traumatic stress.

**Table 3: Association between professional quality of life of nurses and selected socio-demographic variables.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Median</th>
<th>$\chi^2$</th>
<th>p</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age:</td>
<td>≤ 92.5</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 92.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof. qualification</td>
<td>GNM</td>
<td>15</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Sc</td>
<td>23</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.Sc</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total professional experience:</td>
<td>≤1 year</td>
<td>6</td>
<td>5</td>
<td>Fisher exact</td>
</tr>
<tr>
<td></td>
<td>1-10</td>
<td>31</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-20</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 20</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

From the table it can be interpreted that none of the socio demographic variables had association with Professional quality of life. Found higher the age the better professional quality of life. Similarly higher the experience more was their professional quality of life. The M.Sc qualified nurses were with better professional quality of life than rests of the nurses. Those who were drawing low salary had less professional quality of life, Area of work , family structure showed no much changes in their scores on professional quality of life.
Discussion

The study conducted in Gujarat NICU nurses had shown 19.4% with high compassion satisfaction, whereas the current study found none with high compassion satisfaction. The burnout and secondary traumatic stress were high (23.3%), the current study found no nurses experiencing with high burnout and secondary traumatic stress. The study conducted by Tara et al. among nurses working in the tertiary care hospital, New York had indicated 73% of the nurses had high levels of compassion satisfaction, and it was high among female nurses (Mean 50.3±10) than male (Mean 43.8±7.6). The mean of compassion satisfaction of current study is congruent with the study conducted among nurses of Latvia, they found compassion satisfaction mean as 37.41, however, the current study the burnout level mean was higher than the study conducted among nurses from Latvia (22.74).

The study conducted among Japanese nurses working in maternity service delivering units supports the current study. The compassion satisfaction was 33.5±6.8 and burnout 26.9±5.2. This study is in pace with the current study. The study conducted by Tara highlights 57% of the nurses working in critical care units reported to have low levels of burnout, 81% of them who had worked in single acuity units exhibited low burnouts. The study conducted by Hooper indicates that the 82% of nurses working in the emergency unit had moderate to high levels of burnout, and 86% of them exhibited high level of compassion fatigue. The study conducted in Korean Nurses indicates the secondary traumatic stress the mean scores 28.33±5.48, these results are congruent with the current study. The similar results also observed by Hegney who had conducted a study among Australian nurses indicated 24.7% of them with low compassion satisfaction, 25.6% having high burnout and 22.2% with high secondary traumatic stress.

Strengths of the study

1. The study was able to assess the situation of professional quality of life of nurses at the early stage so that based on the need assessment; it has helped the nursing authorities to take measurements to boost the professional quality of life of nurses through in-serve service education and staff welfare measures.
2. The study also helped to know the influence of certain contributory factors like age, salary in raising the professional quality of life of the subjects.

Limitations

1. The study was limited to a single hospital at Mangalore.

Implication of the study

The findings of this study have importance in the field of nursing practice, nursing administration and nursing research.

Nursing practice

The nurse administrators must consult the institute authority to initiate remedial measures to boost the professional quality of life of nurses at their workplace. It is essential to have informal meetings with the nurses to determine their work difficulties and satisfaction towards work.

Nursing research

The present study is a basic approach, further required to undertake an exploratory study to determine the various factors contributing as well as causing an imbalance in the quality of life of nurses and their profession.

Suggestions

1. Staff welfare and staff development committees must conduct frequent programs to uphold the professional quality of nurses. They should act as a mediator to place the nurses’ aspirations and demands in front of the authorities.

Future research directions

1. The study could be replicated on a larger sample drawn from different settings.
2. A qualitative study can be conducted to know the factors contribute/hinders the professional quality of life of nurses.

Ethical Clearance: Obtained from Yenepoya University, Ethics Committee, Deralakatte, Mangalore.

Source of Funding: Self

Conflict of Interest: Nil

Conclusion

The moderate scores in all three components indicated that the subjects might derive their satisfaction from activities other than their job, the moderate scores in the area of compassion fatigue in terms of secondary traumatic stress and burnout it can be interpreted that there is a need to find out further by a research study the potential indicators at the work and work environment that can increase or decrease the stress and burnout among the employees. The burnout, compassion
satisfaction levels to be ruled out as it can affect quality, safety and work out put in the health care setting.

References


Segmentation Strategies: Empirical Evidences from Pharmaceutical Companies

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¹,²Assistant Professor, Mittal School of Business, Lovely Professional University, Phagwara, Punjab, India

Abstract

The Indian Pharmaceutical sector is highly fragmented with more than 20,000 registered units. The organized sector of India’s pharmaceutical industry consists of 250 to 300 companies, which account for 70 percent of products on the market, with the top 10 firms representing 30 percent. Multinationals represent only 35% of the market, down from 70% thirty years ago. Because of differences in the industry structure and combination of market opportunities for domestic companies and multinationals, they are likely to differ on strategic issues. Hence domestic companies and multinational firms need to pursue different strategies to achieve desired goals. The study covers pharmaceutical companies operating in Madhya Pradesh state of India. The data or information required is related to segmentation strategies adopted by these pharmaceutical companies. The participants are selected from the directory of pharmaceutical manufacturing units in India, published by national pharmaceutical pricing authority. ANOVA is used for testing of hypothesis. The results show that there are visible differences in the segmentation strategies followed by different pharmaceutical companies of Madhya Pradesh. Small & medium domestic pharmaceutical companies have very little inclination towards segmentation strategies. MNCs and large domestic pharmaceutical organizations in Madhya Pradesh are following the segmentation strategies but this is also limited to demographic and geographic segmentation mostly. They also follow integrated segmentation strategies to some extent.

Keywords: Segmentation strategies, pharmaceutical companies, integrated segmentation.

Introduction

In the field of drug manufacturing and technology, the Indian pharmaceutical industry holds an important position in global pharmaceutical industry. With its wide range of products from simple compounds to specialized medicines, the Indian pharmaceutical industry is fulfilling almost 75 per cent demand of the country’s pharmaceutical needs. Its expertise in terms of technology, quality and range of medicines manufactured makes it a key role player in promoting and supporting development in the critical area of medicines.

The Pharmaceutical industry in India is the world’s third-largest in terms of volume and stands 14th in terms of value. Indian generic drug’s contribution in global exports is 20% in terms of volume making India as the largest provider of generic drugs globally. Over the Counter (OTC) medicines and patented drugs constitute 21% and 9%, respectively, of total market revenues of US$ 20 billion.

There are more than 20,000 registered units in Indian pharmaceutical sector. It has expanded drastically in the last two decades. The organized sector of India’s pharmaceutical industry consists of 250 to 300 companies, which account for 70 percent of products on the market, with the top 10 firms representing 30 percent. However, the total sector is estimated at nearly 20,000 businesses, some of which are extremely small. These units produce the complete range of pharmaceutical formulations and bulk drugs. Multinationals firms reduced to only 35% of the market, from 70% thirty years ago.

When the performances of domestic pharmaceutical companies are compared with multinational pharmaceutical companies in the past five years, there is a noticeable change. The mid-sized and small domestic companies have shown tremendous growth, while the large domestic companies have managed to grow with the market. The multinationals appear to have lost some impetus and market share.

However there is a two-sided competition for large domestic companies. On one hand small and medium domestics companies can maintain the same growth path if they continue to pioneer market creation. On the other, multinationals can launch patented products to gain their position again in the market.
Because of different implications for domestic players and multinational companies, they are likely to differ on strategic issues. There are also differences in the industry structure and combination of market opportunities for the three groups. Hence domestic companies and multinational firms need to follow different strategies to achieve desired goals.

**Review of Literature:** Market segmentation is the process by which a market is divided into distinct subsets of customers with similar needs and characteristics that lead them to respond in similar ways to a particular product offering and marketing program. Segmentation is a rational and more precise approach to adjust the product message to the requirements of the target market.

Some researchers feel that highly standardized segmentation procedures are premature and undesirable. Possible problems with existing segmentation approach include; incomplete set of variables, a clustering approach that does not highlight useful differences across a common set of variables and difficulties with the identification of target segments.

To being closer to the market and to gain better understanding of customers, market segmentation is the most important step. Effective utilization of market segmentation can provide a point of consent for all stakeholders and a more firm basis for creating advantages that will direct the efforts to increasing sales and improving overall marketing performance. Awareness should also be made of the benefits of segmentation in terms of the immediate positive impact on a product campaign.

In the current competitive environment, where wide range of segmentation methodologies exists, there is growing significance of using complex and integrated approach to segmentation, especially when these include more subjective indicators such as attitude and life stage.

Author analyzed that the dependence of pharma companies on single segment is not sufficient for segmenting the prescriber’s base. They concluded that companies should focus on each and every variable and hence they advocated the use of psychographic and behavioural approach in addition to demographic and geographic approach for segmenting the prescriber’s base.

Author concluded that few companies (large or small) use market segmentation to its maximum potential although top executives in the pharmaceutical industry often advocate being market oriented and customer focused. A majority of pharmaceutical companies still base their product development and commercialization plans on cursory, incomplete, or intuitive marketing analysis in spite of dynamic competitive environment and development of more advanced strategic marketing planning. Hence missing fundamental opportunities and delivering incomplete or inappropriate strategies.

The internet is a channel for rapid interaction, requiring new approaches to customer response and real time analytics. For market segmentation, the internet is laboratory, where predictive approaches and various offerings can be tested through observing, interactions with websites, customer feedback and sales.

As most conventional segmentation relies on post hoc analysis of extensive surveys, it is often difficult to predict future behaviours, especially in a rapidly changing market environment. As pharmaceutical companies increasingly use tools such as e-detailing and CRM, segmentation methodologies will have to become more rapid and deliver a more individualized view of the market.

**Research Methodology:** The study covers pharmaceutical companies operating in Madhya Pradesh state of India. The data or information required is related to segmentation strategies adopted by theses pharmaceutical companies. The informants are limited to the relevant principle management members of the companies; for instance, the Chief Executive Officer and marketing or sales manager.

The participants are selected from the directory of pharmaceutical manufacturing units in India, published by national pharmaceutical pricing authority which includes 414 pharmaceutical manufacturing units in M.P. including 344 formulations and 70 bulk drugs units. The participants are also selected from the directory of Madhya Pradesh Pharmaceutical Manufacturers’ Organization (MPPMO) and Madhya Pradesh Small Scale Drug Manufacturers’ Association (MPSDM).

The simple random sampling method is used. The population is divided into the following groups for comparison purpose:

a. Large domestic companies
b. Small and medium sized domestic companies
c. MNCs operating in M.P.

From each group random sample are chosen and targeted to fill the questionnaires.

In order to collect the information, the 317 people at the level of chief executive officer/managing director or marketing/sales manager of different pharmaceutical companies were targeted. Total 98 people completed the questionnaire out of which 31 were from MNCs, 33 were...
from large domestic pharmaceutical companies and 34 were from small and medium domestic pharmaceutical companies. Out of 98 only 90 questionnaires were used, considering 30 from each type of companies mentioned above. The secondary data was also collected from various sources like published articles, research papers, business magazines, journals, periodicals and internet etc. ANOVA is used for testing of hypothesis.

Results and Discussion

Reliability Statistics

Reliability refers to the extent to which measures are without error. The reliability analysis was carried out to check the degree of accuracy of data. The data collected from respondents is tested for accuracy. The reliability score of data is given below:

Table 1: Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach’s Alpha Based on Standardized Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.873</td>
</tr>
<tr>
<td></td>
<td>0.836</td>
</tr>
</tbody>
</table>

As it is clear from the table 1 that Cronbach’s Alpha value is 0.873 which means the data is reliable.

Types of Segmentation Strategies

The various bases of segmentation and the responses from different pharmaceutical companies are shown in the table 2 below:

Table 2: Segmentation Strategies followed by various Companies.

<table>
<thead>
<tr>
<th>Segmentation Strategies</th>
<th>MNCs</th>
<th>Large</th>
<th>Small &amp; Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Segmentation</td>
<td>50%</td>
<td>40%</td>
<td>5%</td>
</tr>
<tr>
<td>Geographic Segmentation</td>
<td>45%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Behavioral Segmentation</td>
<td>30%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Integrated Segmentation</td>
<td>20%</td>
<td>20%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: As computed by the researcher.

It is found from the above table that MNCs concentrate on almost all type of segmentation. They follow demographic segmentation and geographic segmentation maximum but behavioural segmentation and integrated segmentation to some extent. The large domestic pharmaceutical companies adopt demographic segmentation to the most but concentrate integrated segmentation to some extent. Small & medium domestic pharmaceutical companies have very little inclination towards segmentation strategies. They use demographic and geographic segmentation to some extent. Hence only big pharmaceutical organizations in Madhya Pradesh are following the segmentation strategies but this is also limited to demographic and geographic segmentation.

Comparison of Segmentation Strategies

The results related to comparison of segmentation strategies of pharmaceutical companies of Madhya Pradesh are presented below. In the study it has been hypothesized that there is no significant difference between segmentation strategies and size of the pharmaceutical companies.

To test this hypothesis, we have used Analysis of Variance (ANOVA). The level of significance $\alpha = 0.05$. The value of F-ratio and level of significance is explained in table 3.

Table 3: ANOVA Results for Segmentation Strategies.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>74.400</td>
<td>2</td>
<td>37.200</td>
<td>26.371</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>503.600</td>
<td>357</td>
<td>1.411</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>578.000</td>
<td>359</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: As computed by the researcher

It is found that F-ratio value is equal to 26.371. It is statistical significant at 5% level of significance. Given that $p<0.05$, the null hypothesis is rejected which means that there is a significant difference between segmentation strategies and size of the pharmaceutical companies.

The multiple comparisons between three types of companies on the basis of segmentation strategy, using post hoc analysis, are shown in table 4.
Table 4: Multiple Comparisons on the basis of Segmentation Strategies.

<table>
<thead>
<tr>
<th>(I) Size of the Company</th>
<th>(J) Size of the Company</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNCs</td>
<td>Large Domestic Companies</td>
<td>-0.40000*</td>
<td>0.15333</td>
<td>0.026</td>
<td>-0.7609</td>
<td>-0.0391</td>
</tr>
<tr>
<td></td>
<td>Medium &amp; Small Domestic</td>
<td>-1.10000*</td>
<td>0.15333</td>
<td>0.000</td>
<td>-1.4609</td>
<td>-0.7391</td>
</tr>
<tr>
<td>Large Domestic</td>
<td>MNCs</td>
<td>0.40000*</td>
<td>0.15333</td>
<td>0.026</td>
<td>0.0391</td>
<td>0.7609</td>
</tr>
<tr>
<td>Companies</td>
<td>Medium &amp; Small Domestic</td>
<td>-0.70000*</td>
<td>0.15333</td>
<td>0.000</td>
<td>-1.0609</td>
<td>-0.3391</td>
</tr>
<tr>
<td>Medium &amp; Small Domestic</td>
<td>MNCs</td>
<td>1.10000*</td>
<td>0.15333</td>
<td>0.000</td>
<td>0.7391</td>
<td>1.4609</td>
</tr>
<tr>
<td>Domestic Companies</td>
<td>Large Domestic Companies</td>
<td>0.70000*</td>
<td>0.15333</td>
<td>0.000</td>
<td>0.3391</td>
<td>1.0609</td>
</tr>
</tbody>
</table>

Source: As computed by the Researcher

On the basis of post hoc analysis using Tukey HSD, it can be concluded that all the three types of company i.e MNCs, large domestic companies and small & medium domestic companies have significant differences in their segmentation strategy. This is shown in table 4 above.

As clear from table 2 and analysis of data above, there is a difference in segmentation strategies of pharmaceutical companies of all types. Author13 also analyzed the various segmentation bases for different pharmaceutical companies and found the similar results. He found that different companies use different segmentation basis. These bases include demographics, geographic and psychographic. They also concluded that a clear reading of prescriber’s needs, behavior, perceptions and prescribing processes is required to formulate accurate, verifiable segmentation strategies.

But the authors also suggested that the companies must go for integrated segmentation approach according to which the data first of all could be segmented on geographical basis based on priori segmentation technique followed by clustering analysis using demographic, psychographic and geographical variables. The importance of segmentation can also be seen from the results shown by17,18. They have the opinion that by 2020 the current role of the pharmaceutical industry’s sales and marketing workforce will be replaced by a new model as the industry shifts from a mass-market to a target-market approach to increase revenue. The pharmaceutical companies have to focus on infrastructure, so that they can deliver the high quality value to customers19.

Conclusion

There are visible differences in the segmentation strategies followed by different pharmaceutical companies of Madhya Pradesh. Small & medium domestic pharmaceutical companies have very little inclination towards segmentation strategies. MNCs and large domestic pharmaceutical organizations in Madhya Pradesh are following the segmentation strategies but this is also limited to demographic and geographic segmentation mostly. But pharmaceutical companies should not depend upon single segmentation strategies. Due to existence of high competition the companies need to concentrate on almost each and every variable. In pharmaceutical industry, marketing lies and moves around the print promotion and efforts made by the sales force, to move the product to ultimate consumers. Generally, while segmenting the prescriber’s base, strategy of market segmentation is not adopted. The managers and representatives try to fit the market to the product and not product to the market. The same product is promoted to number of heterogeneous prescribers by adopting similar approach. The Integrated segmentation approach analyzes individual prescribing behaviours, demographics, and psychographics (attitudes, beliefs, and values) of prescribers. Although MNCs and large domestic companies are using integrated segmentation to some extent, they must continue to focus on this approach according to which the data first of all could be segmented on geographical basis followed by clustering analysis using demographic, psychographic and geographical variables.

Research Limitations & Direction for Future Research

1. One important limitation relating to the operationalization of the study is the focus of the single industry in geographical areas of Madhya
Pradesh state of India. Future research will need to test whether these results hold across industries situated in other parts of the country.

2. The use of respondents can be another limitation. There are possibilities that perceptual biases may affect the response of the respondents as well as their assessments of the organizational variables. Hence use of multiple respondents is recommended in the future research.

**Ethical Clearance:** The study involves the perception of managers of pharmaceutical companies and did not involve any human trials. So no ethical committee clearance has been taken, although the informed consent has already been taken from them.

**Source of Funding:** Self

**Conflict-of-Interest Statement**

The authors have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Non-Syndromic Impacted Supernumerary Teeth
– A Case Report

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Abstract

Presence of impacted supernumerary teeth is quite common clinical phenomenon. However, Failure of eruption of permanent teeth may be attributed to some local and systemic factors. In general, systemic factors are responsible for eruption failure of multiple teeth whereas the local causes tend to affect one or few teeth. In this article, we describe a case of impacted permanent teeth and supernumerary teeth in a 13-year-old boy without any syndrome.

Keywords: Non syndromic, Supernumerary teeth, permanent dentition.

Introduction

Supernumerary teeth (STs) are defined as developmental alterations of number and morphology that result in the formation of teeth in excess of the usual number, which can be found in almost any region of the dental arch, erupted or impacted.1

The prevalence of supernumerary teeth ranges between 0.3-0.8% in the primary dentition and 0.1-3.8% in the permanent dentition.2 The male-to-female ratio for the incidence of supernumerary teeth was reported to range in between 1.18: 1 and 1.5: 1.

The most frequent locations for supernumerary teeth; midline of maxilla, palatal area of upper incisors, lower premolar area, distal of the upper and lower third molars. They are also associated with larger than average teeth which reflect their multifactorial etiology. Various hypothesis has been postulated by the authors to explain the phenomena of supernumerary teeth development, but the exact etiology is still unknown.3 The etiology of supernumerary teeth is not completely understood but both genetic and environmental factors have been implicated in the phenomenon.4 Several theories have been suggested to explain their occurrence such as Atavism, Dichotomy theory, Dental lamina hyperactivity theory.5

Case Report:

A 13-year-old boy was referred to the OP, Department of Pedodontics from the orthodontist with a chief complaint of delayed eruption of lower left permanent teeth. The boy was undergoing fixed orthodontic treatment for the correction of irregular teeth. A thorough general examination was carried out to rule out the presence of any syndrome. Medical and family histories were non-contributory. Extra-oral clinical examination did not detect any abnormalities. Intraoral examination revealed mixed dentition. Radiographic examination revealed presence of supernumerary tooth bud resembling odontome in relation 45 region hindering its eruption (Figure 1-2). Buccal object rule was applied and tooth was found to be in buccal position. On consultation, it was decided to remove both the deciduous teeth (75) and the underlying supernumerary tooth bud surgically, followed by orthodontic alignment of remaining teeth.
The condition was explained to the parents and they agreed for surgical intervention and informed consent was obtained. CARE Guide was used for writing this case report.

Before surgical procedures were carried out, routine blood examinations were done. The results were within normal limit. We planned to perform the operation under local anaesthesia. After adequate anaesthesia was achieved, primary molar was extracted and the underlying impacted supernumerary teeth was removed with an elevator (Figure 3). The extracted socket was closed with sutures after thorough irrigation. (Figures 4-5) Patient was recalled after 7 days for removal of sutures and post-operative check up. The post-operative instructions included use of prophylactic antibiotic coverage, antiseptic mouth rinse and to maintain good oral hygiene. Following extraction, permanent premolar erupted spontaneously within 3 months. The patient is now under regular review regarding fixed orthodontic treatment.

Discussion

Supernumerary teeth are considered to be one of the most significant dental anomalies affecting children and adolescents and they are also known as hyperdontia.7 Supernumerary teeth may be associated with different clinical problems like midline diastema, crowding, malocclusion due to insufficient space, tooth dilaceration, delayed, or failure of eruption of permanent teeth, root resorption of adjacent teeth, cyst formation, cheek bite, periodontal problems, dental caries, and other difficulties related to ectopic position. Earlier diagnosis can help to prevent these complications.8 X-Ray plays an important role in localization of supernumerary teeth, especially when they are impacted and need surgical intervention. Periapical radiographs, occlusal radiographs, and orthopantomogram does provide sufficient information, but accurate position of buccally or lingually placed supernumerary teeth is difficult to determine due to the superimposition by the surrounding structures.9

Clark and Richards had suggested horizontal and vertical tube shift technique, respectively, to determine exact location. Recently, Toureno et al. proposed cone beam computerized tomography technique along with two-dimensional imaging modalities for better assessment of ST.10 Whenever supernumerary teeth are diagnosed, single or multiple, a decision regarding the appropriate management should be made carefully.
Some authors recommend removal of supernumerary teeth as soon as detected, whereas others emphasized periodic monitoring and removal only in the case of any associated pathology or crowding along with esthetical problem and difficulty in oral hygiene maintenance or hindrance to any dental treatment especially the orthodontic treatment.11,12

Hogstrom and Andersson suggested either removal as early as it is identified or after completion of the adjacent tooth’s root formation.11 Early removal can disturb the growth of adjacent teeth. Recently, Omer et al. suggested the optimal time for the removal of ST during 6 to 7 years because during this age period, removal can be done with minimal disturbances to the adjacent teeth.13 In the present case, since the supernumerary tooth caused delayed eruption of underlying permanent premolar problem in relation to 45 and the patient was followed up regularly for fixed orthodontic treatment. The clinical management of multiple supernumerary teeth poses a great challenge to the clinicians. Therefore, it is important to do appropriate consultation and each case should be assessed appropriately.

**Conclusion**

Supernumerary teeth are relatively common and present a variety of complications ranging from crowding to cyst formation. Early identification and proper treatment planning are essential for its management. The practitioner should have thorough knowledge of signs suggesting the presence of supernumerary teeth. On appropriate diagnosis, early intervention is required either the surgical or orthodontic treatment and combination in order to minimize unwanted side effects to the developing dentition. Furthermore, multidisciplinary approach is necessary for the management of supernumerary teeth, if it is associated with complications.

**Conflicts of interest:** There are no conflicts of interest.

**Source of Funding:** Self.

**Ethical Clearance:** Taken from Institutional Review Board, SIMATS.

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Development of Educational Message through a Mobile Phone SMS to Improve Adherence and Recurrence Prevention in PLWHA

Evi Muslicha1, Nursalam2, Ahsan3

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2Professor, Faculty of Nursing, Universitas Airlangga, Surabaya, 3Lecturer, Universitas Brawijaya, Malang.

Abstract

Background: A recurrence was the event of re-emergence of symptoms that have previously been progressed. Early detection of signs of deterioration in conditions and discipline of therapy was needed to prevent recurrence. The inquiry of HIV AIDS patients in ART and treatment was still quite high. This study aimed to develop a model of recurrence prevention in improving adherence and reducing recurrence.

Method: This study used the R & D method. Data were collected through questionnaires on 154 patients and FGD with 15 HIV AIDS teams to develop a mobile SMS-based recurrence prevention model, then conducted trials and evaluations. The evaluation was done by the post-test-only control group design method with a simple random sampling technique to get 50 respondents in each treatment and control group.

Results: The trial was conducted in September 2018. Results of the study were the establishment of a recurrence prevention model through educational text messaging contained information on adherence and recurrence prevention. The information provided were adjusted to the level of disease prevention. Mann Whitney test showed that the educational SMS had an effect on medication adherence (p = 0.001) and control compliance (p = 0.038), but this intervention model did not show a significant difference in the nutritional compliance of the control group and the treatment group (p = 0.287). In addition, the results of the study also showed that there was an influence on the psychosexual response with p-value 0.036. Increased compliance and psychosexual response of patients can be an indicator of recurrence and transmission prevention of HIV AIDS.

Conclusion: A mobile SMS-based recurrence prevention model through educational SMS can improve medication adherence and control compliance, improve transmission prevention behavior, and reduce the risk of recurrence in HIV AIDS patients.

Keywords: Recurrence, Adherence, Compliance, HIV, AIDS, Prevention, SMS.

Background

The use of antiretroviral drugs in HIV AIDS patients requires a high level of compliance. Non-compliance with antiretroviral therapy can have a resistance effect so that the drug cannot work optimally or even fail. This situation resulted in obstacles and delays in efforts to prevent and treat HIV epidemics and increase the mortality of people with AIDS. In addition, this can also have an impact on the client's biological response in the form of suppression and relapse of the virological response. The phenomenon that occurs is that the total number of deaths caused by AIDS in East Java is still quite high, around 3,925 cases, and this is largely due to the failure of therapy programs carried out by patients1.

A similar found in Waluyo Jati Kraksaan Hospital, the high number of HIV AIDS cases up to 2017 was not accompanied by a significant increase in the number of PLHIV who were regularly treated, but actually increase the number of client deaths year after year. From the monthly reports of HIV treatment, only around 48.4% or 511 people out of 1055 people living with HIV in Probolinggo District who took a regular ART treatment. In addition, the compliance rate of treatment for HIV-AIDS sufferers who carry out medication and treatment at Waluyo Jati Hospital in Kraksaan also tends to fluctuate every month. Some of them still show compliance rates below 80%. This also has an impact on the high incidence of opportunistic infections and
recurrence in HIV AIDS clients in the hospital, as seen from all the total clients treated only 12% or 62 people who showed CD4 increase and clinical improvement.

The high number of people with HIV AIDS requires an effort to prevent recurrence, as well as controlling and evaluating client compliance. One method that is being developed in improving compliance and facilitating access to HIV AIDS health services is the use of information technology with telehealth and telenursing approaches. Telenursing is part of telehealth. Nurses meet the basic needs of clients by using information, communication and web-based systems. In example, they could use the m-health application for HIV prevention and care, the most common method being SMS or text messaging. Previous studies have evaluated the effect of SMS on HIV disease prevention behavior (period before illness) and patient compliance with treatment (during illness). This study focused on preventing HIV AIDS recurrence (during illness) in addition to evaluating the effect of educational message through a mobile sms on patient’s adherence and recurrence prevention behavior.

**Method:** This research uses qualitative-quantitative method with research and development (R&D) approaches. This study also uses a research design consisting of two stages. The first stage is a descriptive exploration survey, until the development of an intervention model, the second stage is socialization and testing until the preparation of recommendations.

The first stage was the preparation of a mobile SMS-based recurrence prevention models through a descriptive analysis design with a cross-sectional approach. This stage aimed to explored information from the informants to evaluate the risk factors of a recurrence condition, and the implementation of recurrence prevention efforts that had been carried out in RSUD Waluyo Jati Kraksaan. Then followed by compiling and developing a mobile SMS-based recurrence prevention intervention model in HIV AIDS patients. The sample in this research consisted of 154 patients who visited the Clinic and 15 members of clinical teams as participants in the first FGD, taken by total sampling technique. The instruments used to evaluate the risk factors of a recurrence were a knowledge and biopsychosocial questionnaire, as well as focus group discussion guide.

The second stage was a trial and evaluation of recurrence prevention model until recommendations were made. Sample was divided into two groups, which are control and treatment group that consisted of 50 respondents for each group. Sample were taken through simple random sampling. Respondents from the treatment group received regular educational text messaging delivered for a month. The contents of the SMS or text message were about information regarding control and medication schedule, diet and nutrition, and a transmission prevention behaviour, as well as the use of condoms. The participants of the second group discussion were the hospital management team and HIV clinical team at RSUD Waluyo Jati Kraksaan, a total of 12 participants. Then followed by an expert discussion to get an improvement up to formulate recommendations. The instruments used to evaluate the intervention were biopsychosocial questionnaire, and a condom self-efficacy questionnaire.

**Results:** The results showed that based on the evaluation of risk factors for the cause of recurrence, it was found that; 1) Patients’ knowledge about HIV AIDS care and treatment is still lacking, 2) There are still some patients who show maladaptive and anxious psychological responses, 3) Stigma & discrimination are still perceived to be quite high, and 4) Patient compliance in carrying out care and treatment still needs to be improved. Table 1 below also describes the conditions of psychological adaptive responses, social responses, and family support felt by respondents. Most of the patients were in the bargaining stage (80%), this shows that the majority of respondents have been able to go through the denial and anger stages, so that it will be easier for them to accept reality and have more open minds about important information related to their recovery, including in this case the efforts to seek treatment and routine control.
### Table 1: Risk Factors of HIV AIDS Recurrence (n=154).

<table>
<thead>
<tr>
<th>Respondent Factors</th>
<th>Parameters</th>
<th>Category</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td>Good</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>46</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>89</td>
<td>58</td>
</tr>
<tr>
<td>Psychological response</td>
<td>Denial</td>
<td>High</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>64</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>54</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Anger</td>
<td>High</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>40</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>102</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Bargaining</td>
<td>High</td>
<td>124</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>High</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>44</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>104</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Acceptance</td>
<td>High</td>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>62</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>84</td>
<td>5</td>
</tr>
<tr>
<td>Social Response</td>
<td>Emotional</td>
<td>Good</td>
<td>122</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>Good</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>66</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>60</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Social Interaction</td>
<td>Good</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>114</td>
<td>74</td>
</tr>
<tr>
<td>Family Support</td>
<td>Emotional &amp; Reward</td>
<td>Good</td>
<td>88</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>40</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Facilitation</td>
<td>Good</td>
<td>94</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>48</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Knowledge/Education</td>
<td>Good</td>
<td>92</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>48</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Duration of Medication</td>
<td></td>
<td>&lt; 1 year</td>
<td>46</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – 5 years</td>
<td>82</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 5 years</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Adherence</td>
<td>Medication</td>
<td>Good</td>
<td>97</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enough</td>
<td>40</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Scheduled Control</td>
<td>Obedient</td>
<td>89</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disobedient</td>
<td>65</td>
<td>42</td>
</tr>
</tbody>
</table>
In addition, most of the respondents (79%) showed a good social-emotional responses. Respondents’ assessment of every aspect of family support also showed good results. This is the basis for the development of a mobile SMS-based prevention models by using a mobile SMS education application to be easily accepted, understood, and used by the PLWHA. The SMS education content agreed upon based on the FGD results includes information related to treatment, control schedule, nutrition, and recurrence prevention behavior or condom use.

Socialization and testing of the use of educational SMS was carried out well and followed by 50 PLWHA who were the respondents from the treatment group. The trial was conducted for one month in September 2018 by sending SMS education content every Monday, Wednesday and Friday just before the scheduled medication or the day before the control schedule. Of all the text messages sent to 50 respondents in the treatment group, the researchers received some feedback as the results of the following trials: 21 respondents answered the SMS with a positive response, 7 respondents showed interest in consulting via SMS, and 6 respondents gave a positive response by making phone calls. While others did not reply to the SMS sent by the researcher.

Analysis of the effect of a mobile SMS-based recurrence prevention model found that there was an influence on treatment adherence and control compliance with p value 0.001 for treatment adherence and p value 0.038 for control compliance. A mobile SMS-based recurrence prevention models also showed an effect on psychosexual recurrence response with p value 0.036. However, the results of the analysis also showed that the mobile SMS-based recurrence prevention model had no effect on nutritional compliance and biological recurrence responses, each of which had a p value of 0.287 and 0.587.

The recommendation to develop a recurrence prevention model in accordance with the results of second FGD is that educational message intervention through a mobile SMS can be used as an alternative method to improve adherence and reduce the risk of recurrence.

### Tabel 2: The Effect of Recurrence Prevention Model to The Patient’s Adherence.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub Variabel</th>
<th>Treatment Group N</th>
<th>Treatment Group Mean Rank</th>
<th>Control Group N</th>
<th>Control Group Mean Rank</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Medication Adherence</td>
<td>50</td>
<td>58.59</td>
<td>50</td>
<td>42.41</td>
<td>0.001</td>
</tr>
<tr>
<td>2.</td>
<td>Nutrition Adherence</td>
<td>50</td>
<td>48.64</td>
<td>50</td>
<td>52.36</td>
<td>0.287</td>
</tr>
<tr>
<td>3.</td>
<td>Control Adherence</td>
<td>50</td>
<td>54.50</td>
<td>50</td>
<td>46.50</td>
<td>0.038</td>
</tr>
</tbody>
</table>

*mann-whitney test

### Tabel 3: The Effect of Recurrence Prevention Model to The Patient’s Recurrence.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub Variabel</th>
<th>Treatment Group N</th>
<th>Treatment Group Mean Rank</th>
<th>Control Group N</th>
<th>Control Group Mean Rank</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Biological Response</td>
<td>50</td>
<td>51.50</td>
<td>50</td>
<td>49.50</td>
<td>0.587</td>
</tr>
<tr>
<td>2.</td>
<td>Condom Self-Efficacy</td>
<td>50</td>
<td>55.77</td>
<td>50</td>
<td>45.23</td>
<td>0.036</td>
</tr>
</tbody>
</table>

*mann-whitney test

### Discussion

To increase the benefits of antiretroviral therapy, high retention of care, choosing the right time to initiate ART, and adherence to treatment is urgently needed. Lost to follow up on ARV therapy can cause cessation of therapy, increase the risk of death, make it difficult to evaluate and deliver ARV therapy. If resistance occurs then treatment becomes ineffective and increases the risk of recurrence, so new efforts are needed to fight infection with other drugs. From an economic standpoint, treatment disobedience also results in an increase in medical costs with the high price of substitute drugs and the length of treatment in hospitals. This study have developed a a mobile SMS-based model of HIV AIDS recurrence by focusing on ongoing education, counseling and monitoring activities through short messages / SMS to PLWHA and their families. Prevention of recurrence is modified from the theory of primary prevention models and the stages of preventive stages, include prevention in the period before illness and during illness. There are three stages of prevention; primary, secondary and tertiary prevention, with preventive content based on the care response of HIV AIDS patients including; biological response (addition of BB, lab results, CD4 / VL, and clinical); psychological response (adaptive coping); social response (stigma & family support) and spiritual (worship needs). Several
studies have mentioned the importance of developing telenursing and telehealth in providing comprehensive insight, reducing stress burden caused by disease, improving family function in handling health problems, increasing communication relationships between clients and health care facilities, reporting side effects and supporting the presence of controls.\(^9,12,13\) In addition, Drummond et al. in his research also explained that telehealth-based depression management for PLWHA could lead to effective maintenance, cost effectiveness, and save maintenance operating costs in several locations with equally high levels of client and provider satisfaction.\(^14\) Cost effectiveness and ease of accessibility have made SMS one of the most widely used communication channels in the world.\(^15\) Research on the use of short message services to improve compliance has shown that the use of short message services is more innovative and has cost effectiveness.\(^16\) The use of short message reminder service applications is easier to increase adherence to treatment.\(^17\) This is the basis for the use of telecommunications via SMS or also called telenursing to help nurses in providing comprehensive nursing care, including efforts to prevent and treat HIV AIDS. Nurses and other health workers can use information and data remotely, socialization, education, further counseling and monitoring, and even conduct behavioral change interventions related to compliance and prevention of recurrence.

**Conclusion**

The conclusion of this study is; 1) the patient’s knowledge of HIV AIDS and its medication and treatment is still lacking, there are still some patients who show a maladaptive psychological response, and some patients still show low adherence, 2) compile the development of an SMS education intervention model for HIV AIDS patients containing information messages and reminder of control schedule, treatment, nutrition and behavioral prevention of transmission, 3) Dissemination and trial were going well and all participants were able to understand and use the educational SMS application, 4) Evaluation of the design of recurrence prevention models based on mobile SMS had met the standard function, efficiency and easy to use, 5) Recommended recurrence prevention models can be used as a method to improve adherence and reduce the risk of recurrence.

**Ethical Clearance:** This study has passed the institutional review board from the Faculty of Nursing, Universitas Airlangga, Surabaya, number 1164-KEPK.

**Source of Funding:** This study is a self-funded research project.

**Conflict of Interest:** None.

**References**


Online Marketing - Study on Customer Satisfaction and Relationship

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Abstract

Online advertising gives moment information about the item that we have to purchase and satisfy our everyday needs. The propensity for surfing the clients’ survey in the online networking is presently multi day’s normal highlights among the adolescents. The sharing of item exhibitions in the informal organization is urged by the advertisers to comprehend their clients’ fulfilment and additionally to know whether any trap is seen by the client. This will assist the maker with modifying/enhance the item likewise. The more general society connection the advertiser had with their clients will reflect in enhanced consumer loyalty, when clients audits were certain at that point rehash deals and new deals will extend exponentially. Presently, the general population in littler towns in India can approach purchase quality items and administrations like what individuals in the bigger urban communities approach through web based showcasing. It is evaluated around 60% of online customers would originate from past the main eight vast urban areas¹. After the passage of JIO web supplier, rivalry turned out to be more increased and now clients can get to an enormous measure of information in reasonable expense. This expansion in web infiltration has extended the potential client pool and for the most part among Gen Ys². Additionally, their simple winning limit offered opportunity to purchase their everyday necessities all alone form and satisfy their fantasies. Presently, they feel exceptionally advantageous to shop on the web, since it liberates them from specifically visiting to the store and uses their valuable time in some other fascinating occupations. It is the obligation of the advertisers to give the important item data to these surfers and have balanced contact to build open connection with them to support their business change proportion.

Keywords: Online marketing, Targeted customer, Customer satisfaction, Customer relationship.

Introduction

Web based advertising is an arrangement of instruments and techniques used to showcase items and administrations through web. Through the web we can manage the obscure essences of clients whom we have never met face to face to convey and associate flawlessly. Showcasing is the way toward advancing the items/administrations to the required/directed clients⁵. To distinguish these required/directed clients, enhancing Public Relations (PR) with shoppers is one of the require activity. Devices like sites, email, web-based social networking, web investigation, web indexes, and internet promoting are simply advertising emotionally supportive networks that assistance to assemble and keep up connections and in this manner make deals³. For rousing web based advertising, web/Wi-Fi associations may be available 24 × 7 in all spots with no obstruction in signs and ought to be given essentially less expensive than the overwhelming expense⁵. On the other hand, online advertisers may offer the remote web either free of expense or considerably more affordable; this will grow the turnover of web based promoting into multi overlay and makes our regular daily existence ease. Web based Marketing has unlimited chances and tremendous open space; consequently there is a place for everybody on the web. At the point when think about the developed nations, use of online marketing in India is still in the beginning time.

Online Marketing: Ideal web based showcasing can’t happen without clients. Individuals don’t plan to flop, yet they neglect to design appropriately. The critical step is the reasoning. Take in the privileged insights of site that serves and backings the client to change over their visits in to effective deal. Web based
Marketing gives mindfulness and draws in the clients to satisfy their requirements. You can have the best administration or item on the planet, however in the event that it isn’t known to the planned clients, what is the point? Mindfulness can originate from numerous sources like publicizing, inquiry advancement, referrals, web based advertising, customary promoting, informal showings. In these online days “Expression of mouse showcasing source is a lot quicker reach than all other promoting sources”. Correspondence is a basic segment of showcasing. It makes constructs and continues connections and all relationship lighted with an important association with trust factors. Advertising is tied in with adjusting before offering. Client benefit brings new deals to a close and develops rehash deals. You have to grasp the new idea of individuals to individuals relationship-driven promoting. We are living in a period crunched society that is dependent on prompt delight. Web based advertising serves this “I need now” outlook individuals. The web is the way to prompt data and wish satisfaction.

**Online Marketing Strategies:** Web based promoting technique fabricates organization’s notoriety and introduction online by utilizing an assortment of web apparatuses and arrangements. A site gives an online nearness that enables clients to think about your organization, administrations offered and items that you offer. Through internet advertising the organization name is presented to open. Presently multi day substantial number of potential clients search for data in the web amid their relaxation time. Buyers today are more cognizant and enabled. They have to know, as and trust before they purchase. Put resources into advertising that bolsters pulling in, creating, and holding connections and it will be a speculation that conveys an association for a considerable length of time.

**Various tools used in online marketing:** You can develop your own website and display your details in it. Search engine marketing (SEM), is the process and strategy of getting website exposure online with keywords related to your business. SEM includes pay per click (PPC) and search engine optimization (SEO). Pay per click is an advertisement that shows on web crawler result pages. The sponsor pays when the promotion is clicked by the client and is coordinated to their site or greeting page. PPC takes into consideration about quick introduction on the web and can give abnormal state cost straightforwardness. You can likewise publicize your organization, site, and administrations through long range interpersonal communication pages. A noteworthy reason that ads and substance on person to person communication sites help build up your organization through verbal. It enables you to utilize notoriety administration techniques, draw in with clients and answer questions. By drawing in with your clients, you urge them to share their encounters in the system. Web based showcasing methodologies incorporate email advertising too. Organizations utilize this device to contact current clients by conveying pamphlets, coupons or instructive messages. You can likewise urge new clients to agree to accept your pamphlet or mailing rundown to take in more data about the items or administrations that you give. A site is the present distributing stage, so you are what you distribute. Blogging is one of the most effortless approaches to begin building validity and increment perceivability.

**Benefits of online marketing:**
- 24 by 7 accessibility of data, deals, item bolster, Worldwide perceivability and Direct deals (no requirement for a customer facing facade)
- Targeted showcase (finding and serving individuals who need particular items and administrations with a tick of their fingertips)
- Competitive favourable position (to open new markets, save money on working costs, go out on a limb, get found quicker, associate better and serve/offer harder)
- Customer securing and maintenance are ease in web based promoting than conventional showcasing to pick up and keep clients.
- Savings in expense and HR (computerizing forms, utilizing the web to answer clients’ inquiries, streamlining request handling)
- Immediate following to quantify, streamline and burn through cash where it really matters.
- Growth in potential, Reduced costs, Elegant interchanges, Better control, Improved client benefit, and Competitive favorable position
- **Low costs:** Large gatherings of people are reachable at a small amount of customary publicizing spending plans, enabling organizations to make engaging customer advertisements.
- **Flexibility and accommodation:** Consumers may research and buy items and administrations at their relaxation time.
• Analytics: Efficient measurable outcomes are encouraged without additional expenses.
• Multiple choices: Advertising instruments incorporate pay-per-click publicizing, email promoting and neighbourhood seek reconciliation (like Google Maps).
• Demographic focusing on: Consumers can be demographically focused on substantially more adequately in an online as opposed to a disconnected procedure.
• Online advertising is a basic piece of maintaining an effective business in the present computerized world.

Method

To know the customers’ view, an objective type of questionnaire was prepared and distributed to them who had minimum two online purchasing experiences. The questionnaire was handed over and collected the filled questionnaire personally. The objective of this study is to find out the customers experience regarding their day to day online shopping experience, customers’ satisfaction and relationship with the marketers’ w.r.t different aspects of online marketing. The questionnaire provides the customer an opportunity to express their views and concerns which they face on a regular basis while buying through online. This study will help the marketers to identify the challenges affecting buying behaviour of online customers and to identify the areas where these marketers need to formulate the future policy that further helps in customer retention. The survey reveals a number of interesting facts when we interviewed the respondents. Selected customers in tier II cities namely Madurai, Tiruchirappalli and Coimbatore in Tamil Nadu were the respondents. Let us analyze few responses, which can be taken as a strong indicator for awareness of online marketing, its popularity over time and customers satisfaction/perception towards it.

Objectives of the study: General objectives of this research are to establish the extent to which online marketing is relay on customer satisfaction and customer relationship in the society. The research proposes

a) to evaluate the customer satisfaction and customer relationship in the tier II cities Tiruchirappalli, Madurai and Coimbatore in Tamil Nadu

b) to analyse the pattern of customer satisfaction and customer relationship while purchasing the products through online marketing

c) to ascertain the impact customer satisfaction and customer relationship through social media

d) to study the social media and other online marketing sites that encouraging customer involvement in sharing their online marketing experiences

e) to identify and evaluate the difficulties faced by the online marketing customers

f) to offer suitable suggestions on the basis of the findings of the study for improving the customer satisfaction and customer relationship.

Limitations of the Study: The data for the present study were collected through personal interview method. Since the data collected from three tier II cities in Tamil Nadu who had minimum 2 online purchasing experiences, the possibility of data bias exists and hence, the data collected would only be an approximation of actual facts.

Figure: 1 Areas of surfing in internet: (120 Responses).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Often &amp; Often</th>
<th>Occasionally &amp; Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching product information</td>
<td>84</td>
<td>36</td>
</tr>
<tr>
<td>Searching online shopping</td>
<td>72</td>
<td>48</td>
</tr>
<tr>
<td>Searching social networks</td>
<td>94</td>
<td>26</td>
</tr>
<tr>
<td>Chatting</td>
<td>81</td>
<td>39</td>
</tr>
<tr>
<td>Reading News &amp; Articles</td>
<td>92</td>
<td>28</td>
</tr>
</tbody>
</table>
It is clear that two third of consumers are utilizing internet for searching for product information, online shopping, social networks, chatting and news and article reading. This indicates that majority of them aware and involve in online marketing activities.

![Type of Problem faced during online shopping](image)

**Figure: 2 Type of Problem faced during online shopping (120 Responses - out of 720 occasions)**

During online shopping of 120 responses @ average six purchase during last two years i.e, about 720 purchases, they faced 48 times Quality related issues, 16 times delay in delivery, 8 times product damage and 1 time non delivery. Strict Quality control and improved packaging / transportation may avoid all these types of problems. Shoppers have to improve their processes to gain the consumers satisfaction. Through satisfied consumers, we can improve their perception in online marketing.

![Medium preferred by the 120 Pespontents](image)

**Figure: 3 Medium preferred for online shopping (120 Responses).**

Out of 120 respondents, 59% of them prefer cell phones, 23% prefer PCs, 12% prefer Tablets and rest of the 6% prefer I pods. This trend indicates most of them used cell phones for online purchasing and this will rise in future. Based on this information shoppers have to develop their own mobile apps to encourage cell phone users to meet their customers need for expanding their business.

![No of Respondents using Internet - Hrs per day](image)

**Figure: 4 Internet usages (120 Responses).**

Usage of internet for more than 2 Hrs is around 63 %, hence most of them well aware of online marketing in these tier two cities. Since the culture of knowing anything in the internet is in the growing trend, now, it is the shoppers’ responsibility to utilize this changing opportunity to do necessary improvement in online marketing and to gain customer satisfaction.
More than 90% of the respondents are surfing the product information in the net before buying. This shows they utilize all the facility in online marketing like comparing the price, alternative available in the market, users review about the product etc.

Statistics indicates that all the respondents uses internet for their online shopping. This positive trend has to be properly utilized by the online marketers to retain their existing customers as well as to attract new customers.

The response w.r.t major advantages given in the above graph indicates online marketing customers’ view. It is a highly positive sign that show customers had obtained major benefits through online marketing and improves customers’ satisfaction.
Majority of online marketing consumers are facing the following problems in product quality, mismatched/damaged product, delay in delivery, payment risks, returns and trouble free internet connections. Marketers have to ensure strict product quality and flawless payment transition system to improve customers’ trust. For easy return of faulty products, the companies should make the arrangement to collect at the customer doorstep. The government digital India programme will improve the internet/Wi-Fi connectivity, speed and reduce the cost of wireless connection.

**Conclusion and Suggestions**

Shoppers have realized the benefits of online purchasing over purchasing from Brick and Mortars. Consumer purchases are mainly based on the cyberspace appearance such as pictures, image, quality information, and video clips of the product, not on the actual experience. It is much easier for customers to find substitutes from competitors on the internet. This feedback forms the basis of market identification and segmentation that enables marketers to better position their products. With the use of the Internet there can be continuous customer support. Services can be made available through interactive e-mail systems on the net. Companies are now using the Internet to build closer relationships with consumers and marketing partners. The growth online marketing depends to a great extent on effective IT security systems for which necessary technological and legal provisions need to be strengthened constantly. Returns of faulty / unsatisfied products are to be made as simple to improve customers’ satisfaction. For easy accessibility of mobile users, mobile apps to be developed. Customer relationship and cost effectiveness plays critical role for retaining the existing customers as well as to attract new potential customers to penetrate in this online marketing business module. Online marketing has outsold traditional marketing in recent years and continues to be a high-growth industry. Effective online marketing, leverage consumer data, customer relationship management (CRM) systems and ensures increased customers’ satisfaction.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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A Study on the Issues of Financial Ratio Analysis

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Abstract

Financial statement analysis consists of applying analytical tools and techniques to financial statements in an endeavor to quantify the in operation and money conditions of a firm. The stress of the analysis changes relying upon one’s relationship with the corporate. A analyst extending a short, unsecured loan to an organization can examine the firm’s income and also the liquidity of the company’s assets. A stock capitalist, on the opposite hand, is primarily searching for future growth in income and earnings. Investors generally examine variables which may considerably impact a firm’s money structure, sales, earnings production, and dividend policy.

Keywords: Ratio Analysis, Finance Operating performance, asset management, profitability ratio.

Introduction

Having examined the structure and basic interpretation of the record, earnings report, and statement of money flows within the initial 3 components of this series on budget analysis, we tend to come back to the central issue of however the information is employed in investment analysis. This text can take into account money magnitude relation construction and interpretation with a spotlight on ratios classified into in operation performance and liquidity and money risk classes. The money information accustomed illustrate the ratios are taken from the record and financial gain statements developed antecedently.

Ratio Analysis: Ratios are one in every of the foremost widespread money analysis tools. A magnitude relation expresses a mathematical relationship between 2 things. To be helpful comparisons, however, the 2 values should be connected in how. We’ve got chosen some wide used ratios that ought to be of interest to investors. Like all ratios, a comparison with different corporations in similar industries is helpful, and a comparison of those ratios for identical firm from amount to amount is vital in pinpointing trends and changes¹. It’s additionally necessary to stay in mind that these ratios are interconnected and may be examined along instead of severally.

Operating Performance

Operating performance ratios are sometimes classified into plus management (efficiency) ratios and profit ratios. Plus management ratios examine however well the firm’s assets are being employed and managed, whereas profit ratios summarize earnings performance relative to sales or investment². Each of those classes plan to live management’s talent and also the company’s accomplishments.

Asset Management

Total plus turnover measures however well the company’s assets have generated sales. Industries take issue dramatically in plus turnover; therefore comparison to corporations in similar industries is crucial. Too high a magnitude relation relative to different corporations could indicate too little assets for future growth and sales generation, whereas too low associate plus turnover figure points to redundant or low productivity assets.

Whenever the extent of a given plus cluster changes considerably throughout the analysis, it’s going to facilitate the analysis to reason the common level over the amount. this may be calculated by adding the plus level at the start of the amount to the extent at the tip of the amount and dividing by 2, or within the case of associate annual figure, averaging the quarter-end periods.

Inventory turnover is comparable in thought and interpretation to total plus turnover, however examines inventory³. We got used price of products sold instead of revenues as a result of price of products sold and inventory reach recorded at price. If victimization printed trade ratios for company comparisons make certain
that the figures are computed victimization identical technique. Some services could use sales rather than price of products sold. Inventory turnover approximates the amount of times inventory is employed up and replenished throughout the year. The next magnitude relation indicates that inventory doesn’t languish in warehouses or on the shelves. Like total plus turnover, inventory turnover is incredibly trade specific.

The assets turnover tells us what percentage times every amount the corporate collects (turns into cash) its assets. The upper, the turnover, the shorter, the time between everyday sales and money assortment. A decreasing figure over time could be a red flag. Seasonality could have an effect on the magnitude relation if the amount ends at a time of year once assets are usually high. Specialists advocate victimisation a median of the month ending figures to raised gauge the extent over the course of the year and turn out a figure a lot of cherish different corporations. Once averaging the assets, most investors can need to think about quarter-ending figures to calculate average assets.

Average assortment amount converts the assets turnover magnitude relation into a lot of intuitive unit days. The magnitude relation indicates the common range of day’s due is outstanding before they’re collected. Note that an awfully high range isn’t sensible and a awfully low range could purpose to a credit policy that’s too restrictive, resulting in lost sales opportunities. Purposeful trade comparisons associated an understanding of credit sales policy of the firm are crucial once examining these figures.

Profitability

Long-run investors purchase shares of an organization with the expectation that the corporate can turn out a growing future stream of money or earnings even once finance in rising industries like the web sector. Profits purpose to the company’s long-run growth and endurance. There are varieties of interconnected ratios that facilitate to live the profit of a firm.

Gross profit margin reflects the firm’s basic valuation selections and its material prices. The larger the margin and also the lot of stable the margin over time, the larger the company’s expected profit. Trends ought to be closely followed as a result of they often signal changes in market competition.

Operating ratio examines the link between sales and management-controllable prices before interest, taxes, and reserve expenses. Like the profits margin, one is searching for a high, stable margin.

Ratio is that the “bottom line” margin oft quoted for firms. It indicates however well management has been ready to flip revenues into earnings on the market for shareholders. For our example, concerning 4½ cents out of each dollar in sales flows into profits for the shareholder.

Enterprise comparisons are important for all of the profitability ratios. Margins vary from industry to industry. A high margin relative to an enterprise norm may point to a business enterprise with a competitive gain over its competitors. The advantage may variety from patent safety to a fairly green operation operating close to capability.

Return on total belongings examines the return generated by using the assets of the company. An excessive go back implies the property is effective and properly-controlled. go back on stockholder’s equity (ROE) takes this examination one step similarly and examines the monetary shape of the company and its effect on earnings. Return on stockholder’s equity indicates how much the stockholders earned for their funding inside the Organization. The level of debt (economic leverage) on the stability sheet has a massive effect in this ratio. Debt magnifies the impact of profits on ROE at some point of each precise and horrific year. When large variations between return on overall property and ROE exist, an investor should intently have a look at the liquidity and monetary risk ratios.

Liquidity

Liquidity ratios take a look at how without problems the company should meet its short-term duties, while economic danger ratios take a look at a organization’s ability to satisfy all liability duties and the effect of those liabilities at the stability sheet shape.

The modern ratio compares the extent of the maximum liquid assets (contemporary assets) towards that of the shortest maturity liabilities (cutting-edge liabilities). An excessive modern-day ratio indicates high degree of liquidity and less risk of financial trouble. Too excessive a ratio can also factor to needless funding in modern belongings or failure to accumulate receivables or a bloated stock, all negatively affecting profits. Too low a ratio implies illiquidity and the capacity for being unable to satisfy contemporary liabilities and random shocks like moves which can briefly reduce the influx of cash.

The fast ratio, or acid test, is much like the cutting-edge ratio, but it’s miles a extra conservative degree. It subtracts stock from the current assets side of the
comparisons due to the fact inventory may not usually be quickly converted into coins or may additionally ought to be substantially marked down in charge before it is able to be converted into cash.

Financial Hazard

Times hobby earned, or hobby coverage ratio, is the traditional degree of a agency’s capability to meet its interest payments. Times hobby earned shows how well a company is able to generate income to pay interest. The bigger and more stable the ratio, the less chance of default. Hobby on debt duties need to be paid, regardless of corporation coins flow. Failure to achieve the effects in default, if the lender will no longer restructure the debt responsibilities.

The debt-to-general-assets ratio measures the proportion of assets financed by using all varieties of debt. The higher the percentage and the greater the ability variability of income translates right into a more capacity for default. But, prudent use of debt can increase go back on equity. The debt-to-general-capital ratio is a famous measure of economic leverage, but its name may purpose confusion. Debt for this ratio is composed simplest of long-term debt, no longer general debt. Capital refers to all resources of lengthy-time period financing—long-term debt and stockholder’s fairness. This ratio is interpreted within the identical way as the debt-to-general-assets ratio; a high ratio indicates high chance. However, a low stage might not be an indication of low threat if contemporary liabilities are high.

Conclusion

Economic ratio evaluation is based on historical monetary statements to look at the beyond and develop an experience for a business enterprise’s beauty measured thru factors which include its aggressive role, monetary electricity, and profitability. Information of economic ratios has to provide buyers an experience.

Ethical Clearance: Nil
Source of Funding: Self
Conflict of Interest: Nil

References
A Study to Analyse the Effect of Exercise in Individuals With Alcohol Withdrawal Syndrome (Aws)

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Abstract

Objective: The aim of the study is to find out the effect of exercise along with medications in individuals with alcohol withdrawal syndrome and to compare their result with individuals taking medications alone for alcohol withdrawal syndrome.

Background of the Study: Worldwide alcohol consumption in 2010 was equal to 6.2 litres of pure alcohol which translates into 13.5 grams of pure alcohol/day. In 2012, about 3.3 million deaths were attributable to alcohol consumption. When someone stops using alcohol after a period of heavy drinking, a sought of symptoms typically includes anxiety, fast heart rate, shakiness, sweating, vomiting and a mild fever. More severe symptoms includes seizures, visual & auditory hallucination and delirium tremens (DTs). The symptoms typically begins around 6 hours following the last drink, and are worst at 24 to 72 hours. There are three stages of AWS. Stage 1(mild), stage 2(moderate) and stage 3 (severe).

The treatment for AWS includes only medical intervention and psychological therapy which has good improvement. This study aims to analysis the effect of exercise along with medical intervention and psychological therapy for better improvement.

Methodology: This was an experimental study design with comparative pre and post study type. Once the study is reviewed and approved by Institutional Review Board, 40 samples among 60 were selected from Turning Point Deaddiction Centre - Maduravoyal. The study includes the samples only if with stage 1, stage 2 AWS and those who are willing to participate in the study. Excludes those with stage 3 AWS, recurrent episodes of seizure, delirious mental state and old age people above 65 yrs. The outcome measure used was a questionnaire CIWA-Ar. After getting the consent, the 40 samples were equally divided and allocated into two groups–group A and group B. Group A received exercise in the form of relaxation exercise, breathing exercise, balance exercise (eg. Frenkel coordination) and low intensity high repetition endurance training along with medications. Group B received medications alone prescribed by consent registered medical practitioners in their rehabilitation centre. The intervention was carried out for 45 days. The exercise intervention for group A carried out for 5 days/week and 2 session/day. The endurance training was progressed once in a week. The post score was recorded. The pre and post data were analysed using SPSS version 21.0.

Result: On comparing the mean value, both the groups showed much reduction in signs and symptoms of alcohol withdrawal syndrome. The pre test mean value for group A is 38.80. After giving them exercise intervention for 45 days, the signs and symptoms reduced to greater extent with the post mean of 9.15. In Group B, the pre and post mean are 38.75 and 19.0 respectively which is significant at P ≤ 0.001. Hence Null hypothesis is rejected. On comparing the post mean of Group A and Group B, Group A showed much reduction in the signs and symptoms of AWS than Group B.

Conclusion: Exercise along with medication shows greater improvement among the individuals with alcohol withdrawal syndrome.

Keywords: Alcohol Withdrawal Syndrome (AWS), Strengthening Exercise, Balance Exercise and CIWA-Ar.
Introduction

Alcohol is a psychoactive substance with dependence producing properties. Numerous consumption of alcohol leads to health problems such as alcohol dependence, liver cirrhosis, cancer and injuries. The harmful use of alcohol ranks among the top five risk factors for disease, disability and death throughout the world. Harmful use of alcohol accounts for 5.9% of all deaths worldwide. Alcohol withdrawal syndrome is a distinctive clinical syndrome with potentially serious consequences such as autonomic hyperactivity, increased tremor, insomnia, visual hallucination, tactile hallucination, auditory hallucination, nausea or vomiting, psychomotor agitation, anxiety and seizures (American psychiatric association 1994). The symptoms usually begins as early as 6 hours following the last drink. The signs and symptoms of AW vary significantly among the alcohol dependent individuals. AW can be categorised into three stages. Mild or early stage, moderate or second stage and severe or third stage. Mild stage usually begins at 6 hours following the last drink and the Symptoms typically includes anxiety, insomnia, restlessness and nausea. Moderate stage withdrawal syndrome occurs within 1 or 2 days following the mild manifestations and the symptoms includes seizures, breathing difficulties and full body rigidity. The seizure caused due to alcohol withdrawal is known as grand mal or generalized tonic-clonic seizure. Severe stage of alcohol withdrawal develops in 1 to 4 days after the onset of early withdrawal symptoms. The severe symptoms includes severe mental disturbance, full body muscle tremors, deep sleep extends more than 24 hours and hallucinations. The withdrawal symptoms in the severe stage may include a dangerous condition called delirium tremens (DT). Severe medical problems may coexist with alcohol withdrawal, which includes altered blood chemistry, certain infection and Wernicke – korsakoff syndrome.

The questionnaire used in this study has much reliability and validity. AUDIT is a ten item scale used in the identification of alcohol dependence. This scales scores for each question ranges from 0-4. A score of 8 or more is associated with harmful or hazardous drinking, a score of 13 (women) and 15 (men) or more is likely to indicate alcohol dependence. It detects 97% of the alcohol-dependent individuals and has a high sensitivity and specificity. AUDIT is easy to use, quick and reliable and can be very useful in detection alcohol problems in sensitive populations. The Clinical Institute Withdrawal Assessment of Alcohol, commonly abbreviated as CIWA-Ar (revised version), is a ten item scale used in the assessment and management of alcohol withdrawal. The ten items evaluated on the scale are nausea and vomiting, tremor, paroxysmal sweats, anxiety, agitation, tactile disturbance, auditory disturbance, visual disturbance, headache and orientation & clouded sensorium. All items are scored from 0-7 where the orientation category scores only 0-4. The maximum score is 67. The CIWA-Ar scale is highly validated and has high inter-rater reliability.

The treatment for AW includes medications like antipsychotic drugs along with benzodiazepine, anticonvulsant and antihypertensives. Many studies had proposed the important role of exercise in the prevention and treatment of addictive disorders. Exercise reduces the depressive symptoms, negative moods and urge to drink in alcohol dependent patients. No studies had proposed the effect of exercise on withdrawal syndrome. Hence this study is focused to find out the effect of exercise in the improvement of AW symptoms.

Method and Materials

Once the study was approved by Institutional Review Board, 40 participants were selected among 60 volunteers from Turning Point Deaddiction Centre, Maduravoyal, Chennai – 95. After the pre test of filling the CIWA – Ar, participants were randomised into two groups (A & B). The samples were included only if with stage 1, stage 2 AWS and those who are willing to participate in the study. Excludes those with stage 3 AWS, recurrent episodes of seizure, delirious mental state and old age people above 65 yrs. The samples were fully explained about benefits of participating in the study and asked to fill the consent form in acceptance with participation of the study which is duly signed by the participants and the researcher.

Group A performed Progressive Muscle Relaxation, Deep Breathing Exercise, Balance & Coordination Exercise and Strengthening Exercise. Progressive muscle relaxation exercise repetitions depends on individual’s relaxation, deep breathing exercise was progressed once in 2 weeks from 3 minutes to 5, 7, 10 minutes, balancing exercise was progressed once in a week and strengthening exercise(low intensity high repetitive) was progressed once in 3 days. The exercise intervention was carried out for 1 session/day for about 45 days. Group B received only the pharmacological treatment which was prescribed by a consent medical practitioner in their rehabilitation centre. The post test was obtained using the questionnaire CIWA –Ar.
Assessment for eligibility (n=60)

Excluded (n=6)
  Not meeting the inclusion criteria (n=1)
  Declined to participate (n=1)
  Other reasons (n=4)

Randomized (n=54)

N=22 – they received exercise intervention along with medications

Lost to follow up (n=1)
Discontinued intervention (n=1)

N=22 – they received medications alone prescribed by consent medical practitioner

Lost to follow up (n=2)
Discontinued intervention (n=0)

Post-test measurement

Analysed (n=20)
Data Analysis:

Table 1: Comparison of Ciwa-Ar Between Group – A and Group - B In Pre And Post Test.

<table>
<thead>
<tr>
<th>#CIWA-Ar</th>
<th>#GROUP - A</th>
<th>#GROUP - B</th>
<th>t - TEST</th>
<th>df</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN</td>
<td>S.D</td>
<td>MEAN</td>
<td>S.D</td>
<td></td>
</tr>
<tr>
<td>PRE TEST</td>
<td>38.80</td>
<td>2.23</td>
<td>38.75</td>
<td>2.57</td>
<td>.061</td>
</tr>
<tr>
<td>POST TEST</td>
<td>9.15</td>
<td>1.56</td>
<td>19.00</td>
<td>3.90</td>
<td>-11.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*19</td>
<td></td>
<td>19</td>
<td>.952</td>
</tr>
</tbody>
</table>

(*- P > 0.05)(***- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value of the CIWA - Ar between (Group A) & (Group B) in pre test and post test weeks. There is no significant difference in pre test values of the CIWA - Ar between Group A & Group B (*P > 0.05). This table shows that statistically highly significant difference in post test values of the CIWA - Ar between Group A& Group B (**- P ≤ 0.001) (Graph –II)

Table 2: Comparison of Ciwa-Ar Within Group – A & Group – B Between Pre & Post Test Values.

<table>
<thead>
<tr>
<th>#Ciwa-Ar</th>
<th>Pre Test</th>
<th>Post Test</th>
<th>T – Test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D</td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>Group- A</td>
<td>38.80</td>
<td>2.23</td>
<td>9.15</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group-B</td>
<td>38.75</td>
<td>2.57</td>
<td>19.00</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(***- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the CIWA – Ar between pre-test and post-test within Group – A & Group – B. In CIWA - Ar, there is a statistically high significant difference between the pre test and post test values within Group A and Group B (**- P ≤ 0.001). (Graph-III)

Result: On comparing the mean values of CIWA-Ar, both the groups showed much reduction in signs and symptoms of alcohol withdrawal syndrome. The pre-test mean value for group A is 38.80 and post mean of 9.15. In Group B, the pre and post mean are 38.75 and 19.0 respectively which is significant at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing the post mean of Group A and Group B, Group A (9.15) shows much reduction than Group B (19.0).

Discussion

Alcohol withdrawal syndrome is a distinctive clinical syndrome with potentially serious consequences such as autonomic hyperactivity, increased tremor, insomnia, visual hallucination, tactile hallucination, auditory hallucination, nausea or vomiting, psychomotor agitation, anxiety and seizures. The treatment for AW includes medications like antipsychotic along with benzodiazepine, anticonvulsant and antihypertensives. Brown et al., in 2009 and Cranston et a., in 2010 proposed that the physical therapy interventions like aerobic exercise and functional training improved the alcohol withdrawal conditions[5,17].

In a previous study, Cranston et al., in 2010 proved that exercise intervention for 80 years old adult experiencing alcohol withdrawal syndrome showed improvement in his functional activities[17]. Beleiter et al., in 1996 suggested that regular alcohol intake affects the neurotransmitter system in the brain, which ultimately leads to functional effect in the brain. This in turn causes neuropathies and myopathies[6]. Jaswinder kaur et al., in 2014 described that Exercise has a beneficial role in treating the neuropathy and myopathy conditions[18].

Lolak S et al., in 2008 proposed that the progressive muscle relaxation technique is effective in reducing anxiety and depressive symptoms in chronic lung patients[19]. The deep breathing exercise increases the oxygen level, which in turns helps the blood vessels in the body to dilate, regulates blood pressure. Breathing exercise plays an important role in the management of panic disorder symptoms, helps to cope up with the shortness of breath, decrease in the accelerated heart rate and relieving muscle tension. Breathing exercise focus towards the rhythm of breath, clearing the anxious, fearful and negative thought of mind[20]. Smania N et al., in 2010 proposed the effect of the balance training in Parkinson’s Disease which improves the Postural instability[21]. Ari R. Assunção et al., in 2016 suggested
that the low intensity high repetition strengthening program improves the muscular fitness in untrained adolescents\cite{22}. Thereby all the previous studies suggests the effect of exercise in improving the symptoms like anxiety, shortness of breath, postural instability and muscular fitness.

In such a way, the present study was conducted to find out the effect of exercise in individuals with alcohol withdrawal syndrome (AWS) with the mean AUDIT of 31.5. It was noticed that progressive muscle relaxation, deep breathing exercise, balance & co-ordination exercise and strength training program showed improvement in the signs and symptoms of alcohol withdrawal syndrome. The selected individuals with the mean of AUDIT was treated with exercise along with medication. Before the exercise intervention the CIWA – Ar mean for Group A was 38.80 and Group B was 38.75. After exercise and medication for Group A and Group B their mean was reduced to 9.15 and 19.00.

**Conclusion:** The result of this study reveals that there is a significant difference in the post-test values of both the groups. The study concluded that the exercise program along with medication was effective in the management of alcohol withdrawal syndrome.

**Acknowledgement:** The authors would like to thank the authorities of Dr. MGR Educational and Research Institute, and the Principal Faculty of Physiotherapy and Managing Director Turning Point Deaddiction Centre, Chennai for providing the facilities required to conduct the study.

**Ethical Considerations:** The manuscript was approved by the Institutional Review Board of faculty of physiotherapy, ACS Medical College and Hospital. All the procedures were performed in accordance with the ethical standards of the responsible ethics committee of both (Institutional and National) on human experimentation and the Helsinki Declaration of 1964 (as revised in 2008).

**Funding:** This is a self-funded study.

**Conflict of Interest:** All contributing authors declare that they no conflict of interest. This study was approved by the Institutional Review Board of Faculty of Physiotherapy, Dr. MGR Educational & Research Institute University, Chennai.

**Reference**

Evaluation of Positional Accuracy of Conceptually Two Different Die Systems in the Fabrication of Fixed Partial Dentures

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Abstract

The success of any fixed prosthesis is multifactorial right from preparation to passive fit during cementation, various phases both in clinical and laboratory procedures. Die preparation is a procedure without which the success of any prosthesis is compromised. Different systems have been used for preparing die which serves as a platform for the construction of pattern for future prosthesis. Over the years, these die systems passed various modifications and innovations striving towards precision that governs the fit of any prosthesis. This article evaluates two such systems which evolved independently for their positional accuracy throughout a simulated laboratory procedure.

Keywords: Pindex, UniLock, Die systems, Invitro study.

Introduction

Fixed partial dentures gained its significance with the development of design and material, compatible to the oral tissues. For any fixed partial denture to be fabricated we require an accurate replica of prepared tooth/teeth with adjacent hard and soft tissues in the same planar relation. The master cast should allow visualisation and access to the proximal surfaces for better contouring and placing the margins at the exact finish line. Fabrication of wax pattern on a cast posed with certain difficulties like contouring the embrasures and margins. Proximal surfaces if not accessible leaves over contoured or under contoured restorations. This leads to stagnation of food particles as the sluice ways are not channelized properly. This contributes to the development of periodontal diseases and eventual failure of prosthesis.1 So a system was developed where wax pattern can be fabricated on a separate die on which we get access to all the surfaces and readily can be fixed back on the cast to evaluate the relation between the adjacent structures. Any die system should allow for removal and re-fixing of dies for required number of times from the cast without change in spatial position. There has been a gradual development in the die materials and die systems striving towards eliminating these inaccuracies.

This article compares two conceptually different systems for their positional accuracy even after multiple removals and re-fixings as mandated by the procedure in the fabrication of fixed dental prosthesis.

Materials and Method

Two dentoform moulds were chosen, one maxillary and mandibular. Type IV dental stone was poured and using recommended water powder ratio, twenty defect free casts were taken.

Two commercially available systems were compared.

Uni-Lock Tray system.

This system consists of a mould into which the trimmed cast is fitted and stabilized with plaster or stone over an independent base. The clip running around the tray locks it and the cast or the future dies in position.

Fig.1: UniLock Tray

For this study, the first pour of type IV die stone (ultra rock)2 is allowed to set for 1 hour, and the trimmed master cast is positioned so that the occlusal surface of the die is parallel to the base of the tray.

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Once checked for parallelism. A type III dental stone of contrasting colour was poured over the tray and the cast was seated back and allowed to set.

**Pindex System:** This system, designed to drill parallel holes from the underside of the cast, permits the cementation of pins into each removable section. The Pindex system is composed of a precision drill mechanism (aligned drill and a light source) that locates each hole position and automatically stops when hole size and depth are achieved.

For this study, a twin pin (Denerica Dental Corp.,) was cemented in place with cyanoacrylate adhesive (Fevikwik, pidilite). Cast sleeves were then fitted to each cemented pin, the underside of the cast was lubricated, and the base was then poured for each cast with type III dental stone of contrasting colour. Each cast, with its base, was trimmed so that the inferior and superior surfaces were flat and parallel to each other.

Two molar teeth are trimmed in each cast to simulate the prepared teeth. The teeth prepared are 16 & 17 in the maxillary cast and 46 & 47 in the mandibular cast. These prepared teeth are mentioned as **ABUTMENTS** in future reference.

**Fixing of reference points:** Reference points are made with modification of casts. A ball point pen nib and modified 18-gauge wires were used for reference points.

**Movable Reference Points**

This is done on the proximal abutment tooth with a drill done with 702 bur mounted in a lab micromotor (marathon 4) and the nibs are secured with cyanoacrylate. This tooth will be sectioned for removal and re-fixing. This is referred as **REMOVABLE DIE** in future reference.

**Fixed Reference Points:** Distal reference point is made in the distal abutment tooth with a drill done with 702 bur mounted in a lab micromotor (marathon 4) and the nibs are secured with cyanoacrylate. This is used to measure the **ANTERO POSTERIOR DISTANCE**.

![Fig.2: Reference Points.](image)

The **OCCLUSO GINGIVAL HEIGHT** is determined by a modified reference point done with a 19-gauge wire bent at right angles with a triangular base so that the tip comes above the movable reference point. The triangular base is fixed to the UniLock Tray with self-cure acrylic materials.

On Pindex casts the **OCCLUSO GINGIVAL HEIGHT** is determined by modified 19-gauge wire bent at right angles and the base is also bent and secured into a hole drilled with 702 bur on the buccal side of base of the cast.

In Pindex cast, the **BUCCOLINGUAL DISTANCE** is determined by fixing a ball point nib in the lingual surface of the cast in line with the nib on the removable die.

In UniLock cast the **BUCCOLINGUAL DISTANCE** is determined by fixing a modified 19-gauge wire fixed on the lingual side of the tray with self-cure acrylic materials.

**Experiment**

A Travelling microscope provided with cross hairs and mounted in such a way that it can be moved along a base with a screw for making accurate measurements of distance.

![Fig.3: Travelling Microscope.](image)

A Travelling microscope is used to measure the horizontal distance (Bucco lingual and mesio distal) and **vertical distance** (occluso gingival). All measurements were within 10-2, i.e.) 10 micro meters. Each distance was measured three times and average value is chosen.

For vertical measurement the eye piece is tilted horizontally to observe the cast in the vertical plane.

The eye piece is aligned in a way the cross hair is centred with the centre of the ball in ball point nib. And the corresponding readings were noted.

**Sectioning of Dies**

The die is sectioned with a die cutting saw. The first molar tooth is chosen to be removable and the die is referred as removable die. The sections are made near parallel to one another or occlusally diverging. Once the die sections are made post section values are recorded. And the dies are removed and replaced first for ten times and the values are recorded after that. Then the
procedure is repeated for twentieth and thirtieth times and the respective values are recorded. The values were tabulated in a work sheet for further statistical analysis.

Results: The statistical analysis was done using SPSS version 21 software (IBM USA). Independent sample test or Student T test was done to calculate the P values. The total number of samples calculated were kept as 10 for each system. And they were calculated at 5 levels ie) pre-section, post-section, tenth removal, twentieth removal, thirtieth removal.

The first group statistics consists of mean values for Pindex system and UniLock system in the Antero Posterior direction. At presection level the mean values of Pindex and UniLock are found to be 1.1100 and 1.1067 respectively. On comparison the P value is found to be 0.398 which is statistically insignificant, whereas at the thirtieth removal the values for Pindex and UniLock is found to be 1.0930 and 1.10767 respectively which has a P value of 0.024 which is statistically significant.

The second group statistics consists of mean values for Pindex system and UniLock system in the Bucco-Lingual direction. At presection level the mean values of Pindex and UniLock are found to be 0.814 which is statistically insignificant, whereas at the thirtieth removal the values for pindex and UniLock is found to be 0.814 which is statistically significant.

The third group statistics consists of mean values for Pindex system and UniLock system in the Occluso-gingival direction. At presection level the mean values of Pindex and UniLock are found to be 0.758 and 0.851 respectively. On comparison the P value is found to be 0.461 which is statistically insignificant, whereas at the thirtieth removal the values for Pindex and UniLock is found to be 0.761 and 0.848 respectively which has a P value of 0.494 which is statistically insignificant.

In another intra group comparison done between pre-section values and post section at thirtieth removal, In Pindex system at anteroposterior direction the p value recorded as 0.04 is found to be statistically significant. But the same comparison done in the UniLock system yields P value of 0.839 which is statistically insignificant.

The same comparison when done in Bucco-lingual and Occluso-gingival directions in Pindex system shows P values of 1 and 0.987 respectively which are statistically insignificant, In UniLock, the movement in the Bucco-lingual and Occluso-gingival directions also gives insignificant values of 0.964 and 0.973 respectively.
Discussion

This article compares two conceptually different systems. Pindex system which is time tested though gives appreciable accuracy in earlier literatures is cumbersome to use. UniLock tray which has plastic base which confines and controls expansion.

Pindex system uses laser guided precise drills to locate the centre of any tooth or die and holes are drilled for cementation of pins. The pins vary from cross pins with sleeves made of brass, double pins and pins with index in beli St Claire, which has anti rotational features.

The UniLock tray system evolves from AccuTrac system where the dies are locked in horizontal movements but allows for vertical movement. But newer tray systems comes with a spine like arm which locks vertical movement also.

In this study, the sample size is kept as 10 for each. Earlier articles have also chosen the same number of sample sizes with which they were able to get statistically predictable results.

In this study, the measurements were done in three co-ordinates, anteroposterior, mesiodistal and occlusogingival. Earlier studies by Miranda, covo myerset al did with two variables anteroposterior (horizontal) and occluso gingival (vertical). serrano study included all three coordinates Richardson included only horizontal plane.

In another experiment by wee in 2002 to compare the die systems, he used steel balls of 1.98 mm diameter. Ball point pen nibs of 0.7 mm diameter is used in this experiment as reference points.

Earlier experiments used measuring apparatus ranging from scan tunnelling microscope, stereo microscope, travelling microscope, and coordinate measuring machine.

The traveling microscope with sensitivity range of 10 micrometre was used similar to the study by Michael myers who used stereomicroscope with wide filar micrometre graduated to 0.01mm. i.e.) 10 microns. Earlier experiments used micrometre with sensitivity of less than 1 microns also. Though this will increase the sensitivity of the of the experiment at micron level but has little clinical relevance as we have tooth movement in the range of 200 microns and the grain size of the stone is in the range of 15 to 25 microns.

The values were taken at five different stages, pre-section, post-section, after tenth removal, after twentieth removal, after thirtieth removal and was marked on a spread sheet, which is more extensive data collection making the analysis more reliable.

The data from these study reveals differences in each of the stages of reading taken. In the antero-posterior direction the mean values of pre-section(1.1100) and post section(1.11133) shows that in pindex it increases slightly immediately after sectioning and gradually decreases after thirtieth removal(1.09300)

The immediate shift after sectioning results from the expansion of the stone which is attributed to the growth and development of crystalline hemihydrate lattice from the super saturated solution and the accompanying outthrust of the gypsum crystals during setting. It has been said that the energy of crystalline of dental stone leaves residual stresses in the set mass. The release of such forces, however small they maybe, may affect the replacement of divided segments of casts.

This movement though inconsistent shows statistically significant change from the presectioned values (p=0.004). This is in coherent with earlier studies that the horizontal shift is inconsistent. The manual sawing causing the discrepancy which in some casts increased the inter die space might also be a reason for increased antero posterior movement. This is in coherence with the finding of L.V Covo et al which shows the dies sectioned with mechanical die cutter showed less discrepancy than the manually sectioned dies. This may be explained because of the advantage of the mechanical die cutter with thin sectioning diamond disc equipped with dust absorber to prevent debris trapped in the key ways.

The vertical shift in occluso gingival direction in the pindex system shows mid consistent increase as we increase the number of removal times. (see graph)

Though this is statistically insignificant (0.987), this might be because of any debris clogged in the pinhole which would have increased the height. Walter dilts have reasoned this shift to debris clogged in the key hole.

The movement in the Bucco lingual direction is very minimal to insignificant level (P=1). In earlier study by Richardson there was a lingual tilt in one model tray system. But as a double pin is used which has anti rotational feature and the land area raised to 1 mm to prevent theBucco lingual movement.

In UniLock system the antero posterior values shows though inconsistent antero posterior movement, the mean values are statistically insignificant(p=.836)

Even though the same saw was used to section the dies, the vertical slots in the rigid tray prevents further movement.
In buccolingual direction the movement is negligible statistically (.964) as it is locked up in the tray Buccolingually.

In the occluso gingival direction the movement is minimal towards the base. It has a p value of 0.973. This is in contrast with earlier studies which showed other tray system like accuratrac\textsuperscript{5} has statistically significant downward movement and in coherent with study concerning KO tray\textsuperscript{4} where an additional spine is added to prevent the downward movement. Likewise, a horizontal arm is added to prevent the downward movement of the die.

When pindex and UniLock system are compared, in all directions the movement are statistically insignificant except for in the anteroposterior direction where the mean value of pindex system is exceptionally higher in contrast with earlier findings\textsuperscript{6,5,7,12}. It may be due to manual sawing or movement of the pin which is cemented or due to expansion of the base or a cumulative effect of all. This is subjected to further studies.

As Pindex system is more reliable and time tested, the UniLock system which is relatively easy to use yields the same level of accuracy.

**Conclusion**

In the present study two conceptually different die systems were compared for positional accuracy. Within the limitations of the study, it was observed, Pindex system has statistically significant movement in the anteroposterior direction and insignificant movement in the buccolingual and occlusogingival directions. UniLock has no significant movement in anteroposterior, buccolingual and occlusogingival directions. When compared, pindex has statistically significant movement than UniLock system.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Not applicable

**References**

Vitamin C Intake Improve the Anthropometric Measurements, Lipid profile and Atherogenic Indices in Obese and Non Obese Females

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Abstract
Background: Obesity and associated comorbidities are grave problem in India. Vitamin C intake seems beneficial to deal with obesity and associated complications.

Aim and objectives: To study effect of vitamin C intake on anthropometric measurements, lipid profile and atherogenic indices in obese and non obese females.

Materials and method: Total 41 females; (22 obese and 19 non obese), enrolled in this study who received 500 mg vitamin C, thrice a day for 3 months.

Results: Significant decrease in all anthropometric measurements (Except for WHR in obese females), TG, TC, LDL-C and VLDL-C (Except for TC in non obese females), all atherogenic indices and significant increase in HDL-C was observed in all study participants.

Conclusion: Intake of 500 mg of vitamin C, thrice a day for 3 months is effective enough to improve anthropometric measurements, lipid profile and curb atherogenic indices in obese and non obese females.

Keywords: Obesity, Vitamin C, Body Adiposity Index, Castelli’s Risk Indices, Atherogenic Coefficient.

Introduction

Obesity is a major health challenge of the modern world, with increasing rate in adults and children1. This rate is rapid in both developed2 and in developing countries like India3. Women are more prone to develop obesity than men1 and obesity has been stigmatized as most serious public health concern of the era4-5.

Dieting and exercise are two main treatments,6-7 but maintenance of weight loss becomes difficult and requires adoption of lifestyle modifications as an eternal part,8-9 still success rates with such modifications are low7. Medication is another option10 but concerns are raised due to their side effects on many organs11-12. Bariatric surgery seems useful but it is expensive13 and complications occur in most of the cases undergoing surgery14.

So, effective yet invasive solution needed to treat obesity. These days, use of antioxidants becoming popular approach to counteract obesity and associated morbidities15. Therefore, present work was designed to study effect of vitamin C on anthropometry, lipid profile and atherogenic indices in obese and non obese females.

Material and Method

Study design: This randomized trial, was performed during 2015-2016 on participants selected from Krishna Institute of Medical Sciences deemed to be University. Their written informed consent obtained. Utmost care in accordance with Helsinki Declaration16 practiced during work.

Inclusion criteria: Non-alcoholic, non-smoker, apparently healthy, 22 obese and 19 non obese females aged 20-45 years were selected.

Exclusion criteria: Subjects with diabetes mellitus, tuberculosis, malignancy, hepatitis, renal diseases, hypothyroidism, pregnancy, infectious diseases, subjects taking medication or any supplement also excluded.

Anthropometric measurements: Body height measured with standard stadiometer and weight on weighing scale. Waist circumference (WC) and hip
circumference (HC) recorded in duplicate to the nearest 0.10 cm with a stress resistant tape to ensure constant tension during measurement. WC measured at midpoint between lower margin of last palpable rib and top of iliac crest. HC measured around the widest portion of buttocks, with tape parallel to floor. BMI calculated as weight in kilogram divided by height in square meter (Kg/M²) and subjects considered obese if their BMI was ≥25 and non obese if their BMI was ≥18.5 up to 22.917, WHR calculated as waist circumference (cm) divided by hip circumference (cm).

Body adiposity index (BAI) was calculated as, [HC (cm)/Height (m)]1.5-18 and waist to height ratio (WHtR) as waist circumference (cm) divided by their height (cm).

Blood collection and biochemical analyses: After 12 hours of overnight fast, from antecubital vein 5 ml of blood collected in clot vial bulb. Serum separated within 1 hour at 3500 rpm and used for determination of lipid profile, using commercially available kits (ERBA-Mannheim) on EM-360 fully automated analyzer.

Intervention: Participants provided to take 500 mg vitamin C tablets thrice a day for 3 months. Weekly follow up was taken either meeting them or through phone calls.

By using standard method Triglyceride (TG)19, total cholesterol (TC)20-21 and HDL-C22 determined. Plasma very low-density cholesterol (VLDL-C) and LDL-C were calculated by using Friedewald equation as follow: VLDL-C = TG/5 and LDL-C = [(TC)-(HDL-C+VLDL-C)]23

Calculation of atherogenic indices: Atherogenic indices calculated as; Castelli’s Risk Index-I (CRI-I) = TC/HDL-C, Castelli’s Risk Index-II (CRI-II) = LDL-C/HDL-C24, Atherogenic Coefficient (AC) = (TC-HDL-C)/HDL-C25 and Atherogenic Index of Plasma (AIP) = log (TG/HDL-C)26

Statistical analysis: Data analysed using SPSS version 20, applying two-tailed paired and unpaired ‘t’ tests. Differences are considered significant if p<0.05.

Table 1: Vitamin C intake caused improvement in anthropometric measurements, lipid profile and atherogenic indices in obese and non obese females.

<table>
<thead>
<tr>
<th>Variables</th>
<th>OF (N=22)</th>
<th>t-test value and p-value</th>
<th>NOF(N=19)</th>
<th>t-test value and p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Mean±SD</td>
<td>End</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Age (Yrs)</td>
<td>38±7</td>
<td></td>
<td>34±8</td>
<td></td>
</tr>
<tr>
<td>BMI (Kg/M²)</td>
<td>29±4</td>
<td>28±4</td>
<td>t=16.931, p&lt;0.0001</td>
<td>21±1.5</td>
</tr>
<tr>
<td>BAI (Body fat %)</td>
<td>38±6</td>
<td>37±6</td>
<td>t=13.797, p&lt;0.0001</td>
<td>28±4</td>
</tr>
<tr>
<td>WC (cm)</td>
<td>91±6</td>
<td>89±6</td>
<td>t=13.667, p&lt;0.0001</td>
<td>75±7</td>
</tr>
<tr>
<td>HC (cm)</td>
<td>110±8</td>
<td>108±8</td>
<td>t=14.039, p&lt;0.0001</td>
<td>93±7</td>
</tr>
<tr>
<td>WHR</td>
<td>0.83±0.05</td>
<td>0.83±0.05</td>
<td>t=1.578, p=0.1294</td>
<td>0.81±0.05</td>
</tr>
<tr>
<td>WHtR</td>
<td>0.58±0.04</td>
<td>0.57±0.04</td>
<td>t=10.844, p&lt;0.0001</td>
<td>0.47±0.04</td>
</tr>
<tr>
<td>Lipid profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>137±46</td>
<td>117±34</td>
<td>t=3.307, p=0.0034</td>
<td>88±20</td>
</tr>
<tr>
<td>TC (mg/dl)</td>
<td>184±32</td>
<td>176±24</td>
<td>t=2.366, p=0.0277</td>
<td>167±29</td>
</tr>
<tr>
<td>LDL-C (mg/dl)</td>
<td>108±30</td>
<td>96±25</td>
<td>t=3.889, p&lt;0.0008</td>
<td>97±25</td>
</tr>
<tr>
<td>VLDL-C (mg/dl)</td>
<td>27±9</td>
<td>24±7</td>
<td>t=2.987, p=0.0070</td>
<td>18±4</td>
</tr>
</tbody>
</table>

Table 2: Comparison of baseline and end values between obese and non obese females.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Baseline values</th>
<th>t-test value and p-value</th>
<th>End values</th>
<th>t-test value and p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OF (22) Mean±SD</td>
<td>NOF (19) Mean±SD</td>
<td>OF (22) Mean±SD</td>
<td>NOF (19) Mean±SD</td>
</tr>
<tr>
<td>Anthropometric measurements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (Kg/M²)</td>
<td>29±4</td>
<td>21±2</td>
<td>28±4</td>
<td>21±2</td>
</tr>
<tr>
<td>BAI (Body fat %)</td>
<td>38±6.2</td>
<td>28.12±4</td>
<td>37±6.2</td>
<td>27.3±4</td>
</tr>
<tr>
<td>WC (cm)</td>
<td>91±6</td>
<td>75±7</td>
<td>89±6</td>
<td>73±7</td>
</tr>
<tr>
<td>HC (cm)</td>
<td>107±6</td>
<td>95±4</td>
<td>105±5</td>
<td>94±3</td>
</tr>
<tr>
<td>WHR</td>
<td>0.83±0.05</td>
<td>0.80±0.05</td>
<td>0.83±0.05</td>
<td>0.80±0.05</td>
</tr>
<tr>
<td>WHtR</td>
<td>0.58±0.04</td>
<td>0.47±0.04</td>
<td>0.57±0.04</td>
<td>0.46±0.04</td>
</tr>
<tr>
<td>Lipid profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>137±46</td>
<td>88±20</td>
<td>117±34</td>
<td>77±18</td>
</tr>
<tr>
<td>TC (mg/dl)</td>
<td>184±32</td>
<td>167±29</td>
<td>176±24</td>
<td>162±20</td>
</tr>
<tr>
<td>LDL-C (mg/dl)</td>
<td>108±30</td>
<td>97±25</td>
<td>96±25</td>
<td>83±20</td>
</tr>
<tr>
<td>VLDL-C (mg/dl)</td>
<td>27±9</td>
<td>18±4</td>
<td>24±7</td>
<td>15±4</td>
</tr>
</tbody>
</table>

Vitamin C intake caused significant decrease in BMI, BAI, WC, HC and WHtR (p<0.0001) in obese females (OF) and BMI (p=0.0014), BAI (p<0.0001), WC (p<0.0001), HC (p<0.0001), WHR (p=0.0491) and WHtR (p<0.0001) in non obese females (NOF) (Table 1).

Likewise, in NOF; TG (p=0.0380), LDL-C (p=0.0002), VLDL-C (p=0.0380) decreased and HDL-C increased significantly (p<0.0001) after intake of vitamin C (Table 1).

Vitamin C intake caused significant decrease in CRI-I (p<0.0001), CRI-II (p<0.0001), AC (p<0.0001) and AIP (p=0.0001) in OF and CRI-I (p<0.0001), CRI-II (p<0.0001) AC (p<0.0001) and AIP (p<0.0001) in NOF (Table 1).
Compared to NOF, in OF the BMI, BAI, WC, HC and WHtR found significantly higher at baseline and in end values with \( p < 0.0001 \), while no difference in WHR \( (p > 0.05) \) (Table 2).

TG, and VLDL-C significantly high in OF at baseline and end \( (p < 0.0001) \) and HDL-C in end value \( (p = 0.0084) \), while no significant difference in TC and LDL-C in baseline and end values (Table 2).

At baseline CRI-I \( (p = 0.0033) \), AC \( (p = 0.0033) \) and AIP \( (p = 0.0002) \) and at end; CRI-I \( (p = 0.0021) \), CRI-II \( (p = 0.0175) \), AC \( (p = 0.0021) \) and AIP \( (p = 0.0001) \) significantly high in OF as compared to NOF (Table 2).

**Discussion**

It observed that, plasma vitamin C is inversely correlated with BMI, WC and WHR. In present study vitamin C caused significant decrease in all anthropometric measurements and ultimately the body mass (Table 1). This finding is supported by previous studies. Vitamin C is a key factor in degradation of fatty acids, which could have reduced fat mass in all study participants.

Higher WHR indicates greater cardiovascular hazard. Therefore, people under age of 40 years should have WHR <0.5 and for people aged 40–50 years the WHR <0.633.

Accordingly, present study indicates higher cardiovascular risk in OF than in NOF and vitamin C intake caused significant decrease in WHR in all of them (Table 1). This signifies beneficial effect of vitamin C on WHR and prolonged vitamin C intake may rationalize insane WHR.

A study showed, association of reduced HDL-C and increased TC, TG and LDL-C with raised coronary artery disease risk. In present study, vitamin C intake provided significant increase in HDL-C in OF and NOF (Table 1), which is supported by previous study. Some studies showed reduction in TC with intake of vitamin C, our result coincides with them (Table 1). A reduction in TG supported by study of Afkhami-Ardekani M. et al (2007). Vitamin C is essential for cholesterol and fatty acids, metabolism which would have decreased TG, TC, LDL-C and VLDL-C in all participants.

Rise in LDL-C is associated with atherogenesis. There observed inverse association of high LDL-C with low plasma vitamin C. In present study LDL-C decreased significantly with intake of vitamin C in both OF and NOF.

These days some novel indices like CRI-I41, CRI-II42, AC43 and AIP44 are used and values of CRI-I >3.5 in males, >3 in females, CRI-II >3.3 and AC >3.0 determine cardiovascular health whereas, AIP between -0.3 to 0.1 indicates low, ≥0.11 to 0.24 medium while >0.24, indicates high cardiovascular risk.

In present study all atherogenic indices reduced with intake of vitamin C, which disagree with previous results. It might be possible that, vitamin C and estrogen had collective effect on atherogenic indices in females.

**Conclusion**

1500 mg/day of vitamin C intake for 3 months is effective enough to sane body mass, lipid profile and curb atherogenic indices in obese and non obese females.

**Conflict of Interests:** None

**Funding:** Krishna Institute of medical Sciences, Deemed to be University, Karad.

**Ethical Clearance:** Obtained from Institutional Ethics committee of Krishna Institute of Medical
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Correlation of Interalar Width and Maxillary Anterior Teeth for Different Arch Form in Den-Tate Subjects

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Abstract

Statement of problem:

Purpose: The aim was to investigate the relationship between the inter alar width (IAW) and the distance between the maxillary canines tip and also to determine the relation of the ala of nose and canine on individual side, for different arch forms, to aid in artificial denture teeth positioning.

Materials and Method: A total of 300 dentate subjects aged between 18-30 years, of both genders were selected, among them 150 were males and 150 females. The subjects were divided into three group based on their arch forms that is, square arch, ovoid arch and tapered arch forms. The subjects to be photographed were made to achieve the natural head position (NHP). All photographs were analyzed for inter-alar width. The inter-canine width using Adobe Photoshop-7 professional.

Conclusion: It is concluded that maintaining symmetry while fabricating a complete denture is not mandatory. After observing the data it is suggested that in both males and females for all arch forms teeth arrangement can be made with the alar lines extending distal to the premolar.

Keywords: Inter alar width, Inter canine width, Arch forms, Teeth arrangement.

Introduction

A first time Complete denture wearer desires to have a near similar previous dentate appearance and achieving this is a challenge to the operator but when achieved, surely improves the confidence of the patient¹. The basic important elements to achieve this esthet-ics are the maxillary anterior teeth. So the importance lies in the selection and arrangement of these teeth²³. Over the years, many suggestions have been given by artisans of dental profession regarding the norms, criteria and guidelines for esthetics but, no universally accepted parameter exist for selection of anterior teeth in local population⁴. This study was conducted to investigate the relationship between the inter alar width (IAW) and the distance between the maxillary canines tip and also to determine the relation of the ala of nose and canine on individual side, for different arch forms, to aid in artificial denture teeth positioning.

Materials and Method

The present study was conducted in the Department of Prosthodontics, SDS, KIMSDU, Karad, Maharashtra, India. The subjects were patients of Karad population seeking dental treatment in the college. A total of 300 dentate subjects of both genders were selected, among them 150 were males and 150 females. The subjects were divided into three group based on their arch forms that is, square arch, ovoid arch and tapered arch forms the division into these category was made on the following definition.

- For Square arch form the anterior teeth are straight up and incisal edges are even and approach is straight line.
- The ovoid arch is wider between the canines, the central incisor slant slightly inwards. The lateral incisors overlay the central and are depressed at the neck.

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• In tapering form the arch is narrow between the canine to canine the teeth slant out and the incisal edges are forward from the cervical.

Demographic data and informed consent of all the subjects was obtained. The age group of all the subjects was between 18-30 years. The subjects were considered as per the following criteria. The one who is having an apparent esthetics or pleasing smile and having full component of natural teeth without Orthodontic or Prosthodontic treatment and with no overlapping, no spacing, no crowding, no proximal restorations, no abnormal or altered nose.

The subjects to be photographed were made to achieve the natural head position (NHP) by looking at a distinct point. NHP represents a valid cranio-facial reference system with larger inter-individual and intra-individual reproducibility compared to other planes. NHP is considered to be a repeatable and reliable head position and hence is used in the study. It was marked using a spirit level device (fluid level device) on the forehead using a double sided adhesive and a Velcro band(fig 3). Once the desired position was achieved and confirmed, the subject was made to position his/her chin on the custom made stand, by still maintaining the same head position and the photograph was taken using grid system in view-finder of the camera. The digital single lens reflex (DSLR) camera (Nikon D-80-with lens Nikon DX AF-S Nikon 18-135mm) was used to take photographs(fig 1). A smile view was taken at a fixed focal length of 100mm at a fixed subject lens distance of 11 inches using a custom made wooden stand (fig 3). The stand was made such that the distance between the subject and lens remains constant, when the subject rests his/her chin over the chin support of the stand and camera placed on the tripod on the other end of it(fig 2). The grid system in view finder of the camera was used to position the lens with central focus point focusing at the incisal embrasure between central incisors. A face view was clicked to confirm the head position of the subjects against a blue black-ground (fig 2). All photographs were transferred to the computer (Dell) and analyzed using Adobe Photoshop-7 professional. The interalar width was measured from the widest point on the photograph from one side to the other and was recorded. The inter-canine width from one canine tip to the other was measured and recorded. The width of the mouth was measured between the corners of the mouth. To know the relation of ala and canine a perpendicular line was dropped from the widest point of ala to the canine and its relation to the canine tip and was recorded as at the canine tip, mesial to canine tip or distal to canine tip.

Figure 1: Apparatus used

Figure 2: Setup for Photography

Figure 3: Natural head position
Results

Table 1: Subject selection and the breakup of arch form.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean Age</th>
<th>Arch forms</th>
<th>Square</th>
<th>Tapered</th>
<th>Ovoid</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>26</td>
<td></td>
<td>63</td>
<td>40</td>
<td>47</td>
<td>150</td>
</tr>
<tr>
<td>Females</td>
<td>25</td>
<td></td>
<td>59</td>
<td>41</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>Not required</td>
<td></td>
<td>122</td>
<td>81</td>
<td>97</td>
<td>300</td>
</tr>
</tbody>
</table>

The study was conducted in 150 males and 150 females. The subjects were observed for their arch form. There were total of 122 subjects with square arch form, 81 with tapered arch form and 97 with ovoid arch form.

Table 2: The Inter alar range and mean width.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Range</th>
<th>Mean width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>25mm to 50mm</td>
<td>44.36 mm</td>
</tr>
<tr>
<td>Females</td>
<td>24mm to 39mm</td>
<td>36.69 mm</td>
</tr>
<tr>
<td>Total</td>
<td>24 mm to 50mm</td>
<td>40.66 mm</td>
</tr>
</tbody>
</table>

The inter alar width was measured on the widest portion of the ala from right to left on the photographs. The Interalar width of total sample showed a mean of 40.66 mm, ranging from 24 mm to 50 mm. The mean Interalar width in males was 44.36 mm and in females was 36.69 mm indicating the influence of male dominance factor.

Table 3: Number of alar lines coinciding with different arch forms.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Arch form No.</th>
<th>Right side</th>
<th>Left side</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Distal to canine tip</td>
<td>At canine tip</td>
</tr>
<tr>
<td>Males (150)</td>
<td>Square (63)</td>
<td>08</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Tapered (43)</td>
<td>04</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Ovoid (44)</td>
<td>05</td>
<td>12</td>
</tr>
<tr>
<td>Females (150)</td>
<td>Square (59)</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Tapered (50)</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Ovoid (41)</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

Discussion

The study measured and compared the width of the nose with the distance between the tips of natural maxillary canine on the digital photographs in square, ovoid and tapered arch forms. The photograph was used as that would give the real picture as how the person looks when the artificial teeth would be arranged following the nasal width. It has been reported that the width of the nose may be used for selecting the size of anterior teeth, for positioning maxillary canine and for registering the curve of anterior arch4. The Interalar width of total sample showed a mean of 40.66 mm, ranging from 24 mm to 50 mm. The mean Interalar width in males was 44.36 mm and in females was 36.69 mm indicating the influence of male dominance factor. Nelson, latta, weaver and conkin found a mean of 43.93 mm with a range from 29.00 to 63.00 mm5,6 but this was done in the edentulous subjects. Hoffman, bonberg and hatch found a mean of 34.28 mm in dentulous subjects7.

In the present study the mean intercanine width was 36.31 mm, ranging from 27mm to 48 mm. The mean
Intercanine width in males was 38.26 mm and in females was 34.36 mm again indicating the influence of male dominance factor (Table 2). Hoffman, bonberg and hatch found a mean of 35.35 mm.

The alar lines proves, the right and left side of teeth placement are not symmetrical. In both the males and females the alar lines were found to be coinciding maximum distal to premolar. In males the sequence of alar line coinciding from maximum to minimum were found to be distal to premolar then distal to canine then mesial to canine and lastly at canine tip, for square arch forms. It was distal to premolar then at canine tip then mesial to canine and lastly distal to canine for tapered arch forms. For ovoid arch forms it was distal to premolar then mesial to canine then at canine tip and lastly distal to canine.

In females the sequence of alar line coinciding from maximum to minimum were found to be distal to premolar then canine tip and lastly distal to canine, for square arch forms. It was distal to premolar then at canine tip and lastly distal to canine for tapered arch forms. For ovoid arch forms it was distal to premolar then at canine tip and lastly distal to canine. For all the arch forms, no alar line coincided mesial to canine (Table 3).

**Conclusion**

Within the limitations of the study, it is concluded that maintaining symmetry while fabricating a complete denture is not mandatory. After observing the data it is suggested that in both males and females for all arch forms teeth arrangement can be made with the alar lines extending distal to the premolar. This could be done by asking the patient to smile and observe the alar lines during the try-in stage.

**Ethical Clearance:** Taken from the Institutional ethical committee, KIMSDU, Karad

**Conflict of Interest:** Nil

**Source of Funding:** KIMSDU, Karad

**References**

2. Rutuja sancheti, Assessment of anteroposterior arrangement of maxillary anterior teeth in complete dentures fabricated by students IJPCDR April-June 2018;5(2)5-8
Adverse drug reactions (ADRs) occur due to the drugs that are prescribed in acute and chronic or terminal ailments. They are a bane to the healthcare society as they not only challenge the principles of prescribing individual drug candidates but also the prescribing of multiple drugs. This may hold the patient, especially geriatric and pediatric patients, at a high risk of unexpected, undesired and serious events. In the review of current literature, it was observed that it was the commonly prescribed drugs such as hematological agents, anti-hypertensive medications, anti-arrhythmic medications, neuroleptics, proton pump inhibitors and especially Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) that caused most of the ADRs in elderly patients (60 years of age and above). In most cases, the affected systems were the Cardio Vascular System (CVS), the nervous system, the Gastrointestinal (GI) system and the most common symptoms seen were nausea, vomiting, headache, stomach ache, dizziness and vertigo that led to falls. In this article, the occurrence of ADRs due to polypharmacy or Potentially Inappropriate Prescriptions (PIPs) and how they affect children belonging to the pediatric age group (i.e. 16 years and less) were investigated. In this review of literature, it was found that the main reason for ADRs were off-label prescription of drugs. The off-label prescription of drugs refers to the prescription of drugs for a different purpose other than its approved use. Off-label prescription of drugs cause major psychiatric disorders, skin eruptions, enteral problems and some severe reactions like respiratory depression, hypotension, liver failure, seizures, bradycardia, bleeding etc. with the use of drugs such as anti-tussive agents, rhinological agents and GI drugs. Ultimately, it was determined that it was not the age group that determined the occurrence of ADRs, but it was the prescription errors, polypharmacy and drug-drug interaction that caused casualties and inpatient admissions, out of which some cases proved to be fatal.

**Keywords:** Adverse Drug reactions (ADRs), Potentially Inappropriate Prescribing (PIPs), Polypharmacy, Drug-Drug Interactions (DDIs), Geriatric ADR reporting, Pediatric ADR reporting.

**Introduction**

The World Health Organization (WHO) defines the science that involves the detection, assessment, understanding and prevention of Adverse Drug Reactions (ADRs) as Pharmacovigilance (PV). WHO also implies ADRs to be “a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function”\(^{(1)}\)

This definition excludes trivial or expected side effects and poisonings or overdose.

The ADRs can occur instantaneously or only after a long period of administration of the drug or even after the stoppage of the drug.

The most common ADRs are due to polypharmacy i.e. simultaneous use of multiple drugs.

ADRs are most commonly divided into:

1. Predictable (Type A or Augmented) reactions
2. Unpredictable (Type B or Bizarre) reactions

Type A reactions are based on the pharmacological properties of the drug. (Mechanism based Adverse Drug Reaction). These are more common and are preventable and reversible.

E.g. bleeding from warfarin or a low therapeutic index, E.g. nausea from digoxin.

Type B reactions are related to the distinct characteristics of the patient and are not dependent on the pharmacology of the drug as such. They are more serious, uncommon and require the withdrawal of the drug immediately and include idiosyncrasy and allergy.

Some examples of Type A and type B reactions are given in Table 1.
Table 1: Type A and Type B reactions to several drugs.

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Type A</th>
<th>Type B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpromazine</td>
<td>Sedation</td>
<td>Cholestatic</td>
</tr>
<tr>
<td>Naproxen</td>
<td>Gastrointestinalhaemorrhage</td>
<td>Agranulocytosis</td>
</tr>
<tr>
<td>Thiazides</td>
<td>Hypokalaemia</td>
<td>Thrombocytopenia</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Bleeding</td>
<td>Breast Necrosis</td>
</tr>
</tbody>
</table>

Pharmacovigilance plays a very important role in the drug safety assessment of an individual drug candidate and keeps an account of ADRs provoked by the drugs used to cure diseases. In a the data provided by Food and Drug Association (FDA), it was observed that the rate of ADRs reported in 2006 increased to 20% in 2007 and data collected for 2008 showed a considerable increase of 32% in ADR reporting than compared to 2007 (New FDA Data: Adverse Event reporting Increase Dramatically).

Review of Literature: This literature study was performed to appreciate the trends in the occurrence, detection, identification, monitoring and prevention of ADRs in patients of different age groups and in patients with known co-morbidities who may or may not be under multiple prescribed medications or due to wrong self-medication.

While the data from different sites and demographics was studied, it was observed that the patients who were more than or equal to 60 years of age (geriatric group) suffered from ADRs more than any other age group apart from the terminally ill patients.

A study was performed at the University of Reins, France in the Dementia Management Unit where the patients with Alzheimer’s disease and its associated disorders like Behavioral and Psychological Symptoms in Dementia (BPSD) took part. The observations were recorded by the research team for a period of 19 months where the patients belonged to various socio-demographics, had varied clinical histories and were under different prescriptions of polypharmacy. In this study, it was observed that the drug candidates that showed the maximum ADRs were Angiotensin converting Enzyme (ACE) inhibitors, Antidementia agents, Antiarrhythmic agents and Neuroleptics. (Kanagaratnam et al. (2014))(2)

Different sets of studies were performed at different centers in Italy that showed that ADRs mainly occurred in the patients who were on long term therapy of hematological agents and proton pump inhibitors. The study conducted by Lattanzio MDet al. (2012) showed that the hematological agents like Warfarin, Acenocumarol and some of the proton pump inhibitors were responsible for the ADRs in patients. These ADRs were a result of drug-drug interaction (DDI). (3) Another study by Marengoni et al. (2014) showed that among 506 patients on prospective observation were found to have ADRs due to the commonly prescribed drug candidates that were mainly hematological agents, neuroleptics, respiratory drugs and antibiotics.(4)

Patients with many co-morbidities are often at higher risks of health hazards and suffer from various DDIs and sometimes medication errors. These medication errors may be referred as Potentially Inappropriate Prescriptions (PIPs). Management of such patients becomes challenging due to the co-existing chronic and/or acute health problems. A study conducted by Hedna et al. (2015) with 813 elderly patients showed that almost 374 (i.e. 46.0%) of the patients suffered from drug reactions due to PIPs and 159 (i.e. 19.5%) of them suffered from ADRs. In this case of PIPs and ADRs, it was observed that 60% of these reactions affected the vascular system, 50% were manifestations that affected the nervous system and 62.5% of them led to fall due to the patients’ unstable nervous conditions. The drug candidates that were observed to have such noxious reactions were vasodilators that mainly caused postural hypotension, Neuroleptics, first generation antihistamines and benzodiazepines that caused vertigo and loss of consciousness, which led to falls and fractures. (5)

A study by the World Health Organization (WHO) presented that almost 31% of the deaths caused globally are because of cardiovascular disorders and that 8.5% of the total global population suffers from diabetes. Both of these are chronic form of ailments that can be controlled, but not cured in most of the cases. Cardiovascular disorders and metabolic disorders bring along the co-morbidities that include hypertension, thromboembolism, chronic kidney disease secondary to diabetes mellitus, diabetic neuropathy, etc. All of the conditions that arise secondary to these diseases are known as the co-morbidities. These co-morbidities need a constant management for which multiple medications must be employed simultaneously for individual as well combinatorial therapy and management of them. In a study performed on 186 patients for 640 days by Cristina G et al. (2005), it was found that, out of all the medications that are prescribed in such chronic conditions the most common drug candidates that have been found to show the maximum ADRs were Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), Digoxin, Anti-diabetics, Angiotensin Converting Enzyme (ACE) inhibitors and antibiotics. (6)
A study was conducted by Veehof et al. for a duration of 2 years involving 195 individuals who were studied for a cumulative 247 episodes of ADRs due to polypharmacy. The drugs that majorly caused ADRs were antibiotics, NSAIDs, anti-hypertensives, anti-depressants and diuretics. The most common ADRs that these drugs caused were nausea, vomiting, stomach pain, diarrhea, erythema and headache. These were observed in the elderly patients who had known Chronic Obstructive Pulmonary Disease (COPD), Coronary Artery Disease (CAD), asthma, sleeping disorders and Urinary Tract Infections (UTI). (7) Another study was performed by Pedrós et al. (2015) for a period of 7 years from January 2008 to December 2014 with 28,000 patients in the PV program of Bellvitge University Hospital where out of 30 cases, at least one was ADR and out of all the cases of ADRs, half of them were due to DDIs. The most common form of DDI reactions was Gastrointestinal (GI) bleeding due to anti-thrombotic agents and/or NSAIDs and intracranial bleeding caused due to Vitamin K antagonist. (8)

For this current study, the data of the pediatric age group were also collected from the reported researches worldwide. The worldwide ratio of the pediatric cases was lesser as compared to the ADRs and DDIs in elderly patients.

In the practice of medicine, when required for management of certain ailments, the Food Drug Association (FDA) has approved the prescription of drugs that are typically not used for the treatment of said ailment. Such a practice is known as off-label use/prescription of drugs. A study conducted by Mike Ufer MD et al. (2004) in a worldwide survey of spontaneous ADR reporting in children under 16 years of age. The authors identified 109 non-serious and 49 serious ADRs concerning 79 and 33 patients where none of the ADRs were fatal. Due to the non-approved age or dose, serious ADRs were found more in number and the most commonly found signs and symptoms were psychiatric disorders and mucocutaneous inflammatory reactions. Most commonly suspected groups include which caused ADRs were prescribed drugs: i.e.; antiasthmatics, antibiotics, antiepileptics and psycholeptics/analectics and off-label prescription of drugs such as i.e.; Rhinological agents, anti-tussives and gastrointestinal drugs. (9)

Another study was performed by Turner et al. (1999), which involved the prospective surveillance of five different pediatric wards (surgical, medical, neonatal surgical, cardiac intensive care and general pediatric intensive care units (ICU)) in Alder Hey Children’s Hospital for the patients ranging in age from 1 day to 18 years in which the patients’ ages, dates of birth, diagnoses, drugs administered, routes of administration, doses and indications for use were recorded. 936 of the 1046 admissions received medicines with 4455 drug courses. The admissions to each of the wards were as follows: Surgical - 376, Medical - 331, General ICU- 138, Cardiac ICU - 101, and Neonatal Surgical - 100. The incidence of unlicensed and off-label drug prescriptions was highest in the ICUs and 157 ADRs were experienced by the patients (Table 1), among which electrolyte imbalance was most common ADR found. 17 ADRs were found to be severe (Respiratory depression - 8, Hypotension - 4, Liver failure - 2, Seizures - 1, Bleeding - 1, Bradycardia - 1) and the groups of drugs responsible for the ADRs are shown in Table 2. (10)

<table>
<thead>
<tr>
<th>ADRs experienced by patients</th>
<th>Number of ADRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolyte imbalance</td>
<td>39</td>
</tr>
<tr>
<td>Thrush</td>
<td>22</td>
</tr>
<tr>
<td>Rash</td>
<td>16</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>10</td>
</tr>
<tr>
<td>Itching</td>
<td>10</td>
</tr>
<tr>
<td>Hypotension</td>
<td>9</td>
</tr>
<tr>
<td>Respiratory depression</td>
<td>8</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>7</td>
</tr>
<tr>
<td>Abnormal movements/hallucinations</td>
<td>5</td>
</tr>
<tr>
<td>Hepatic impairment/failure</td>
<td>4</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>3</td>
</tr>
<tr>
<td>Cushingoid</td>
<td>3</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>157</strong></td>
</tr>
</tbody>
</table>

Table 2: Severe ADRs and number of cases

<table>
<thead>
<tr>
<th>Types of drugs associated with ADRs</th>
<th>Number of ADRs</th>
<th>Severe ADRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotics</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Morphine and other opiates</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>Diuretics</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Antihypertensive vasodilators</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Sedatives</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Bronchodilators</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>TPN</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Inotropic agents</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>157</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

Table 3: Commonly used drugs observed to cause ADRs.
Rivas et al. (2015), Madrid conducted a prospective cohort study in neonates ranging from ages 0 to 29 days who were admitted to the neonatal department at the Hospital Clínico San Carlos in Madrid (Spain). Demographic characteristics and the data of new drug administrations were recorded by the physicians. A total of 313 patients were included by the authors in the study and the route of administration used were IV (51%), Enteral (19%) and IM (12%). The authors identified 116 ADRs and the majority of the ADRs were experienced in the NICU.\textsuperscript{11}

Following tables enlist the common ADRs (Table 4) and ADRs in newborns (Table 5).

**Table 4: Commonly occurring ADRs.**

<table>
<thead>
<tr>
<th>List of most common ADRs identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding intolerance</td>
</tr>
<tr>
<td>Phlebitis</td>
</tr>
<tr>
<td>Tachycardia</td>
</tr>
<tr>
<td>Central hyperactivity</td>
</tr>
<tr>
<td>Constipation</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
</tr>
<tr>
<td>Jaundice</td>
</tr>
<tr>
<td>HTN</td>
</tr>
<tr>
<td>Liver failure</td>
</tr>
<tr>
<td>GI hemorrhage</td>
</tr>
</tbody>
</table>

**Table 5: ADRs observed in newborns.**

<table>
<thead>
<tr>
<th>Severe ADRs identified in newborns</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Thrombocytopenia</td>
</tr>
<tr>
<td>- Renal failure</td>
</tr>
<tr>
<td>- Necrotizingenterocolitis</td>
</tr>
<tr>
<td>- Liver failure</td>
</tr>
<tr>
<td>- Cardiovascular disorders</td>
</tr>
<tr>
<td>- Anemia</td>
</tr>
<tr>
<td>- Prolonged neuromuscular blockade</td>
</tr>
<tr>
<td>- Bradycardia</td>
</tr>
<tr>
<td>- Bradypnoea</td>
</tr>
<tr>
<td>- Hyperglycemia</td>
</tr>
<tr>
<td>- HTN</td>
</tr>
<tr>
<td>- Hypotension</td>
</tr>
<tr>
<td>- Tachycardia</td>
</tr>
</tbody>
</table>

**Conclusion**

In this study, the literature on ADRs reported at various sites was reviewed and it was noted that ADR reporting were higher in elderly patients than in younger ones.

One of the most common reasons behind this observation is the use of polypharmacy, prolonged use of medications for and inappropriate prescription or inappropriate self-medication. ADRs may also be seen in patients who fail to adhere to the prescriptions, in terms of medications, their doses and their schedules of administration.

The ADRs commonly affected the cardiovascular system, musculoskeletal system and the nervous system. Most of the cardiovascular manifestations include myocardial sensitivity to beta-adrenergic drugs, fluctuation in BP, cardiac output and total peripheral resistance. The central nervous system manifestations included changes in weight and volume of the brain and may cause cerebral edema, memory impairment, and loss of consciousness followed by dementia. Some of the ADRs also show a prominent effect on the gastrointestinal system, which may cause an increase in gastric pH, deceased digestion, hampered excretion and reduced peristalsis.

The rate and extent of physiological changes and the response of various body processes like development, metabolism, differentiation, reproduction and homeostasis not only differ in patients of different ages like geriatric patients, adult patients and pediatric patients, but also differs highly on an individual basis. Newborn infants have a much slower rate of metabolism than children from older age groups. The premature babies are more likely to undergo slower metabolism and drug clearance than the normally born infants.

The main principal of dosing and drug selection highly depends on the age group. Different drugs may have different effects in elders and children. During birth, the renal and hepatic functions are not as developed as in adulthood. Drug clearance from the system may slow down and cause accumulation leading to toxicity in infants and small children. Thus, doses are designed based on the tolerability of the body to a dose. All the drugs do not cross the blood brain barrier (BBB), a layer formed by the endothelial cells of brain that allows only polar drugs to pass through. In newborn infants, the BBB is very delicate and many drugs can pass through causing severe CNS manifestations.

The most common pharmacokinetic effects of various drugs that have been observed in pediatric patients are staining of teeth during development of enamel, skin rashes and toxicity due to topical products if they are applied extensively, less distribution of fat soluble drugs due to lack of fat in children and infants. The pharmacodynamic effects may include
hyperkinesias, sedation, and kernicterus by displacement of bilirubin from albumin, hypothyroidism, dystonias and hepatotoxicity.

Some of the drugs may just transfer from breastfeeding of the infant and can cause toxicity due to their inefficient clearance mechanism. Those drugs include amiodarone, aspirin, benzodiazepine, chloramphenicol, ciprofloxacin, oral contraceptives, sulphonylureas, thiazide diuretics and vitamin A/retinoid analogues.

The pediatric medication-use process is complex and error prone owing to multiple steps required in calculating, verifying, preparing, and administering doses.

**Ethical Clearance:** Not required as it is a review article.

**Conflict of Interest:** Authors declare no conflict of interest.

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**References**

Assessment Helmet Usage among Two Wheeler Users in the South India

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Abstract

Background: In India, road traffic injuries are one of the top four leading causes of death and health loss among persons of age group 15-49 years. The share of two wheelers in total road accidents has increased from 28.8% in 2015 to 33.8% in 2016. Out of total of 52,500 two wheeler riders killed in road accidents during the calendar year 2016, 10,135 two-wheeler riders (19.3%) were reported to be not wearing helmets.

Aims: Mandatory helmet usage law was enforced in January 2016 for both riders and pillions in Bangalore.

Settings and Design: Randomly selected Traffic Junctions of Bangalore city, Karnataka, India. Purposive sampling technique was used to obtain the helmet usage among two wheeler users.

Method and Materials: It is a cross sectional study, where 1471 two wheeler riders, pillions were observed at selected 6 traffic junctions using an observation checklist with different intervals of the time in weekdays and weekends. Information regarding socio demographic details and helmet compliance will be collected.

Results: In observational survey 1471 two wheeler users were observed at the 6 selected traffic junctions, among riders (82.18%) ,pillions (72.82%) wore helmet. Helmet usage (riders-87.64%) (pillions-76.03%) in inner city junction and in outer ring road junction (riders-74.88%) (pillions-55.12%) respectively. helmet usage in weekdays was 6% more than in weekends among riders.

Conclusion: Nearly 20% of riders and 30%of pillions were not wearing helmets. Compliance to ISI (Indian Standard) helmets and buckling of the helmets was poor in both the users.

Keywords: Helmet usage, helmet compliance, traffic junctions, standards of helmet.

Introduction

Road traffic injuries are a major cause of death and disability globally, with a disproportionate number occurring in developing countries. Road traffic injuries are currently ranked ninth globally among the leading causes of disability adjusted life years lost, and the ranking is projected to rise to third by 2020.[1] In India 13 States accounted for 87.8 % of share in persons injured in road accident in the entire country during the calendar year 2016. Tamil Nadu stood on top in persons injured in road accidents in the entire country with a percentage share of 16.6 % followed by Madhya Pradesh 11.7 % and Karnataka 11.0 % respectively.[2] The road accident scenario in Karnataka causes a great concern. More than 10000 persons die every year due to road accident. [3] Nearly 90% of road traffic crashes are due to human errors and faulty human perceptions. Among fifty million plus population cities, Delhi reported highest number of deaths followed by Chennai and Bangalore.[2]

Increasing individual modes of transport, heterogeneous traffic mix, rapid addition of high speed vehicles and less emphasis on the safety of vulnerable road users are some contributing factors. Increasing speeds, non-use of helmets, drinking and driving, poor visibility, failure to implement safety laws and poor trauma care are some factors recognized in India.[4]

The non-usage of seat belts or helmets, single roads and alcohol consumption contribute in majority of severe road traffic accidents.[5]

The most vulnerable group for road traffic injuries is identified as pedestrians, cyclists and those using motorized two and three-wheelers, they account for 46% of the global road deaths.[6]

Two-wheelers being smaller in size and not highly visible on the road make the rider particularly vulnerable...
to crashes. In the event of a two-wheeler crash, the head of the driver or pillion directly hits a mobile or immobile object causing injury. Several studies point to the fact that head is the most commonly injured organ among two-wheeler occupants in case of crashes. It is found that about 40 to 50% of those injured and more than one-third of those killed in two-wheeler crashes are found to have sustained brain injuries such as concussion, contusion and haemorrhage.[6]

Rapid growth in the use of motorized two-wheeled vehicles in many countries has been accompanied by increases in injuries and fatalities among users, but wearing a motorcycle helmet can reduce the risk of death by almost 40% and the risk of severe injury by approximately 70%. Helmet laws should apply to all riders (including children) and specify a helmet-quality standard, but only 44 countries (representing 1.2 billion people) have laws that apply to all drivers, passengers, roads and engine types; require the helmet to be fastened; refer to a particular helmet standard. Those with laws incorporating these characteristics are disproportionately high-income countries in the European Region. This is particularly worrying as the South-East Asia Region and the Western Pacific Region are known to have a high proportion of motorcycle deaths, while in the Region of the Americas the proportion of road traffic deaths among motorcyclists is on the rise increasing from 15% to 20% between 2010 and 2013. Enforcement is critical to the effectiveness of helmet laws, yet only 68 countries rate their helmet law enforcement as “good” (8 or above on a scale of 0 to 10), revealing that urgent attention needs to be given to ensuring helmets are up to standard and properly worn.[7]

Bangalore, a silicon city of India, city is a capital of Karnataka state, which has a vehicular population of about 1.5 million, with an annual growth rate of 7-10% and two wheelers constitute more than 70% of the total volume.[8]

On 1st January 2016 Karnataka state Government made Gazette notification that Karnataka motor vehicles, Rules 1989, in rule 230, for sub rule (1) Every persons while driving or riding (both for rider and pillion riders) a motor cycle of any type i.e to say motor cycles, scooters and mopeds irrespective of brake horse power of the vehicle within the limits of Karnataka state shall wear protective headgear (Helmet).[3]

Compulsory helmet law was enforced in Bangalore (2016) for riders and pillions. So far, no study had been undertaken to evaluate helmet law enforcement in Bangalore. Hence current study had been undertaken.

Objectives of the Study
1. To evaluate the compliance of motorized two wheeler users towards mandatory helmet law.
   1.1 To assess the current compliance of motorized two wheeler users towards usage of ISI standard helmets.
   1.2 To assess the current compliance of motorized two wheeler users towards strapping of helmets.

Materials and Method
(a) Study place: Bangalore, Karnataka, India
(b) Study subjects: Two wheeler riders and pillions at selected traffic junctions of Bangalore city for observational survey.
(c) Study Period: 5 months, July 2017 to December 2017.
(d) Study design: Cross Sectional
(e) Sampling design: Purposive sampling.
(f) Sample Size: Totally 1471 Observations were done by observing two wheeler users at the selected traffic junctions.

(i) Data Collection Tool: Helmet compliance data was collected using a pretested checklist developed based on review of literature.

Method of collection of data: Compliance to Helmet law was assessed by direct observations of two wheeler users at the selected traffic signalled junctions on different timings of the day.

Selection of junctions for observational surveys: Bangalore city has two major traffic divisions such as, East and West. East had Twenty number of traffic divisions and west had Twenty three number of traffic divisions. Further junctions were divided in to outer and inner city junctions.

   Total 6 junctions, three from each division were selected by random sampling method. Out of three selected junctions, two were from inner city junctions and one was from outer city junction. Madivala traffic junction, Wilson garden traffic junction from inner city junction and Konnapana agrahara traffic junction in outer ring road area were selected from East division. AnandRao traffic junction, K R Market traffic junction from inner city junction and Kodigehalli-Hebbala traffic junction in outer ring road area from West Division.

Data was collected by using observational survey to assess the compliance of two wheeler users.
Observational survey: Direct Observation of two wheeler users was done standing at the safest road side at selected traffic junctions during both weekdays and weekends at different timings of the day such as morning 9-10:30 am, afternoon 12-1:30 pm and evening 5-6:30 pm, to ensure the change in traffic volume and traffic composition at different timings of the days.

Both two wheeler riders and pillions in each traffic junctions were observed at traffic junctions when vehicles were stopped for red signal. Riders and pillions of vehicles traveling in one direction and those who have stopped at one side of the curb were observed to avoid confusions. A pretested checklist was used to collect information’s such as, gender, type of vehicle, rider/pillion, helmet/no helmet, type of helmet and strapping pattern.

Results

Table 1: Helmet usage among riders and pillions in Bangalore.

<table>
<thead>
<tr>
<th>Helmet Users</th>
<th>No. of Observations</th>
<th>Helmet wearing %</th>
<th>95% CI</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riders</td>
<td>1471</td>
<td>1209(82.18)</td>
<td>0.8015-0.8406</td>
<td>1.755</td>
</tr>
<tr>
<td>Pillions</td>
<td>920</td>
<td>670(72.82)</td>
<td>0.6986-0.7560</td>
<td></td>
</tr>
</tbody>
</table>

Helmet usage among riders and pillions

Observations in the current study showed that the odds of helmet usage among riders is 1.75 times more compared to pillions (Table 1).

Table 2: Helmet usage among riders and pillions in weekdays and weekends in Bangalore.

<table>
<thead>
<tr>
<th>Two wheeler users</th>
<th>Weekdays</th>
<th>No. of observations</th>
<th>Helmet users</th>
<th>Weekends</th>
<th>No. of observations</th>
<th>Helmet users</th>
<th>Z-Test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riders</td>
<td></td>
<td>653</td>
<td>559(85.60)</td>
<td>818</td>
<td>649(79.33)</td>
<td></td>
<td>3.115</td>
<td>0.001*</td>
</tr>
<tr>
<td>Pillions</td>
<td></td>
<td>450</td>
<td>331(73.55)</td>
<td>470</td>
<td>339(72.12)</td>
<td></td>
<td>0.486</td>
<td>0.6241</td>
</tr>
</tbody>
</table>

Figures in parenthesis indicate percentages
* Significant

Helmet usage in weekdays and weekends: Usage of helmet by two wheeler users was more in weekdays compared to weekends and the difference of helmet usage by riders in weekdays and weekends was found to be significant (p<0.05) (Table 2).

Table 3: Riders and pillions adherence to strapping pattern of helmet.

<table>
<thead>
<tr>
<th>Strapping pattern</th>
<th>Riders N=1209</th>
<th>Pillions N=670</th>
<th>Z-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strapped</td>
<td>880 (72.78)</td>
<td>430 (64.17)</td>
<td>3.889</td>
<td>0.001**</td>
</tr>
<tr>
<td>Unstrapped</td>
<td>329 (27.22)</td>
<td>240 (35.83)</td>
<td>3.889</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

Figures are given in parenthesis indicates percentages
** Highly significant

Adherence to ISI mark and fastening of helmets: Hardly half of the riders and one fourth of the pillions did use ISI marked (Indian Standard) helmet and more than 30% of helmet users never strapped the helmet (Table 3).

Table 4: Helmet usage among riders and pillions according different traffic locations in Bangalore.

<table>
<thead>
<tr>
<th>Two wheeler users</th>
<th>Inner City junction</th>
<th>Outer ring road junction</th>
<th>Z-Test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rider</td>
<td>842</td>
<td>738(87.64)</td>
<td>6.327</td>
<td>0.001**</td>
</tr>
<tr>
<td>Pillions</td>
<td>772</td>
<td>587(76.03)</td>
<td>4.017</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

Figures in parenthesis indicate percentages.
** Highly significant
Helmet usage in inner and outer city junctions

Helmet usage among riders in inner city junction (87.64%) was 12% more compared with outer ring road junction (74.88%) and also helmet usage among pillions in inner city junction (76.03%) was 15% more compared with outer ring road junction (55.12%). There was a significant difference in the compliance of two wheeler users to helmet in inner city junctions and outer city junctions. (p<0.001) (Table 4)

![Helmet Usage](image)

**Figure 1: Helmet usage among Riders and Pillions in different timings of the Day.**

Helmet usage in different timings of the day: Observations did not show much difference in usage of helmet on different timings of the day but the usage of helmet between riders and pillions in different timings of the day found to be significant (p<0.05) (Fig 1)

<table>
<thead>
<tr>
<th>Helmet usage</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riders</td>
<td>Pillions</td>
<td>Total</td>
</tr>
<tr>
<td>Helmet used</td>
<td>979</td>
<td>670</td>
</tr>
<tr>
<td>Helmet not used</td>
<td>183</td>
<td>28.06</td>
</tr>
</tbody>
</table>

**Table 5: Gender and Helmet usage among Riders and Pillions in Bangalore.**

Gender vs Helmet Usage: There was no much gender difference in helmet usage as a rider or pillions (table 4) but on the whole, total 3% more helmet usage was found among females (table 5).

Helmet usage in Bangalore before and after Mandatory helmet law for both riders and pillions.

Various studies done to assess the helmet usage among riders before the Mandatory helmet law showed that the prevalence of helmet usage was below 65% in the riders. After the Compulsory Helmet law was enforced in 2016 for riders and pillions, the helmet usage was more in two wheeler users in Bangalore.

**Discussion**

This is the first study to assess the helmet compliance in both riders and pillions in Bangalore after the enforcement of compulsory helmet law for riders and pillions in the year 2016 following Karnataka state Government Gazette notification in January 2016. Nearly 80% of riders wore helmet in Bangalore, where as a observation study done in Bangalore in 2010 by NIMHANS reported that nearly 60% of riders used helmet, showing the increase of 20% since last six years. Usage of helmet among pillions was assessed first time in Bangalore through this study, which reported nearly 70% of pillions using a Helmet.

Where as a study conducted in Delhi, an other city in India showed that 88.4% of pillions wore helmets following the enforcement.[9] This adds to the evidence that legislation and enhanced enforcement increases helmet use while the use decreases when the laws are repealed.[10]

In the current study it was found that helmet usage among riders and pillions was 15-20% more in inner city junctions compared to outer or peripheral junctions, which is similar to a study in Bangalore in 2010.[2] which might be due to highly vigilant police at inner roads compared to outer or peripheral roads.

In the current study it was found that the helmet usage of riders in weekdays 6% more than in the weekends which is similar to the study done in Bangalore in
2010 which is similar studies done in parts of other developing countries like which reported drop in helmet usage over weekends,[11],[12]

In this study it was observed that helmet wearing status among riders and pillions was more in the morning compared to afternoon and evening. which is similar to study done in Cambodia[13], and China.[11]

Not more than half of the riders and one fourth of pillions were using ISI Standard (brand) helmets and more than 30% of them had not strapped their helmets. Similar study done by NIMHANS in 2010 reported that more than half of the riders who used helmets were wearing construction hat like helmets, and many had not strapped helmets, which were more likely to fall off any time.[2] studies done in other low income countries showed that 54% were using non-standard helmets.[14] this might be due to increase cost of standard helmets or lack in strict enforcement of standard helmets. Making standard helmets available at affordable prices can increase helmet ownership while enhanced enforcement can encourage both helmet ownership as well as helmet use.[15]

Conclusion

Helmet compliance among riders and pillions was more after the enforcement of law in 2016 compared to 2010 with variations depending on the type of two wheeler user, timing of the day and type of roads. Compliance to standard helmets and to strapping of helmet was still poor.

Acknowledgement

To begin with it gives me immense gratitude and privilege to thank to Rajiv Gandhi Institute of Public Health and Centre for Disease Control. Rajiv Gandhi University of Health Sciences, Karnataka.

I extend my sincere thanks to Prof. Gangaboraiah, for his kind support and help rendered in statistical analysis.

Source of Funding: Self
Conflict of Interest: None

Institutional Ethics Committee Approval: Ethical approval obtained from the Rajiv Gandhi Institute of Public Health and Centre for Disease Control Ethics committee, Ref.No.IEC/PG/02/2017-18.

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A Comparative Study on Morbidity Status of Geriatric with Pre Geriatric Population in Rural Area, Tamil Nadu

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Abstract

Background: India has acquired the label of “an aging nation” with 7.7% of its population being more than 60 years old. Research on geriatric morbidity and associated factors are required to improve the delivery of health care to the elderly. The awareness should be initiated much in early years 45 to 59 years, but not many studies were available in India. Hence this study was an attempt to study the morbidity status of both groups which may serve as a baseline data and also help in planning the health services. The aim of the study was to find the morbidity pattern and depression status among geriatric and pre geriatric population in field practice area of Karpaga Vinayaga Institute of Medical Sciences, Kancheepuram, Tamilnadu, India.

Method: An observational study conducted in a rural area of kancheepuram district, Tamilnadu, India during the year 2016. 72 Study participants in geriatric and 97 in pre geriatric were enrolled and administered with pre tested, semi structured questionnaire after obtained informed consent. Descriptive statistics were calculated by using SPSS 18V.

Results: Among 72 geriatric people, common morbidity were arthritis (75%), Hypertension (63.9%), cataract (55.6%) and Diabetes (33.3%) which was statistically significant when compare to pre-geriatric(p<0.01). 61% of geriatric had reported more than one chronic illness. In pre geriatric groups, low back pain and other infections almost similar to geriatric which was not significant (p>0.05). The prevalence of depression was almost similar in both the groups.

Conclusions: There is high morbidity rate identified in this present study, similarly depression status was even increased in pre geriatric itself, this implies that need to develop pre geriatric health care services, counseling at primary health centre level at the early years of age.

Keywords: Geriatric, Pre geriatric, Morbidity, Depression.

Introduction

Aging is generally a process of deterioration in the functional capacity of an individual that results from structural changes, with advancement of age.1-3 It is not merely a matter of accumulating years but also a process of “adding life to years, not years to life.” The WHO Theme for the year 2012 was “Good health adds life to years”.1-3 The focus was how good health throughout life could help older men and women to lead a productive life and be a resource for their families and communities.3 India has acquired the label of “an aging nation” with 7.7% of its population being more than 60 years old.2,3 In India geriatric age group was classified as 60 years and above it may vary for other developed countries. The pre geriatric group defined like fifteen years before which was productive or non dependent age groups range from 45 years to 59 years. The inequality in morbidity prevalence among different population groups may not give a true picture because of the influence of subjectivity in measurement of morbidity. The morbidity point of view, at least 50% of the elderly in India have chronic diseases and approximately 35% - 40% percent of pre geriatric age (45 years to 59 years) group suffering with at least one non communicable disease now a days; similarly the prevalence of depression also higher in this age groups, which leads poor quality of life in their

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later stages. India made significance improvement in reducing mortality rate in all the age group but morbidity rate is still in query. Early surveillance of these people’s health needs and knowledge of their situation and circumstances are essential to provide cost effective services and to plan strategies for intervention and care. Hence this study attempted. The objective of this study was to compare morbidity pattern and prevalence of depression among geriatric and pre geriatric population in rural area, Tamil Nadu.

**Materials and Method**

The observational study was conducted among geriatric (> 60 years) and pre geriatric population (45 – 59 years) in rural field practice area, Pullipakkam, Kancheepuram district, Tamil Nadu during the year 2016. The ethical clearance was obtained from Institutional Ethical Committee (IEC) and permission was taken from college authorities to conduct this study. 72 study participants were in geriatric group and pre geriatric group 97 participants who were between age group 45 years to 59 years, were selected through Simple Random Sampling techniques and explained the purpose of this study.

Primary Data was collected by pre tested structured questionnaire with Center for Epidemiological Studies Depression Scale by interview method after obtain informed consent. The questionnaire contains the demographic variables such as age, gender, education, occupation, income, SES, employment, religion, marital status, type of family, family support, own property, crisis, social security, any loss etc. Morbidity pattern were assessed system wise and collected information regarding duration of illness, place and cost of treatment and travel distance for treatment. CESD was developed to assess the depression status among people in community based studies and it can be used for all age groups. It has 20 questions assessed within 2 weeks of depression, scores ranges from 0-3 and the total score will be classified as mild, moderate and severe depression.

The data thus obtained was entered and analyzed in SPSS 21v. Descriptive statistics frequency, percentages, mean and standard deviation were calculated. Proportion test was used to find the difference between groups at 5% level of significance.

**Results:** The total number of study subjects was 169. Among them, 72 were geriatric population and 97 were pre geriatric populations for comparison. There were 23.3% males and 76.7% female participants. Most of them were Hindus 91%, Christians 8.3% and Muslim 0.8%. 30.8% were illiterates and 33.8% studied upto primary school level. Among geriatric population 38.9% were widows. Most of them belonged to lower middle class (61.1%) according to Modified Kuppuswamy Classification followed by 30.6% in lower class.

Among geriatric study participants 69.4% of them were living in nuclear family 25 % in joint family and 5.6% extended family. Majority of elderly 80.6% had family support, 77.8% had own properties. Nearly more than 77% of them depend on either their son or daughter. Only 8.3% had Health insurance and 40 % of them were receiving pension whereas 55.6% of them had no social security. Among abuse, verbal abuse (38.9%) was more common than physical abuse (2.9%) and drug abuse (5.6%).

Table 1 shows comparison of morbidity pattern among geriatric and pre geriatric study participants. Hypertension (63.9%), Diabetes (33.3%), Coronary Heart Disease (16.7%), Cataract (55.6%), Osteoarthritis (75%), Asthma or COPD (5.6%), Peripheral Neuropathy (11.1%) were showing significant difference from Pre geriatric population (p<0.01). Where in Low back pain, Reproductive Tract Infection, Urinary Tract Infection, Cognitive Impairment, disability, bowl infections, skin diseases are not showing any difference(p>0.05). Among geriatric population 55.6% of them utilized Primary health centers and 38.9% Government hospitals.

Graph 1 explains the prevalence of depression between the groups, 51% mild and 49% moderate depression among elderly wherein 57% mild, 39% moderate and 4% severe depression among pre geriatric population which was statistically not significant (p>0.05).

**Table 1: Morbidity Pattern of Geriatric and Pre geriatric Population.**

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Geriatric N (%)</th>
<th>Pre geriatric N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>23 (63.9)</td>
<td>13 (13.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12 (33.3)</td>
<td>11 (11.3)</td>
<td>0.005</td>
</tr>
<tr>
<td>CHD</td>
<td>6 (16.7)</td>
<td>3 (3.1)</td>
<td>0.006</td>
</tr>
<tr>
<td>Cataract</td>
<td>20 (55.6)</td>
<td>15 (15.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>27 (75)</td>
<td>25 (25.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Asthma /COPD</td>
<td>2 (3)</td>
<td>11 (11.3)</td>
<td>0.03</td>
</tr>
<tr>
<td>Peripheral Neuropathy</td>
<td>4 (11.1)</td>
<td>2 (2.1)</td>
<td>0.02</td>
</tr>
<tr>
<td>Irritable bowl</td>
<td>2 (5.6)</td>
<td>14 (14.4)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Low Back Pain</td>
<td>19 (52.8)</td>
<td>50 (51.5)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Reproductive tract infection</td>
<td>0</td>
<td>2 (2.1)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>UTI</td>
<td>4 (11.1)</td>
<td>13 (13.4)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Skin Diseases</td>
<td>2 (5.6)</td>
<td>9 (9.4)</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>Cognitive Impairment</td>
<td>0 (1)</td>
<td></td>
<td>p&gt;0.05</td>
</tr>
</tbody>
</table>

*Multiple answers*
Graph 1: Bar diagram showing comparison of depression among geriatric and Pre geriatric population.

p>0.05

Discussion

The present study, the mean age group of geriatric population was 66.9 years and 49.6 years for pre geriatric which was similar in study by Barman et al but contradict to srinivas et al. Among the study subjects, 63.9% and 81.4% of them were females respectively almost similar to Anil et al study. 58.8% of them were illiterates as compared to 78% according to study conducted in Tamilnadu by Piramanayagam et al and Majority of them belonged to upper lower socio economic status according to Modified Kuppuswamy classification which was similarly observed in a study by Quadri et al.

This study revealed that elderly people aged 60 and above were having high burden of non-communicable disease like Hypertension, Diabetes, Cataract and Osteoarthritis. More cases have been reported or diagnosed because of increased literacy rate and frequent screening programs conducted and health education has been given to the study area regarding early diagnosis and prevention of complications. The most common morbidity in elderly was Arthritis (75%) and 63.9% of hypertension which was similarly observed in Anil et al. 55.6% of them had Cataract in our study, which was lower than a study conducted in Bihar (61.25%). However, higher in studies conducted in Andhra Pradesh (20%) and (40.16%) Aurangabad.

This study explained that nearly three or four times more prevalence rate with geriatric when compare to pre geriatric population regarding non communicable diseases such as diabetes, hypertension CHD, cataract and arthritis where in low back pain was almost equal to both the groups which shows that it might have started much early and preventive measures should also be done at the earliest. Peripheral neuropathy was high among geriatric which was almost similar to gill et al reproductive tract infection, urinary tract infection, skin diseases and respiratory infections shows higher among pre geriatric however not statistically significant. Not much studies were available for pre geriatric group, more emphasis are needed in this area.

Conclusion

The current study has highlighted increased prevalence of morbidity and depression status in both geriatric and pre geriatric populations. This explains to us the need to develop and strengthen the health care services in the developing countries like India and provide training to health care providers to manage the commonly existing health problems in the community. Social integration like guidance, counseling to the family members need to be provided. Health professionals need to be oriented regarding the needs.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: The ethical clearance was obtained from institutional ethical committee (EC No: 24/2016).

References


Relationship Between Diabetes and Periodontitis: A Systematic Review

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Abstract

Periodontal disease and Diabetes Mellitus are two chronic diseases that share a cause and effect relationship with each other. Various studies have found a positive relationship between both of them. Not only the disease progression has negative effect on each other but even the control of the disease and its treatment also causes substantial improvement in the overall disease condition. Hence, it is very important for both the physician and the dentist to understand the relation between periodontitis and diabetes mellitus for overall appraisal of the patients.

Keywords: Diabetes, gingivitis, periodontitis.

Introduction

Chronic periodontitis is defined as the inflammation of gingiva leading to apical migration of the epithelial attachment which further causes loss of connective tissue attachment and alveolar bone¹. It is a result of the interaction between the pathogens and the immune inflammatory response of the host². A new outlook that the periodontal disease has serious insinuation not only on the systemic health but also on the progression and management of systemic diseases which cautions the dental physician to treat periodontal diseases more proficiently in order to improvise systemic health of the patient.

Diabetes mellitus is a metabolic disorder caused due to either due to defective secretion or inactivity of insulin and is mainly characterized by hyperglycemia³. Various clinical and epidemiologic studies have confirmed a positive association between periodontal disease and type 2 diabetes. This article systematically reviews the relationship between periodontitis and diabetes mellitus.

Diabetes mellitus: Chronic hyperglycemia is the most important feature of diabetes mellitus which is supplementary associated with irreversible complications such as retinopathy, nephropathy, neuropathy, peripheral vascular diseases, cardiovascular diseases, delayed healing and periodontal diseases⁴.

The American Academy of Diabetes (1997), defined periodontal disease as the 6th complication of diabetes. Periodontal diseases, including the reversible form (gingivitis), are highly prevalent and affect up to 90% of adults worldwide⁵,⁶.

The Effect of Periodontitis on Diabetes: Recently many investigators have attempted to determine whether the presence of periodontal disease influences the control of diabetes or not. Grossi and others⁷ have suggested that effective control of periodontal infection in diabetic patients reduces the level of AGEs in the serum. The key factor is the level of glycemic control. Tervonen and Karjalainen⁸ followed diabetic patients and nondiabetic controls for 3 years and found that the level of periodontal health in diabetic patients with good or moderate control of their condition was similar to that in the nondiabetic controls and those with poor control had more attachment loss and were more likely to exhibit recurrent disease. This phenomenon has been pointed out by other researchers⁹. From this, it can be concluded that prevention and control of periodontal disease must be considered an integral part of diabetes control. Genetic factor, especially in certain populations such as Aboriginal peoples¹⁰ is also considered to be a very strong factor. There is a 10 time increase in periodontal disease in diabetic patients who have habit of smoking, reported by the study. Contribution of periodontal
infection in insulin resistance and progression of diabetes and its complications is biologically conceivable.

**Effect of Antimicrobial Periodontal Therapy on Metabolic Control of Diabetes:** Yoshihiro et al. in his study on effect of antimicrobial (minocycline) periodontal therapy on serum TNF – α concentration and subsequent metabolic control of diabetes, concluded that antimicrobial therapy notably reduces the number of microorganisms in periodontal pockets. After treatment the circulating TNF – α was appreciably reduced, HbA1c was also reduced significantly. Conventional (non-surgical) periodontal treatment is very effective in diabetic patients.

Certain studies have shown that, if scaling and root planning are combined with systemic doxycycline, there is a marked improvement in the periodontal status of the patient, that significantly improves the glycaemic control, as can be monitored by the glycosylated haemoglobin assay (HbA1c).

**Effect of Periodontal Therapy on Metabolic Control of Diabetes:** A successful periodontal therapy did not result in statistically significant changes in glycemic control in diabetic subjects as been observed in meta-analysis of 10 interventional studies of periodontal treatment. However, most of the studies were small as merely 456 subjects were included.

Larger studies with randomized clinical trials are needed to determine the benefit of periodontal therapy on glycemic control in patients with diabetes mellitus.

**The effects of diabetes on periodontal disease:** Most of the studies have focused on type 2 diabetes, although type 1 diabetes also shows an identical effect on risk for periodontitis. It is considered that the increased risk of periodontitis is dependent on the level of glycemic control. Thus, in well controlled diabetes with HbA1c of around 7% (53 mmol/mol) or lower, there appears to be little effect of diabetes on risk for periodontitis. Diabetes not only increases the prevalence of periodontitis but also affects the extent of periodontitis and the severity of the disease.

The exact mechanism by which diabetes affects periodontal tissues is not fully elucidated. An altered immune-inflammatory response to bacterial pathogens has been suggested. Hyperglycemia affects periodontal tissues by causing imbalance between reactive oxygen species and antioxidants thus resulting in increased oxidative stress, which may eventually lead to accumulation of Advanced Glycation End products (AGE). The binding of AGE to their receptors (RAGE) triggers intracellular events that enhance the production of proinflammatory cytokines, chemokines and cell adhesion molecules.

The contributing factors in increased inflammation of the periodontal tissues in diabetic patients are the accumulation of reactive oxygen species, oxidative stress, and interactions between advanced glycation end products (AGEs) in the periodontal tissues and their receptor (RAGE, the receptor for advanced glycation end products). In diabetes, the disrupted energy metabolism in the tissues in diabetes can lead to changes in apoptosis which can varies depending on the insulin dependency of the particular tissue.

Hyperglycemia results in the formation of AGEs which further make endothelial cells and monocytes susceptible to the production of proinflammatory cytokines. Both diabetes and chronic periodontal disease therefore induce an inflammatory response, whether through AGE or bacterial accumulation, respectively, leading to the production of inflammatory mediators which cause hard and soft tissue destruction. Some authors, have speculated that AGE accumulations in the gingival tissue lead to increased vascular permeability, greater breakdown of collagen fibres, and accelerated destruction of both non mineralized connective tissue and bone.

**Periodontal disease and Pre – diabetes:** Pre-diabetes as defined by impaired glucose tolerance was associated with a higher mean pocket depth and greater alveolar bone loss in men. A study of bleeding following probing in individuals who had not received a diagnosis of diabetes revealed that patients above the median bleeding percentage demonstrated an increased likelihood of impaired fasting glucose or impaired glucose tolerance.

**Hyperglycaemia and cellular stress:** The enhanced susceptibility to periodontal disease in diabetes appears to be primarily driven by an altered host response to the bacterial challenge. Indeed, hyperglycaemia has been shown to contribute to the development and progression of other diabetic complications by exerting stress on multiple cell types critical to the pathogenesis of these complications.

Reactive oxygen species also have more wide ranging effects including effects on bone formation and recently revealed pathways involving the interaction of reactive oxygen species, Wntsignalling and activation of FoxO transcription factors in the regulation of osteoblast
activity suggest another novel pathway which may link periodontitis and diabetes\textsuperscript{25}. Effects on other relevant cell types have also been reported, such as decreased collagen production and increased collagenolytic activity by gingival and periodontal ligament fibroblasts\textsuperscript{26} and a hyper-inflammatory response by oral epithelial cells\textsuperscript{27}.

In summary, the hyperglycaemic state in diabetes has a number of effects on cellular function relevant to the pathogenesis of periodontitis, but the relative contribution of these individual observations remains to be fully determined.

A number of studies focusing on osteoclastogenesis-related factors have reported elevated levels of RANKL in diabetes-associated periodontal tissues\textsuperscript{28}. These studies have proposed that hyperglycaemia may modulate the RANKL/OPG ratio in periodontal tissues and this would, at least in part, explain enhanced alveolar bone destruction in diabetes. Interestingly, the AGE-RAGE axis has also been suggested to contribute to osteoclastogenesis via increased RANKL expression and OPG down-regulation in various cell types\textsuperscript{29}. In summary, evidence from clinical studies of mediators of bone resorption as well as relevant animal models strongly suggest that altered alveolar bone homeostasis is an important pathway in the pathogenesis of periodontitis in diabetes and there is evidence that this pathway may be important in both T1DM and T2DM.

**Mechanisms of interaction between diabetes and periodontal diseases**: Because periodontal diseases are infectious diseases, research initially focused on possible differences in the subgingival microbial flora of patients with and without diabetes. In some early studies it was reported that the periodontal pockets of patients with diabetes showed higher proportions of certain bacteria in, while in later studies involving cultures generally revealed few differences in periodontally diseased sites of subjects with diabetes and those of subjects who did not have diabetes. Because the pathogens associated with periodontitis do not appear to differ greatly in people with and without diabetes, researchers have focused attention on potential differences in the immunoinflammatory response to bacteria between people with diabetes and those without diabetes.

The role of neutrophils in the pathogenesis of periodontitis in diabetic patients has been analysed directly using numerous assays of neutrophil function. Although the dogma is that neutrophil function in periodontitis and diabetes is defective, the evidence obtained has been variable likely due to the variety of assays employed and the technical challenges in quantifying neutrophil function ex vivo\textsuperscript{30}. Importantly, levels of the neutrophil-derived enzyme b-glucuronidase and the neutrophil chemotactic factor IL-8 are depressed in chronic periodontitis patients with T2DM as compared to systemically healthy chronic periodontitis patients which might suggest compromised gingival neutrophil-mediated immune responses in diabetes\textsuperscript{31}.

However, other studies of IL-8 expression in gingival tissue and in GCF did not replicate these findings\textsuperscript{32}. Studies in diabetic rats have provided evidence of compromised gingival neutrophil function in vivo and in vitro\textsuperscript{33} and studies in diabetic mice also suggest changes in gingival neutrophil function\textsuperscript{34}.

Recent evidence suggests that T-cells, which accumulate in insulin sensitive tissues, are important in metabolic disturbances associated with obesity and diabetes, possibly through their ability to regulate macrophage function\textsuperscript{34}. T-cell subsets are diverse and plastic and their function is determined by the local cytokine milieu. However, although there is a substantial role for altered balance of Th1/Th2 cells in the pathogenesis and progression of periodontitis, there is no direct information about its role in periodontitis patients with diabetes.

In summary, evidence for a role of altered monocyte and T-cell function in diabetic patients with periodontitis is limited. The incidence and prevalence of diabetes mellitus have significantly increased in worldwide recent decades, mainly because of the increase in type 2 diabetes mellitus (T2DM). Long-term diabetes results in vascular changes and dysfunction, and diabetic vascular complications are the major cause of morbidity and mortality in diabetic patients. Therefore, the development of better treatments and novel prevention strategies for type 2 diabetes mellitus is a matter of great urgency.

**Conclusion**

Synthesis of existing and future studies will be helpful in elucidating these relationships and provide the direction for public health policies aimed at reducing their burden on the general public.

**Conflict of Interest**: Nil

**Source of Funding**: Self

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**References**


Sirtuins as Novel Protein Markers in Diabetes and Periodontitis

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Abstract

Sirtuins are a highly conserved family of proteins. The role of Sirtuins in diabetes and inflammation is well established but literature revealing sirtuins role in Periodontitis is very scarce. The present article demonstrates the role of inflammation in diabetes, inflammation and periodontitis.

Keywords: Inflammation, Periodontitis, Sirtuins.

Introduction

Sirtuins are a highly conserved family of proteins. A set of four genes, SIR1–4, replaced the name “MAR” with “SIR”. Sirtuins belong to class III histone deacetylase family of enzymes. There are 7 mammalian sirtuins with distinct protein structure, varied subcellular location, and unique functional properties.¹

The main function of these enzymes is to deacetylate the various proteins that regulate a wide variety of cellular processes regarding protein, carbohydrate and lipid metabolism, mitochondrial homeostasis and programmed cell death mechanisms including autophagy and apoptosis. Among them, SIRT 4 and-6 have an additional ADP-ribosyltransferase activity that is also important in telomere maintenance, genomic stability and longevity.² Sirtuins remove the acetyl groups from lysine residues of histones, transcription factors specific enzymes such as manganese superoxide dismutase and peroxisome proliferator activated receptor–γ (PPR-γ) -coactivator-1α (PGC-1α) and other miscellaneous proteins that have important roles in the cellular homeostasis. As a consequence of the deacetylation, nicotinamide and 2’O-acetyl-ADP ribose are generated.³

Sirtuins & Periodontal Disease: Most of the connective tissue destruction-taking place in periodontal disease results from the interaction of bacteria and their products with mononuclear cells. One possible mechanism to explain as to why diabetics have more severe periodontal disease is that glucose mediated AGE accumulation would affect migration and phagocytic activity of mononuclear and polymorphonuclear phagocytic cells resulting in establishment of more pathogenic subgingival flora.⁴ Evidence has consistently indicated that diabetes is a risk factor for increased severity of gingivitis and periodontitis. Conversely, periodontitis may be a risk factor for worsening glycemic control among patients with diabetes and may increase the risk of diabetic complications. Periodontitis may initiate or propagate insulin resistance in a manner similar to that of obesity, by enhancing activation of the overall systemic immune response initiated by cytokines.⁵

One recent report also demonstrated that the decreased levels of SIRT 3 in the skeletal muscle of streptozotocin (STZ)-induced diabetic mice and high fat-diet-induced obese mice were an important component of the pathogenesis of type 2 diabetes mellitus. SIRT 3 knockout mice exhibited decreased oxygen consumption and increased oxidative stress due to mitochondrial dysfunction via hyperacetylation of complex I and III in OXPHOS, and these factors led to JNK activation and impaired insulin signaling.⁶ In addition, SIRT 3 was shown to decrease the function of a component of complex II via the deacetylation of SDH. Therefore, agents that increase SIRT 3 activity or expression could therefore potentially reverse at least some of the adverse effects of type 2 diabetes mellitus.⁷

Periodontal disease is universally present in human beings. It is the infectious disease of the periodontium. There is an activation of immune-inflammatory mechanisms within the local periodontal tissues which
further causes destruction of collagen and alveolar bone. Clinically, patients present with redness and bleeding of the gingiva, detachment of the soft tissues from the teeth to produce periodontal pockets, and radiographic evidence of loss of alveolar bone height.\(^8\) Progression of disease results in increased tooth mobility, loss of masticatory function, pathological migration of teeth resulting in poor esthetics and tooth loss.

The disease varies in severity from gingivitis to aggressive forms of early onset periodontitis. Gingivitis is a reversible condition if it is controlled within time. It is evident in several forms all of which display early and rapid destruction of the periodontium and management becomes difficult. The issue of a genetic component to the disease experience of different individuals must be taken into consideration. First paradigm explains that all individuals are equally susceptible to one or several pathogenic bacteria; a second paradigm shows that all bacteria are equally dangerous and that host vulnerability determines onset of disease; or a combination of the above. The accumulation of microbial plaque and gingivitis may proceed to periodontitis resulting from immune and inflammatory response which in turn are influenced by his genetic constitution.\(^9\) Bacteria cause inflammation and ultimately periodontal tissues breakdown. Patient’s genetics and environmental modifiers, such as smoking along with bacteria determine the magnitude and quality of tissue changes. The net result of those factors produces clinical severity of disease.\(^10\)

DNA methylation, histone modification and RNA-associated silencing (micro-RNA) are three different types of epigenetic modifications. Immune response of a person makes it susceptible to periodontitis. Decrease in number of neutrophils also increases the susceptibility of infections.\(^11\)

Several environmental factors give rise to the progression of periodontitis. It has been found that alterations in DNA methylation status as a result of environmental stressors begin before birth though some epigenetic marks are potentially reversible.\(^12\) In a study, few DNA were extracted from the gingivae of 108 systemically healthy non periodontitis patient, blood samples from 110 patients with periodontitis and neoplastic tissues from 106 breast cancer patients and then all were tested for the methylation of E-cadherin and cyclo-oxygenase. It was found that in periodontitis patients there was 25% and 19% detection rate of hypermethylation of E cadherin and cyclooxygense and nothing was found in systemically healthy non periodontitis patient (92).\(^13\) Increased level of IL1 and IL1 gene polymorphism increased the susceptibility of individuals to periodontitis. Epigenetics and environmental factors such as diet, diabetes, aging, gender, BMI, race, smoking etc. changed the expression of DNA transcription.

Ari et al. (2016)\(^14\) found higher prevalence of the periodontal disease in India. Authors concluded that DNA methylation and histone modifications occur in the oral mucosa in response to bacteria and inflammatory process. Thus, identification of the genetic factors and epigenetic variations in periodontitis is useful in developing pioneering therapeutic interventions.

The epigenetic changes on pro-inflammatory mediators in periodontal disease have been associated to a number of environmental stimuli such as smoking and nutrition, and the oral bacteria themselves. Iacopino et al (2010)\(^15\) suggested that these changes in the humans can assist in bacterial colonization, increase inflammatory destruction and also offer bacteria with increased levels of carbohydrate for metabolism. They found that these findings have implications for the method used to diagnose periodontal disease and to identify patients at risk. Authors concluded that types of bacteria and epigenetic changes in the periodontal tissues along with bleeding and pocket depths, provides a new approach in management of periodontal problems.\(^16,17\)

Authors showed a lower level of DNA methylation of genes expressing proinflammatory cytokines in chronic or aggressive periodontitis patients as compared to those with a healthy periodontium, resulting in over-expression of these mediators in inflamed tissues.\(^18\)

Epigenetic changes demands excessive study to understand if the methylation status in chronic periodontitis could turn out similar to that in healthy individuals with no history of periodontitis, following an effective periodontal therapy, maintenance, and compliance.\(^19\)

**Sirtuins & diabetes mellitus:** Single nucleotide polymorphisms associated with obesity and Type 2 diabetes have been identified in the SIRT\(^1\) and SIRT\(^3\) genes, suggesting that sirtuins may play a role in the development of these conditions in humans. SIRT 3 has beneficial effects on glucose metabolism by increasing insulin sensitivity and decreasing serum glucose. Hirschey et al.\(^20\) recently demonstrated that high-fat diet feeding induces hepatic mitochondrial protein hyperacetylation in mice and down regulation of the major mitochondrial protein deacetylase SIRT 3. According to the results of this study, increased obesity, insulin resistance, hyperlipidemia, and steatohepatitis are prominent in mice lacking SIRT 3 compared to wild-type mice.\(^20\)
The diagnostic tools and therapeutic approaches, the pathophysiology of diabetes mellitus and cellular defensive mechanisms are unknown. The maintenance of cellular homeostasis requires a well-organized network between glucose, amino acid and lipid metabolism. Sirtuins are a group of NAD+ dependent proteins that are involved in cellular homeostasis due to their deacetylating activity. Of these, sirtuin 1, -3 and -4 have been the most extensively investigated.21

Another important sirtuin involved in glucose metabolism is SIRT4. One of the target enzymes of SIRT4 is glutamate dehydrogenase (GDH) which converts glutamate to α-ketoglutarate in the mitochondrion. SIRT4 inhibits amino-acid induced insulin secretion by repressing GDH. During the fasting state, SIRT4 is inhibited in liver. This induces gluconeogenesis from amino acids and fats and the inhibition of SIRT4 allows insulin secretion from β-cells. However, SIRT4 is activated and the reactions mentioned above are reversed in the fed state.22

It is shown that SIRT3 induces ketogenesis by activating acetylCo-A synthetase in mammalian cells. Hence, one might expect that SIRT3 may play an important role in the increased ketogenesis observed during diabetes mellitus. SIRT1, -3 and -4 play an important role in the pathogenesis of hepatosteatosis which is commonly seen in diabetic patients. When taken together, inhibition of SIRT1 and 3 and/or activation of SIRT4 might be attributed to this heightened risk of hepatosteatosis in the progression of diabetes mellitus. There was an association between the SIRT5 and SIRT6 gene variants with atherosclerosis.23

The low level of sirtuins may lead to DM. Recent studies have shown that therapy targeted at activating SIRT 3 have beneficial effect in patients with DM. Sirtuin 1 has shown to suppress bone break down through the direct activation of FOXO proteins through their deacetylation. The sirtuin has been shown to activate SOD2, resulting in the diminution of oxidative stress and the inhibition of inflammation-mediated bone loss. So, it can be presumed that it might play an important role as therapeutics for inflammation induced periodontal bone loss.24

Caton et al25 analyzed changes in SIRT3 expression in experimental models of type 2 diabetes and in human islets isolated from type 2 diabetic patients. SIRT3 expression was markedly decreased in islets isolated from type 2 diabetes patients, as well as in mouse islets or INS1 cells incubated with IL1β and TNFα. SIRT3 knockdown in INS1 cells resulted in lowered insulin secretion, increased beta cell apoptosis and reduced expression of key beta cell genes. SIRT3 knockdown also blocked the protective effects of nicotinamide mononucleotide on proinflammatory cytokines in beta cells. The deleterious effects of SIRT3 knockdown were mediated by increased levels of cellular ROS and IL1β. Decreased beta cell SIRT3 levels could be a key step in the onset of beta cell dysfunction, occurring via abnormal elevation of ROS levels and amplification of beta cell IL1β synthesis. Strategies to increase the activity or levels of SIRT3 could generate attractive therapies for type 2 diabetes.

SIRT3 expression in skeletal muscle is decreased in models of type 1 and type 2 diabetes and regulated by feeding, fasting, and caloric restriction. SIRT 3 knockout mice exhibit decreased oxygen consumption and develop oxidative stress in skeletal muscle, leading to JNK activation and impaired insulin signaling. This effect is mimicked by knockdown of SIRT3 in cultured myoblasts, which exhibit reduced mitochondrial oxidation, increased reactive oxygen species, activation of JNK, increased serine and decreased tyrosine phosphorylation of IRS-1, and decreased insulin signaling. Thus, SIRT3 plays an important role in diabetes through regulation of mitochondrial oxidation, reactive oxygen species production and insulin resistance in skeletal muscle.26

SIRT 3 might play an important role for the enhanced ketogenesis seen during diabetes. SIRT 1, 3 and 4 play an essential role in the pathogenesis of hepatosteatosis which is commonly seen in diabetic patients. When taken together, inhibition of SIRT 1 and 3 and/or activation of SIRT 4 might be attributed to this heightened risk of hepatosteatosis in the progression of diabetes.

Sirtuins & Inflammation: Metabolism is known to influence aging in rodents and a number of other species of organisms. Several lines of evidence suggest that benefits of calorie restriction are mediated through sirtuins. The most convincing link between aging and sirtuins was established after the effects of aging on NAD+ were studied. In addition to its role as a cofactor in many enzymatic processes, NAD+ regulates key metabolic processes. Sirtuins are NAD+ sensors. SIRT1 and SIRT6 are known aging related sirtuins. Evidence suggests that NAD+ levels are decreased in aging; NAD+ replenishment in aged mice restores mitochondrial homeostasis in a SIRT1 dependent manner. SIRT6 deficient mice show signs of accelerated aging and early death from hypoglycemia. Inflammation defends against severe stress responses and if successful must resolve. SIRT1, known as a major metabolic regulator, epigenetically reprograms inflammation by altering histones and transcription factors such as NFXB.
and AP1. Mounting evidence supports that inflammation sequentially links immune, metabolic, and mitochondrial bioenergy networks; sirtuins are essential regulators of these networks.27

**Several general concepts are relevant to the role of sirtuins in inflammation:**

1. The requirement for NAD+ as cofactor supports sirtuin function in redox and bioenergy sensing.
2. While sirtuin-dependent deacetylation activities dominate our present understanding of the functional roles of sirtuins in inflammation, other attributes such as ADP ribosylation (SIRT4) and removal of succinyl, malonyl, and glutamyl groups from lysine residues (SIRT5) may be important in inflammation Acetyl CoA levels and its support of histone-acetylation and other proteins are linked to nutritional status of cell. Fasted or survival state of cell utilizes protein deacetylation with SIRT. SIRT effects on inflammation can be a double edged sword, since low levels accentuate early acute inflammation-related autotoxicity by increasing NFκB RelA/p65 activity, and prolonged increases in SIRT1 during late inflammation are associated with immunosuppression.28

**Conclusion**

Sirtuins are important proteins which have shown significant role in inflammation, periodontitis and diabetes mellitus. Thus assessment of their level in humans may provide useful information regarding status of periodontium and level of blood glucose.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** It has been taken from Institutional Ethical Committee.

**References**


Hypertension Knowledge and Hypertension Caretaking Behavior of Urban Residents in Pondicherry Region, India

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Abstract
Hypertension is a major health problem in India. Prevention and control of hypertension is urgent need of the hour. The knowledge and awareness on cause of hypertension enables one to find the ways and means of control the hypertension. This paper deals with hypertension knowledge and hypertension caretaking behavior of the urban residents in Pondicherry region. It outlines the indicators on hypertension knowledge and hypertension caretaking behavior and such indicators are quantified with the help of 5 point rating scale. This paper concludes with some interesting findings along with policy suggestions.

Keywords: hypertension knowledge, medication, hypertension care, hypertension control.

Introduction
The study of hypertension is very important and it is a process of increase in the level of normal blood pressure. According to Cunha (2011), hypertension occurs consequent upon over pressure on main arteries and it is a public health problem. The normal blood pressure should be in the range of 120-80 and it also in the range of 140–90. It could be noted that high blood pressure is major health problem and it is called hypertension. In general high blood pressure is caused by aging, excess intake of salt content in the food, lack of moment in the life, genetic factors and occurrence of new diseases in the body.

Puska et al. (2003), report that sedentary life is the outcome of economic growth, modernization and urbanization and such situation results in hypertension. The high blood pressure is associated with obesity and it is the process of accumulation of body fat. Hence there is a need to reduce the consumption level of fat with a view to reduce the obesity condition. According to Stabouli et al. (2011), hypertension occurrence at the early age is associated with overweight and excessive salt intake in food. Moreover excessive intake of alcohol can raise the blood pressure.

Review on the Subject: Bussotti M, and Sommaruga M (2018) report that anxiety and depression are frequent disorders in patients with pulmonary arterial hypertension, but despite this only less than one-fourth of them is treated. Eghbali-Babadi M, Khosravi A, Feizi A, and Sarrafzadegan N (2017), bring to attention that trends in prevalence, awareness, treatment and control of hypertension and the effect of expanded chronic care model on control, treatment and self-care and lack of information about hypertension leads to failure in detection, treatment and reduced estimation of this disease effects. Joseph N1, Chiranjeevi M, Sen S, Singh P1, Saini M, and Beg S (2016), determine awareness, self-management practices and compliance with treatment among hypertensive patients.

Gu J1, Zhang XJ, Wang TH, Zhang Y, and Chen Q (2014) conducted a study on hypertension knowledge, awareness, and self-management behaviors of 3,328 hypertensive patients, including 1,935 females and 1,390 males with a mean age 70.6 years in China. The authors observed that patients who knew that ‘high blood pressure is related to salt intake and were willing to receive regular health education were less likely to fail in hypertension control. The authors concluded that patients who visited clinics because of fear of complications and visited medical institutions other than community health centers for hypertension were more likely to fail in hypertension control.

Aly Z et.al., (2009), conducted a study on 398 individuals with reference to hypertension and stress and the overall awareness of the study population regarding stroke was shown to be inadequate by this study and knowledge was significantly greater in participants of younger age and a higher level of education. Lam AY (2008), examined the medication consultations, hypertension control, awareness, and treatment among
elderly Asian community dwellers. The most prevalent non-adherent behavior reported was self-adjustment of medication dosing. The authors reported that among 65 participants who received HTN medication-related advice, majority of them reported changes in medication therapy and showed significant improvement in BP at six months before and after the self-report. HTN awareness/treatment rates were low in the entire population.

Method and Materials

This study deals with urban residents hypertension knowledge and hypertension care behavior in Pondicherry region. The researcher has selected the 200 urban residents in Pondicherry region, representing different occupational groups. The relevant data are collected from them with the help of interview schedule method, focusing information on hypertension knowledge and hypertension care behavior. The collected qualitative data are quantified with the help of 5 point rating scale. The data interpretation has been done with the help of mean, t test ranking method and Anova two way analysis.

Findings

This section deals with the respondents’ rating on knowledge on hypertension. It can be assessed with the help of 17 factors on a 5 point rating scale. These indicators are individually measured and analyzed. The age wise variation and occupation wise variation among the hypertension patients has been observed.

Table 1: Age Wise Respondents’ Rating on Knowledge on Hypertension.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Score</th>
<th>Variables</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing normal values of blood pressure as 120/80 mm Hg</td>
<td>2.67</td>
<td>Over weight is a risk factor for hypertension</td>
<td>3.97</td>
</tr>
<tr>
<td>Increase in blood pressure above 140/90 mm Hg called hypertension</td>
<td>3.67</td>
<td>Regular physical exercise reduces hypertension</td>
<td>2.75</td>
</tr>
<tr>
<td>Hyper tension progress along with the age</td>
<td>2.29</td>
<td>More salt consumption increases hypertension</td>
<td>1.90</td>
</tr>
<tr>
<td>Both sexes have equal chance of developing hypertension</td>
<td>3.29</td>
<td>Medication can control hypertension</td>
<td>2.56</td>
</tr>
<tr>
<td>Hypertension is treatable condition</td>
<td>2.89</td>
<td>Hypertension can lead to life threatening condition</td>
<td>3.42</td>
</tr>
<tr>
<td>Risk of developing hypertension due to family inheritance</td>
<td>3.79</td>
<td>Stress causes high blood pressure</td>
<td>2.98</td>
</tr>
<tr>
<td>Ageing is greater risk of hypertension</td>
<td>3.21</td>
<td>High work expectations cause blood pressure</td>
<td>3.88</td>
</tr>
<tr>
<td>Smoking is a risk factor for hypertension</td>
<td>3.56</td>
<td>Hypertension caused by excessive stress and fear</td>
<td>4.10</td>
</tr>
<tr>
<td>Eating fatty foods is a risk factor for hypertension</td>
<td>2.45</td>
<td>Average</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Source: Computed from primary data

<table>
<thead>
<tr>
<th>Age Group Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-40 years</td>
<td>3.65</td>
</tr>
<tr>
<td>40-45 years</td>
<td>3.40</td>
</tr>
<tr>
<td>45-50 years</td>
<td>3.24</td>
</tr>
<tr>
<td>50-55 years</td>
<td>2.99</td>
</tr>
<tr>
<td>55-60 years</td>
<td>2.41</td>
</tr>
<tr>
<td>Average</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Table 2: Occupation Wise Respondents’ Rating on Knowledge on Hypertension.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Employee</td>
<td>3.53</td>
</tr>
<tr>
<td>Private Employee</td>
<td>3.42</td>
</tr>
<tr>
<td>Business</td>
<td>3.05</td>
</tr>
<tr>
<td>Farmers</td>
<td>2.90</td>
</tr>
<tr>
<td>Agriculture Labours</td>
<td>2.81</td>
</tr>
<tr>
<td>Average</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Source: Computed from primary data
Hypertension Care

This section deals with the respondents' rating on hypertension care. It can be assessed with the help of 27 factors on a 5 point rating scale. The hypertension care has been measured and analyzed. Based on the analysis age wise variation and occupational wise variation has been observed among the hypertension patients with respect to their level of hypertension care.

Table 3: Age Wise Respondents’ Rating on Hypertension Care.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Score</th>
<th>Variables</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs for increased blood pressure must be taken every day</td>
<td>2.14</td>
<td>Reducing worry and anxiety in life</td>
<td>3.36</td>
</tr>
<tr>
<td>Individuals with increased blood pressure must take their medication only when they feel ill</td>
<td>3.55</td>
<td>Discussing worries with friends</td>
<td>2.35</td>
</tr>
<tr>
<td>Individuals with increased blood pressure must take their medication throughout their life</td>
<td>3.13</td>
<td>Checking blood pressure regularly</td>
<td>2.94</td>
</tr>
<tr>
<td>Individuals with increased blood pressure must take their medication in a manner that makes their feel good</td>
<td>3.83</td>
<td>Taking the recommended dosage of medicine</td>
<td>2.41</td>
</tr>
<tr>
<td>Best meat for individuals with increased blood pressure is white meat</td>
<td>1.83</td>
<td>Reduction in consumption of saturated fat</td>
<td>1.99</td>
</tr>
<tr>
<td>Individuals with increased blood pressure must eat fruits and vegetables frequently</td>
<td>3.64</td>
<td>Practicing yoga therapy</td>
<td>4.05</td>
</tr>
<tr>
<td>Exercise to reduce weight</td>
<td>2.20</td>
<td>Strict diet control</td>
<td>3.94</td>
</tr>
<tr>
<td>Follow doctor advice regarding blood pressure control</td>
<td>3.47</td>
<td>Taking low cholesterol food</td>
<td>1.91</td>
</tr>
<tr>
<td>Trying to control stress</td>
<td>2.28</td>
<td>Leading peaceful life</td>
<td>2.48</td>
</tr>
<tr>
<td>Avoiding smoking</td>
<td>3.02</td>
<td>Patients with hypertension should consume antihypertensive medication every day</td>
<td>2.86</td>
</tr>
<tr>
<td>Following a low salt diet</td>
<td>3.21</td>
<td>Changing lifestyle and maintaining a healthy weight will help prevent hypertension</td>
<td>3.70</td>
</tr>
<tr>
<td>Walking frequently</td>
<td>3.27</td>
<td>Consume a diet rich in calcium and magnesium</td>
<td>2.55</td>
</tr>
<tr>
<td>Taking care during the time of symptoms of high blood pressure</td>
<td>3.89</td>
<td>Consume diet rich in potassium</td>
<td>4.15</td>
</tr>
<tr>
<td>Following a low fat diet</td>
<td>3.76</td>
<td>Average</td>
<td>3.03</td>
</tr>
</tbody>
</table>

Source: Computed from primary data.

Age Group Score

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-40 years</td>
<td>3.49</td>
</tr>
<tr>
<td>40-45 years</td>
<td>3.33</td>
</tr>
<tr>
<td>45-50 years</td>
<td>3.16</td>
</tr>
<tr>
<td>50-55 years</td>
<td>2.86</td>
</tr>
<tr>
<td>55-60 years</td>
<td>2.32</td>
</tr>
<tr>
<td>Average</td>
<td>3.03</td>
</tr>
</tbody>
</table>

Source: Computed from primary data

Table 4: Occupation Wise Respondents’ Rating on Hypertension Care

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Employee</td>
<td>3.51</td>
</tr>
<tr>
<td>Private Employee</td>
<td>3.39</td>
</tr>
<tr>
<td>Business</td>
<td>3.20</td>
</tr>
<tr>
<td>Farmers</td>
<td>2.82</td>
</tr>
<tr>
<td>Agriculture Labours</td>
<td>2.26</td>
</tr>
<tr>
<td>Average</td>
<td>3.03</td>
</tr>
</tbody>
</table>

Source: Computed from primary data
Discussion

It could be seen clearly from the above discussion that the respondents have high level knowledge on hypertension by citing the indicators that hypertension caused by excessive stress and fear, over weight is a risk factor for hypertension, high work expectations cause blood pressure, risk of developing hypertension due to family inheritance, increase in blood pressure above 140/90 mm hg is called hypertension and smoking is a risk factor for hypertension as per their secured a mean score above 3.50 on a 5 point rating scale. The respondents have moderate level knowledge on hypertension by citing the facts that hypertension can lead to life threatening condition, both sexes have equal chance of developing hypertension, ageing is greater risk of hypertension, stress causes high blood pressure, hypertension is treatable condition, regular physical exercise reduces hypertension, knowing normal values of blood pressure as 120/80 mm hg and medication can control hypertension as per their secured a mean score in the range of 2.5 to 3.5 on a 5 point rating scale. The respondents have low level knowledge on hypertension by citing the incidences that eating fatty foods is a risk factor for hypertension, hypertension progress along with the age and more salt consumption increases hypertension as per their secured means score below 2.5 on 5 point rating scale.

The findings of respondents’ rating on hypertension care behavior reveal the following facts. The respondents have high level hypertension care by citing the practices that consume diet rich in potassium, practicing yoga therapy, strict diet control, taking care during the time of symptoms of high blood pressure, individuals with increased blood pressure must take their medication in a manner that make them feel good, following a low fat diet, changing lifestyle and maintaining a healthy weight will help prevent hypertension, individuals with increased blood pressure must eat fruits and vegetables frequently and individuals with increased blood pressure must take their medication only when they feel ill as per their secured a mean score above 3.50 on a 5 point rating scale. The respondents have moderate level hypertension care practices by citing the facts that follow doctor advice regarding blood pressure control, reducing worry and anxiety in life, walking frequently, best meat for individuals with increased blood pressure is white meat, individuals with increased blood pressure must take their medication throughout their life, avoiding smoking, checking blood pressure regularly, patients with hypertension should consume antihypertensive medication every day and consume a diet rich in calcium and magnesium as per their secured a mean score in the range of 2.5 to 3.5 on a 5 point rating scale. The respondents have low level hypertension care by citing the practices that leading peaceful life, taking the recommended dosage of medicine, discussing worries with friends, trying to control stress, exercise to reduce weight, drugs for increased blood pressure must be taken every day, reduction in consumption of saturated fat, taking low cholesterol food and following a low salt diet as per their secured a mean score below 2.5 on 5 point rating scale.

Conclusion

It is observed from the study that hypertension knowledge and hypertension caretaking behavior of urban residents in Pondicherry region, India has been influenced by occupational status and educational status of the urban residents. It could be noted that higher the occupational status and educational status, higher the hypertension knowledge and hypertension caretaking behavior and the vice versa. In general old age people need more attention towards their hypertension care behavior.

Suggestions

There is a need to increase the knowledge on hypertension awareness among the old age group respondents, agricultural labor respondents, primary level educated respondents, and female respondents through health awareness generation programmes.

Efforts could be made to increase the hypertension care among the old age group respondents, low level age group respondents and agriculture labor respondents through public health programmes.

Efforts should be made to improve the hypertension knowledge among the women through health workers programmes.

Conflict of Interest: In this study, data collection from the respondents is a laborious work. Many hypertension patients are not in a position to explain their hypertension care behavior and hypertension awareness. In such situation, the researcher faced a lot of difficulties in data collection.

Source of Funding: The author made use of his own money in conducting research, data collection, data analysis and report preparation.

Ethical Clearance: It is a social science oriented method of investigating the hypertension patients and there is no question of ethical clearance.
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Attitude Towards Prescribed Drugs in a Rural Training Center of Tertiary Care Hospital in Puducherry: From Patients Perspective

T. Prasad¹, J. Arun Daniel¹

¹Assistant Professor, Department of Community Medicine, AVMC.

Abstract

Background: Patient’s information regarding the usage of drugs isn’t just of indispensable significance in the anticipation of medication related issues, yet in addition a central point that impacts treatment achievement and thus if given, it offers an open door for one to accomplish a full wellbeing potential.

Objective: To reason out patients perspective regarding prescribed drugs and injections.

Materials and Method: The study was carried out among patients attending rural training center at a tertiary hospital in Puducherry. Two hundred and sixty patients, who gave their informed consent, were enrolled by consecutive sampling method. A prevalidated questionnaire regarding knowledge, attitude about prescribed drugs and injections was filled up. Data was analyzed with suitable statistical tests.

Results: 231(88.8%) patients took medications as prescribed by doctors. 226(86.9%) patients preferred low cost drugs since most of them came from low socio-economic status and 140(53.8%) patients were satisfied with medications without injections. Regarding knowledge, 73.8% of patients knew about the adverse effects of prescribed drugs (p value<0.01). 168(64.6%) of patients knew about the adverse effects of injections (p value<0.01) and hence only 80(30.8%) of them requested for injections.

Conclusion: Patients had a positive attitude and knowledge regarding prescribed drugs and injections, while further awareness is needed about prescribed drugs and injections focusing on the patients general education and knowledge adverse drug events to empower them to choose healthier therapies.

Keywords: Attitude, drugs, injections, patients.

Background

Patient’s information regarding the usage of drugs isn’t just of indispensable significance in the anticipation of medication related issues, yet in addition a central point that impacts treatment achievement and thus if given, it offers an open door for one to accomplish a full wellbeing potential. Their insights about the medicine can reflect the communication amongst doctors and patients and the social and dialect contrasts existing between them. Poor comprehension of medicines and trouble in perusing names isn’t phenomenal and may prompt an adverse drug event (ADE). ADEs can be caused by the medications themselves, or result from related factors, for example, incorrect medicines, supply and monitoring of drugs.

Worldwide, ADEs related hospital admissions are on the increase annually and occurs irrespective of inpatients or outpatients. One of the important factor that causes adverse drug events being inadequate basic health literacy among the other various factors. The American Medical Association (AMA) defines health literacy as ‘A constellation of skills, including the ability to perform basic reading and numerical tasks required to function in the health care environment. Patients illiteracy and prescriptions with multiple drugs are more prone for blunders while inadequate or complex instructions adds to the complexity of the adverse drug events.

Doctors’ knowledge and practices regarding therapeutic injections and drugs has been studied in developing countries. The attitudes of patients to injections have
been reported for migrant farm workers in the USA and among Tanzanians. There are very few published data on the views of patients toward prescribed drugs and injections in India, and very little information on this from other places in the developing world. Hence this study was designed to reason out patients perspective regarding prescribed drugs and injections.

Method and Methodology

• **Study Design:** Descriptive Study
• **Study Area:** Rural Health Training Center, Puducherry.
• **Study Duration:** 1 Month
• **Study Population:** Totally Around 260 Patients Selected By Consecutive Sampling Method (On An Average 10 Patients Per Day)

**Data Collection Procedure:** Data will be collected by trained investigator during the scheduled duration of study. Patients knowledge and attitude towards the use of drugs and injections prescribed by doctors will be assessed by pre-designed and pre-tested proforma. Information regarding patients socio-demographic profile will also be recorded.

**Statistical Analysis:** The data will be recorded and analyzed using MS excel. Patient’s attitude and knowledge towards the use of drugs and injections prescribed will be expressed in percentages.

**Results:** Total 260 patients were included in the study among which females were 156 (60%) and males were 104 (40%); mean age group of the patients was 40.79 years. Among the 260 patients, 241(92.6%) patients were married. 192 (73.8%) were old patients and 68 (26.2%) were new patients visiting the health centre. Regarding the education status, 93(35.8%) patients had no formal education and only 46 (17.7%) patients had secondary school education and above. Most of them, around 223 (85.7%) hail from poor and middle socio-economic status according to modified B.G.Prasad’s socio-economic classification. 10

Table 1: Educational status of the patients.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Education status</th>
<th>No of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No formal education</td>
<td>93 (35.8%)</td>
</tr>
<tr>
<td>2</td>
<td>Primary school education</td>
<td>56 (21.5%)</td>
</tr>
<tr>
<td>3</td>
<td>High school education</td>
<td>65 (25%)</td>
</tr>
<tr>
<td>4</td>
<td>Secondary school education and above</td>
<td>46 (17.7%)</td>
</tr>
</tbody>
</table>

Table 2: Socio-economic status according to Modified B.G.Prasad’s classification.

<table>
<thead>
<tr>
<th>Class</th>
<th>Socio-economic status</th>
<th>No of patient’s (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Upper High</td>
<td>1 (0.4%)</td>
</tr>
<tr>
<td>II</td>
<td>High</td>
<td>36 (13.8%)</td>
</tr>
<tr>
<td>III</td>
<td>Upper middle</td>
<td>71 (27.3%)</td>
</tr>
<tr>
<td>IV</td>
<td>Lower middle</td>
<td>69 (26.5%)</td>
</tr>
<tr>
<td>V</td>
<td>Poor</td>
<td>83 (31.9%)</td>
</tr>
</tbody>
</table>

Table 3: Attitude of patients regarding prescribed drugs.

<table>
<thead>
<tr>
<th>S.no</th>
<th>Factors</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Consult doctor for advice</td>
<td>170 (65.4%)</td>
<td>90 (34.6%)</td>
</tr>
<tr>
<td>2</td>
<td>Desire for particular drug</td>
<td>99 (38.1%)</td>
<td>161 (61.9%)</td>
</tr>
<tr>
<td>3</td>
<td>Consultation without medical examination</td>
<td>83 (31.9%)</td>
<td>177 (68.1%)</td>
</tr>
<tr>
<td>4</td>
<td>Difficulty in taking multiple tablets</td>
<td>209 (80.4%)</td>
<td>51 (19.6%)</td>
</tr>
<tr>
<td>5</td>
<td>Take medication as prescribed by doctors</td>
<td>231 (88.8%)</td>
<td>29 (11.2%)</td>
</tr>
<tr>
<td>6</td>
<td>Expect low cost medicines</td>
<td>226 (86.9%)</td>
<td>34 (13.1%)</td>
</tr>
<tr>
<td>7</td>
<td>Continue treatment after symptoms subsided</td>
<td>50 (19.2%)</td>
<td>210 (80.8%)</td>
</tr>
<tr>
<td>8</td>
<td>Use old prescription</td>
<td>149 (57.3%)</td>
<td>111 (42.7%)</td>
</tr>
<tr>
<td>9</td>
<td>Share medications with family members</td>
<td>75 (28.8%)</td>
<td>185 (71.2%)</td>
</tr>
<tr>
<td>10</td>
<td>Side effects of medicines</td>
<td>192 (73.8%)</td>
<td>68 (26.2%)</td>
</tr>
<tr>
<td>11</td>
<td>Satisfied treatment without injections</td>
<td>140 (53.8%)</td>
<td>120 (46.2%)</td>
</tr>
<tr>
<td>12</td>
<td>Injection alone cure diseases</td>
<td>66 (25.4%)</td>
<td>194 (74.6%)</td>
</tr>
</tbody>
</table>

Around 231(88.8%) patients took medications as prescribed by doctors, while 209(80.4%) of patients found difficulty in taking multiple tablets. 226(86.9%) patients preferred low cost drugs since most of them came from low socio-economic status and 140(53.8%) patients were satisfied with medications without injections. Moreover 194(74.6%) had the disbelief that injections alone can cure diseases. More than half of the patients 149(57.3%) sought the help of old prescription for similar complaints suffered before and it was found that 75(28.8%) of patients used to shared their prescribed drugs with their family members for similar complaints. Regarding knowledge, 73.8% of patients knew about the adverse effects of prescribed drugs (p value<0.01) and
this may be one reason why 170(65.4%) patients always consulted doctor for ailments.

Table 4: Patients knowledge and attitude regarding injections.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Factors</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demand for injections</td>
<td>80 (30.8%)</td>
<td>180 (69.2%)</td>
</tr>
<tr>
<td>2.</td>
<td>Injections powerful than tablets</td>
<td>71 (27.3%)</td>
<td>189 (72.7%)</td>
</tr>
<tr>
<td>3.</td>
<td>Prefer tablets over injections</td>
<td>50 (19.2%)</td>
<td>210 (80.8%)</td>
</tr>
<tr>
<td>4.</td>
<td>Aware of using new disposable syringes/needles for injections</td>
<td>186 (71.5%)</td>
<td>74 (28.5%)</td>
</tr>
<tr>
<td>5.</td>
<td>Aware of side effects of injections</td>
<td>168 (64.6%)</td>
<td>92 (35.4%)</td>
</tr>
<tr>
<td>6.</td>
<td>Aware of disease transmitted by unsterile needle/syringe</td>
<td>165 (63.5%)</td>
<td>95 (36.5%)</td>
</tr>
</tbody>
</table>

When it comes to knowledge regarding injections, 168(64.6%) of patients knew about the adverse effects of injections (p value<0.01) and hence only 80(30.8%) of them requested for injections. 165(63.5%) of patients were aware about the diseases transmitted by unsterile needles and syringes with p value <0.01, which was highly significant but still around 95(36.5%) were not aware of any diseases transmitted by unsterile needles and syringes, the reason may be because most of them come from poor socio economic status and education and to some extend since we had new patients who were not given health education. Comprehensively it was found that most of the patients were satisfied with tablets alone than injections.

**Discussion**

Research on adherence has typically focused on the barriers patients face in taking their medications. Common barriers to adherence are under the patient’s control, so that attention to them is a necessary and important step in improving adherence. In responses to a questionnaire, typical reasons cited by patients for not taking their medications included forgetfulness (30 percent), other priorities (16 percent), decision to omit doses (11 percent), lack of information (9 percent), and emotional factors (7 percent); 27 percent of the respondents did not provide a reason for poor adherence to a regimen.11 Physicians contribute to patients’ poor adherence by prescribing complex regimens, failing to explain the benefits and side effects of a medication adequately, not giving consideration to the patient’s lifestyle or the cost of the medications, and having poor therapeutic relationships with their patients.12-15

To improve the patient’s ability to follow a medication regimen, all potential barriers to adherence need to be considered. An expanded view that takes into account factors under the patient’s control as well as interactions between the patient and the health care provider and between the patient and the health care system will have the greatest effect on improving medication adherence.16,17 One might suggest that good medication knowledge could possibly bring about more positive attitude and consequently better compliance in the general population, as reported in several studies.18,19

In this study only 50% considered injections superior to tablets even though many patients did not have any formal education and nearly 63.5% of them were unaware of diseases transmitted by unsterile needles in compared to a study conducted in Pakistan where 64% considered injections to be more powerful than tablets which too had poorer and less educated patients tending for more injections and having less knowledge regarding the risks of injections with unclean needles.20 The attitude of the patients regarding injections were rather balanced and open, an injection was regarded neither as a panacea nor as the only viable treatment. Study conducted at Africa, very few people consulted doctor for advise, whereas in this study 65.4% consulted doctor for advice which is well appreciated. In a study done in Portugal the level of knowledge about drug therapy was considered good in 11.3% of participants21 while the percentage of patients was higher in this study around 73.8% were aware of side effects of drugs, the reason mainly by repeated health education given to them.

**Conclusion**

Patients had a positive attitude and knowledge regarding prescribed drugs and injections, while further awareness is needed about prescribed drugs and injections focusing on the patients general education and knowledge, adverse drug events to empower them to choose healthier therapies.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Ethical Clearance:** obtained from Institutional Human Ethics committee, AVMC&H
References


Artificial Intelligence: A Tool For Medical Diagnosis & Treatment a Narrative Review

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Abstract

Artificial intelligence is gaining significant momentum in healthcare and is forecast to have the potential to transform the industry, as well as the way practitioners interact with their patients. AI is bringing a paradigm shift in the healthcare sector, powered by the increasing availability of health care data and rapid development in analytical techniques. The use of AI in healthcare will go far forward turning data into useful and actionable information that benefits the health and care of patients. Several researches had been conducted and many randomized control trials are in progress around the globe using various AI technologies to find out the extensive scope of artificial intelligence in clinical diagnosis and treatment. This review summarizes the recent research studies that utilizes artificial intelligence and its contribution to health care.

Keywords: Artificial intelligence, Diagnosis, Treatment of diseases, Health care.

Introduction

According to the father of artificial intelligence, John Mc Carthy, AI is the science and engineering of making intelligent machines, especially intelligent computer programmes. Concept of AI is developed by incorporating the study results of how a human brain thinks, analyses, and takes decisions etc when trying to solve out a problem. Based on this, intelligent softwares and algorithms are formulated. AI is defined as the study of algorithms that gives machines the ability to reason and perform cognitive functions such as problem solving, object and word recognition and decision making. It is a combination of different technologies that enables machines to sense, comprehend, act and learn so that they can perform administrative and clinical health care functions. (1,2)

Impact of Artificial Intelligence In Healthcare:

AI is after all an extension, a by-product of the natural intelligence which Homo Sapiens are endowed with. AI in health care focuses on converting data generated in care settings into usable and actionable information that benefits health and care of patients. Health care industry is a data rich industry driven by digital health, image capture, wide spread electronic health record adoption etc. Nurses have been diligently entering data while documenting patient’s care and treatments. Healthcare witnessed an exponential growth in the data.”Big Data” refers to extremely large data sets that cannot be analysed and interpreted using traditional data processing method. (4) According to Harvard Business Review, 30% of world’s electronic data storage is occupied by health care information. (5) Statistics revealed that an average person will leave a trail of more than 1 million gigabytes of health related data in their life time. (6) All these big data of healthcare industry can be extracted first, and secondarily aid as a guide in aiding clinicians in delivering standard care to the patients and thus improving the quality of clinical practice. Processing of these data offers the promise of unlocking novel insights and accelerated breakthrough in health care industry.
**Contribution of Artificial Intelligence In Diagnosis And Treatment of Diseases: A Review Through Recent Research Contributions**

Powerful AI techniques can unlock clinically relevant information hidden in the massive amount of data which in turn assists in clinical decision making. AI technologies have been extensively utilized in areas like oncology, cardiology, orthopaedics, neurology, obstetrics & gynaecology surgery, ophthalmology, psychiatry and in many other streams for diagnosis and treatment of diseases.

**Oncology:** Chen and colleagues conducted a study using an AI technology called Conventional Neural Network (CNN) machine learning on detection of lymphnode metastasis. AI achieved image level scores above 97%, whereas human pathologists could achieve only 73.2% sensitivity. (7) Esteva et al analysed clinical images to identify skin cancer subtypes. They also utilized CNN technology, and found out that CNN technology performed at a level of competency comparable to dermatologists in classifying skin cancers from biopsy proven clinical images. (8) Several studies have suggested that the incorporation of computer-aided detection (CADe) systems into the diagnostic process can improve the performance of image interpretation by providing quantitative support for clinical decision-making, particularly in the differentiation of malignant and benign tumours. Li et al studied the uses of abnormal genetic expression in long non-coding RNAs to diagnose gastric cancer. (9) Somashekhar et al demonstrated that IBM Watson for oncology is a reliable AI system for assisting the diagnosis of cancer through a double blinded validation study. (10) AI can serve as a useful modality in diagnosis and treatment of lesions of the oral cavity and can be employed in screening and classifying suspicious altered oral mucosa undergoing premalignant and malignant changes. The advantage would be no observation fatigue, and even minute changes at single pixel level can be detected which might go unnoticed by the naked eye. (11) In May of 2018, the Annals of Oncology published a landmark German study where a deep learning convolutional neural network (CNN) trained on 100,000 images outperformed an international group of 58 dermatologists from 17 countries in diagnosing malignant melanomas. Google deep mind machine learning algorithms are utilized to identify areas to be treated or avoided during radiotherapy to improve the efficiency of cancer treatment especially around head and neck. (12)

**Cardiology:** In the research presented by Moss et al in this issue of Critical Care Medicine, the authors employed an automated rhythm classification methodology to analyze continuous electrocardiograms (ECGs) of critically ill patients to detect AF and AFL. Of note, 7.5% of all ICU admissions had new-onset subclinical AF as identified by the automated rhythm classification. The authors demonstrate how machine learning applied to routinely captured clinical data can generate new information and potentially new insights that are missed by the clinician who cannot continuously observe all ongoing ECG patterns. (13) Dilsizian and Siegel discussed the potential application of the AI system to diagnose the heart disease through cardiac image. (14) Arterys recently received clearance from the US Food and Drug Administration (FDA) to market its Arterys Cardio DL application, which uses AI to provide automated, editable ventricle segmentations based on conventional cardiac MRI images. (15) The Ultromics system, trialled at John Radcliffe Hospital in Oxford, uses AI to analyse echocardiography scans that detect patterns of heartbeats and diagnose coronary heart disease.

**Orthopaedics:** Within musculoskeletal medicine, machine learning and active shape modelling have proven influential in understanding biomechanics, orthopaedic implant design, bone tumour resection, prediction of progression of osteoarthritis based on anatomical shape assessment, and robotic surgery. The analysis of complex physiological data via ML has been used in patients with spinal degenerative changes. (16-19) Hayashi et al focused on gait analysis as a classification method to improve diagnostic accuracy in patients with multilevel spinal stenosis. (20) Eskenazi et al created an ANN-based contact model of the tibiofemoral joint using over 75000 evaluations of a fine-grid elastic foundation (EF) contact model. (21)

**Neurology:** AI tools are being developed that analyse speech patterns to predict psychotic episodes and identify and monitor symptoms of neurological conditions such as Parkinson’s disease. Bouton et al developed an AI system to restore the control of movement in patients with quadriplegia. (22) Farina et al tested the power of an offline man/machine interface that uses the discharge timings of spinal motor neurons to control upper-limb prostheses. (23) Shin et al developed an electrodiagnosis support system for localising neural injury. (24) In a study of 1271 head trauma records, artificial neural networks (ANN) and
multivariable logistic regression models were compared in their ability to predict outcomes in head trauma. Reproducibility of the findings were studied. ANNs significantly outperformed logistic models in both fields of discrimination and calibration, but under performed in accuracy. Prediction of intracranial pressure trends with ANN has been reported. ANN proved superior to logistic regression models in predicting recurrence of chronic subdural hematoma and cranioencephal injuries. Brain death prediction, based on ensemble ANN networks, in a neurosurgical intensive care unit has been reported. Objective grading of facial paralysis using AI analysis of video data has been reported. Clinical decision support systems (CDSS) based on machine learning algorithms could assist in combined stimulation and medication therapies for Parkinson’s Disease. Accurate prediction occurred in 86% (12/14) of motor improvement scores, 100% in tremor outcome and 93% in speech outcome, one year after surgery. The authors emphasise that prediction accuracy is dependent on the quality of the clinical measurements, used to populate the database. Automatic seizure detection using scalp electroencephalogram (EEG) and advanced artificial intelligence techniques have been reported following preprocessing with filtering and artefact removal. AI has been used in the management of stroke, in the areas of early detection and diagnosis, treatment, outcome prediction and prognosis evaluation. The US Food and Drug Administration (FDA) has approved an mHealth app that uses AI software to analyze CT scans for signs of a stroke, and then sends a text message to a neurologist. Ophthalmology: Long et al, who analysed the ocular image data to diagnose congenital cataract disease and Gulshan et al, who detected referable diabetic retinopathy through the retinal fundus photographs. Surgery: AI technological approaches have been used in the analysis of preoperative images to help the surgeon define intraoperative bone resection levels in upper limb arthroplasty. Robotic tools controlled by AI have been used in research to carry out specific tasks in keyhole surgery, such as tying knots to close wounds. Brain tumor ablation has been identified as an ideal procedure for autonomous robotic surgery. It involves perception of the environment by the robotic system and a corresponding adaption of its behaviour to the changing environmental parameters. Obstetrics & Gynaecology: The effects of AI have already been felt in the areas of fetal heart monitoring and fertilization. An example of AI utility is its application in assessing cardiotocographs during labor. Intrapartum monitoring is dogged by inconsistencies between different centers and between obstetricians. Examples of where AI has been tested in CTG analysis include CAFE (Computer Aided Foetal Evaluator) and the INFANT study protocol, both highly integrated systems involving complex algorithms developed to overcome difficulties in CTG analysis. System 8000 is another such technology which was designed to take account of episodic changes in FHR and fetal movements characteristic of sleep states by recording CTG quality, uterine contraction peaks, basal heart rate, variation, decelerations, and accelerations. A much needed boost for earlier detection of epithelial ovarian cancer (EOC) using noncoding RNAs has been attempted with a neural network model, and initial results suggest that circulating miRNAs have the potential to develop as a noninvasive diagnostic test for ovarian cancer. Attempts have also been made to predict preterm labor by analyzing uterine electrical signals (electrohysterography), a specific type of electromyography. AI could also provide better and more consistent outcomes for IVF results between different clinics.

Psychiatry: 707 patients with mental health issues were studied. Using 345 variables, an analysis was carried out with AI tools. The authors reported that eventually AI tools could help to reduce the risk of suicide. A study from Taiwan reported that Bayesian statistics (learning from evidence as it accumulates) helped clinicians explore other potential risk factors for dementia.

Conclusion

The top applications that represent the greatest near-term value are robot-assisted surgery, virtual nursing assistants and administrative workflow assistance, fraud detection, clinical trial participant identifier, automated image diagnosis etc. AI-powered solutions have made small steps towards addressing key issues, but still have yet to achieve a meaningful overall impact on the global healthcare industry, despite the substantial media attention surrounding it. If several key challenges can be addressed in the coming years, it could play a leading role in how healthcare systems of the future operate, augmenting clinical resources and ensuring optimal patient outcomes.

Ethical Clearance: This is an article review which is not done by research. There is no need for ethical clearance.
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Conflict of Interests: The authors declare that there is no conflict of interests.

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A Case of Bullous Lung Disease

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Abstract

Bullous Lung disease is the formation of bullae in the lung due to multiple factors. The risk factors of COPD are adjunct with the risk of bullous lung disease. The affected patients commonly exhibit the respiratory symptoms similar to that of COPD cases. Usually chest imaging reveals the condition. Men are more likely to get affected. In this article we report a case of Bullous Lung Disease in a 57 year old male patient.

Keywords: Bullous Lung disease, Giant Emphysematous bulla.

Introduction

Bullous Lung disease is an entity described by the nearness of bullae in one or both the lung fields, with ordinary mediating lung. Bullous lung disease is portrayed by the advancement of bullae inside the lung parenchyma.1 A bulla is a changeless, air-filled space inside the lung parenchyma that is around 1 cm in size and has a thin or inadequately developed wall; it is flanked just by remainders of alveolar septae and additionally pleura.1,2

Etiology & Risk Factors of developing bullous lung disease

• Affected people will, in general, be more seasoned (typically > 45).4
• Exposures and ecological factors, for example, prolonged presentation to smoke from burning of tobacco (more typical) or different biomass fuels utilized for warming or cooking, for example, wood, coal, peat, and lamp oil.5
• The IV infusion of heroin or smashed oral tablets (e.g., methylphenidate) has been related with a basilar-prevalent bullous lung ailment.4
• Genetic factors, for example, Alpha-1 Antitrypsin Deficiency expands defenselessness to smoke-actuated bullous emphysema. A number of epidemiological studies show that Marfan’s and Ehlers-Danlos disorder have been connected to an expanded danger of bullous lung infection and pneumothorax.6
• Human immunodeficiency infection (HIV): Multiple observational investigations have demonstrated that even after alteration for other hazard factors, these patients (HIV positive) create COPD at a marginally more youthful age and with somewhat bring down dimensions of tobacco presentation contrasted with HIV-negative controls.6

Classification: Bullous lung infection can be arranged into a few classifications dependent on the state of the encompassing lung parenchyma.

• Bullous emphysema alludes to the development of bullae inside emphysematous lung parenchyma. Patients for the most part show airflow deterrent on spirometry.

• Bullae inside typical lungs are frequently solitary and encompassed by morphologically ordinary lung tissue. This class is far less normal than bullous emphysema. It results in dynamic air catching. Notwithstanding when symptomatic, patients with this type of illness may display typical PFT.1

• Bullae in late stage lung fibrosis, for example, late stage sarcoidosis or pneumoconiosis.

• Vanishing lung disorder or idiopathic giant emphysematous bulla, is an uncommon disorder in which bullae take up > 30% of the influenced hemithorax with no recognizable basic etiology. The upper flaps are frequently included, and the nearness of subpleural bullae is an overwhelming component. The positive treatment for the most part requires careful bullectomy.1

Clinical Manifestations: Generally, symptoms are typically insidious, but sudden and severe dyspnea or chest pain in a patient with bullous lung disease which may raise suspicion for pneumothorax due to
a ruptured bulla or bleb. Rarely, fever and malaise +/- increased sputum production may signal an infected bulla. Shortness of breath or chest tightness, particularly with exertion, cough and sputum production may be present. Occasionally, a sense of abdominal fullness or bloating due to airway obstruction may be seen.6

There are other diseases that can mimic bullous lung disease such as Blebs: Effectively “blisters” that occur within layers of the visceral pleura, rather than within lung parenchyma itself, Cystic lung disease, Cystic bronchiectasis, Cavitary lung disease, Pneumatocele, Pneumothorax.6

Making or excluding the diagnosis of bullous lung disease.

The Chest X-ray may reveal focal areas of radiolucency surrounded by thin curvilinear density, suggesting the presence of bullae. Cross-sectional imaging using CT allows more detailed characterization of the number, size, and location of bullae, as well as the condition of the surrounding lung parenchyma. A CBC may exclude anemia as a contributor to dyspnea, and in severely affected patients, may occasionally reveal polycythemia associated with hypoxemia. Pulse oximetry with exercise will reveal which patients require supplemental oxygen. ABG can evaluate for hypercapnia in those with severe respiratory impairment. The patient has undergone Chest X-ray and HRCT (High Resolution Computed Tomography)3,7

Case Report

An 57 year old male patient, normotensive, nondiabetic, euthyroid, known case of COPD since 13 years presented to the hospital with chief complaints of breathlessness which has increased progressively over time. There was no history of fever, cough and cold. General and systemic examination revealed the history that he was a chronic cigarette smoker and alcoholic for 24 years but has stopped smoking and alcoholism since 13 years.

X-Ray Chest revealed Giant bullous emphysema with involvement of bilateral lungs. Chronic collapse involving basal segments of left lower lobe. Small left pleural effusion. Subcutaneous emphysema along chest wall and visualized lower neck on left side.

HRCT (High Resolution Computed Tomography) revealed the presence of widespread emphysematous changes with presence of giant bullae replacing the normal lung parenchyma. These bullous spaces are more extensive on left side with largest bulla measuring approximately 24.8 (CC) x 9.5 (TR) x 17.5 (AP) cms. There is extensive fibrotic opacities with associated architectural distortion. There is chronic collapse involving basal segments of left lower lobe.

Figure 1: Chest X-Ray reveals bilateral Giant bullous emphysema.

Figure 2: HRCT showing giant bullae.

Serological examination revealed low Hb (12.0g/dl), Low RBC Count (million/ul), Low PCV(36.7%) and high Total Leukocyte Count (14.3 Thou/ul), high neutrophils and low lymphocytes. The SGPT was increased (80U/L).

Medical & Surgical Management: Symptomatic patients often experience clinically significant improvements in symptom control and exercise tolerance from usual COPD treatment such as bronchodilators, inhaled corticosteroids, and oxygen as needed and pulmonary rehabilitation. With smoking cessation and medical therapy, many patients with bullous lung disease experience stabilization of lung function.6

However, even patients who are aggressively treated may occasionally experience progressive dyspnea, airflow obstruction, exercise limitation, and poor quality of life. Patients with bullous lung disease are at increased risk for developing spontaneous secondary pneumothorax because of rupture of blebs or bullae.

In this case the patient was administered following medications Inj. Deriphyllin, Lupituss Suspension, Syp. Looz, Inj. Tazact, Inj. Azee, Inj. PCM, Inj. Rablet and Inj. Solu Medrol. The dosage and duration of the medication was as prescribed by the concerned Medical Practitioner. The patient was educated regarding the action of each medication and the side effects were monitored.
The patient was also advised for Betadine Gargle and Steam Inhalation. Nebulization was administered with **Duolin** (Salbutamol / Ipratropium bromide 2.5 mg / 500 mcg in 2.5m) and **Budecort 0.5 MG Respules** (corticosteroid).

**Nursing Management/Diagnosis**

1. Airway clearance, ineffective related to expiratory airflow obstruction as evidenced by wheezing sounds on auscultation.

**Nursing Interventions:**

   a. Assessed lung sounds every 2 to 4 hours
   b. Encouraged turning, deep breathing every 2 to 4 hours
   c. Provided semi fowlers position
   d. Administered oxygen as prescribed
   e. Assisted with the treatment in administering medications used in inhalation therapy

2. Breathing pattern, ineffective related to decreased lung expansion secondary to chronic airflow limitations as evidenced by the use of accessory muscles of respiration and adventitious breath sounds.

**Nursing Interventions:**

   a. Assessed for the indicators of respiratory distress
   b. Auscultated Breath sounds
   c. Instructed to use of pursed-lip breathing
   d. Monitored the response of oxygen administration
   e. Administered bronchodilator therapy as prescribed

3. Gas exchange, impaired related to airway obstruction secondary to the buildup of secretions as evidenced by decreased oxygen saturation shown by ABG analysis.

**Nursing Interventions:**

   a. Assessed the frequency and depth of breathing
   b. Provided comfortable position
   c. Observed nail beds for cyanosis and clubbing
   d. Evaluated patient hydration status
   e. Noted blood gas results

**Outcome and Follow-up:** At the end of the 3-week treatment plan, the patient was able establish natural breathing to certain extent. The person was able to perform his activities of daily living although he was not completely asymptomatic. The patient was re-evaluated by the Pulmonologist and Physician, who acknowledged maximal medical improvement of the initial symptoms but insisted regular follow up and prevention of risk factors that exacerbate the symptoms.

**Discussion**

Untreated, the natural history of bullous lung disease is generally one of gradual increase in the size and extent of bullae, as well as gradual progression of dyspnea and airflow obstruction. However, both the rate and extent of progression over time are highly variable and depend on many factors. Smoking cessation is the most important intervention to slow the progression of bullous lung disease.

**Conclusion**

In conclusion, this case exemplifies the importance of diagnosing the bullous lung disease and providing the required attention in preventing the complications. In this case the presence of bullae was confirmed by HRCT. The given treatment improved the quality of life of the patient.

**Ethical Clearance:** For this case study we have taken the consideration of ethical issues. No significant ethical concerns were raised during the study. Ethical clearance was obtained from Shri Mata Vaishno Devi Project Evaluation Committee (SMVDPEC). Consent was obtained from the patient and he was assured about the confidentiality of the data obtained from him.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Bibliography**


Effectiveness of Platelet-rich Plasma in Knee Osteoarthritis

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Abstract

Osteoarthritis is a degenerative condition which is characterized by joint pain, tenderness, stiffness, swelling, restricted movement and joint deformities decreased range of motion. In recent years, an increasing number of patients are being diagnosed with osteoarthritis, which has a notable impact on human health and quality of life. The causes of osteoarthritis are very complex, and the pathogenesis of this disease is not well understood. Osteoarthritis is divided into two categories i.e primary and secondary osteoarthritis according to the presence of local and systemic risk factors. Knee osteoarthritis is a degenerative disease which may develop due to ageing, obesity, strain, congenital abnormal joints, joint deformity or trauma. Etiology is multifactorial, such as degradation of articular cartilage injury, joint edge and subchondral bone hyperplasia of reactivity. Positive results have been uniformly found by various researchers for the use of platelet-rich plasma (PRP) in early osteoarthritis (OA) knee in the past few years. Platelet-rich plasma (PRP) is a concentrate of autologous blood growth factors which show some symptomatic relief in early osteoarthritis (OA) of the knee. Prolonged and sustained release of growth factors from platelets could possibly help in much better biological healing in body and sustained clinical effects. This article intends to discuss the role of the PRP and ideas for improvising PRP in early OA knees based on available evidence.

Keywords: Early OA knee, Platelet-rich plasma.

Introduction

Osteoarthritis (OA) is a leading cause of disability in population and doubles the number of visit of patients to primary care practitioners for those with the condition in comparison to those without. Knee joint is most commonly affected by OA than any other joint. The joint destruction arising from OA occurs as a result of an imbalance between the breakdown and repair of the joint tissue while a combination of cellular changes and biomechanical stresses causes various secondary changes in the joint itself. Recent research has been found a number of key biochemical pathways that could be targeted therapeutically through biological intervention.

There are various conservative treatments for knee OA that have short-term relief with their own benefits and disadvantages. For example, Non steroidal anti-inflammatory drugs (NSAIDs) and intra-articular corticosteroid are common treatments for arthritis. Despite their easy access and low cost, these treatments have various systemic adverse effects and may cause destruction of joint cartilage and flaring up of the osteoarthritic process. Also common treatments for cartilage tissue repair rarely achieve an ideal level of functional capacity for the patient of OA.

Because of the high costs of management of knee OA, therapeutic options that are effective in tissue healing have been taken into consideration in recent years in order to prevent the progression of OA. Among these intervention there are growth factors that have been studied both in vitro and in vivo as effective factors for the cartilage healing in OA with promising results. Growth factors are effective in chemotaxis, mesenchymal stem cells differentiation, proliferation of chondrocyte, and synthetic activities of osseous and cartilaginous cells; therefore, they have important roles in both healing and remodeling of cartilage tissue.

Platelet-rich plasma (PRP) is an autologous biologic treatment including patients’ own plasma which contains growth factors released from platelets and endogenous fibrin scaffold.

Platelet-rich plasma (PRP) promotes proliferation cell and differentiation of synovial cell and may recover promotes cartilage morphology. Previous research has suggested that PRP exhibits beneficial effects on
injurious articular cartilage repair through the removal of harmful inflammation factors in patients with joint diseases. The main rationale for the use of PRP is to stimulate the cascade of natural healing process and tissue regeneration by a “supraphysiologic” release of platelet-derived factors directly at the treatment site.

Most studies found that therapeutic PRP should have platelet concentrations four to six times greater than whole blood (200,000 mm$^{-3}$). Some authors stated that the concentrations less than or greater than this amount may be ineffective or inversely lead to suppression of cascade of the healing process. PRP is classified into following four categories, depending on leukocyte and fibrin contents: 1. pure platelet-rich plasma (P-PRP); 2. leukocyte-and platelet-rich plasma (L-PRP); 3. pure platelet-rich fibrin (P-PRF); and 4. leukocyte- and platelet-rich fibrin (L-PRF).

Previous study reports have indicated that inflammatory cytokines have an essential role in the initiation and development of osteoarthritis, targeting the synovium in joint diseases. PRP injections in patients with knee OA resulted in decrease of pain, improved function and global assessment, and changes regarding joint imaging. A study by Meheux et al. suggested that PRP injection significantly improved validated patient reported outcomes in patients with symptomatic knee OA.

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Objectives: The current study aimed at the role of PRP of certain specifications for management in the early knee OA.

Methodology
A Comprehensive computerized search performed on google scholar, pub med etc. (Publication from 2014-2018) is used.

Search Strategy: Knee–osteoarthritis
Platelet rich plasma (PRP)

Mechanism by which PRP works for knee OA
Osteoarthritis alters the metabolism of normal joint by favouring increased catabolism and decreased anabolism. Platelet alpha-granules contain and release various growth factors, including hepatocyte growth factor (HGF), vascular endothelial growth factor (VEGF), platelet-derived growth factor (PDGF) and transforming growth factor-b (TGF-b)\(^\text{18}\), which could alter the changing joint milieu in OA. In cartilage it decreases catabolism, increases anabolism and promotes chondral remodelling. Higher amounts of collagen II and synthesis of prostaglandin (PG) have been documented by Akeda et al.\(^\text{19}\) and Pereira et al.\(^\text{20}\). With the increasing proliferation of chondrocyte and production of matrix molecules have also been documented\(^\text{21-24}\). Synoviocytes are influenced by increased hyaluronic acid (HA) secretion\(^\text{25}\), that creates a more favourable and balanced state for angiogenesis\(^\text{19,26}\), and a decreased interleukin-1 (IL-1)-mediated rise in some matrix metalloproteinases (MMPs)\(^\text{27,28}\). The apoptotic pathway of osteoarthritic chondrocytes is influenced as insulin-like growth factor 1 (IGF-1) in PRP may downregulate the programmed cell death 5 (PDCD5)\(^\text{29}\). Lower levels of apoptosis were detected in vivo studies by Mifune et al.\(^\text{30}\)and the authors suggested that complex interaction of PRP within joint might positively influence apoptosis of chondrocyte.

What specific type of PRP is ideal for Knee OA?
Based on the available literature, there are some answers and but more questions which need to be answered. Different PRP preparations – Magalon et al.\(^\text{31}\) studied five different commercial PRP preparations in a single donor/subject model and noticed various significant biological variation in the PRP products among different preparations and postulated this to be a reason for the variability of results in PRP studies. Intra-individual variations were observed by Mazzocca et al.\(^\text{32}\) in the same individual, and there were variations in the PRP yield by the same method in samples drawn at different time periods. Storing platelets in freezing conditions can alter the morphology of platelets and decrease the functional properties of platelets by degradation of alaphagranules\(^\text{33}\). However, freeze thawing PRP is better in terms of compliance of patients of OA as the PRP can be prepared in a single sitting. Roffi et al. studied the effect of freezing/thawing on the PRP molecule release, and its effects on the chondrocytes and synoviocytes metabolism. They noticed decreased level of protein secretion in the freeze thawed PRP but the gene expression in cultured chondrocytes and synoviocytes was similar as that in fresh PRP.

Summary of included study’s characteristics:
-Mandeep S. Dhillon, Sandeep Patel, and Rakesh John (2017), PRP in OA knee – update, current confusions and future options. A Review article concluded that PRP of certain specifications is used for the management of knee in the early knee OA\(^\text{34}\).

-Liam G. Glynn, Alaa Mustafa, Monica Casey, Janusz Krawczyk, Jeanete Blom, Rose Galvin, Ailish Hannigan, Colum P. Dunne1, Andrew W. Murphy and Christian Mallen (2018), Platelet-rich plasma (PRP) therapy for knee arthritis: a feasibility study in primary care. A feasible study concluded that Platelet-rich plasma therapy is a simple and minimally invasive treatment which is feasible to deliver in primary care for patients to treat osteoarthritis of the knee joint. Well-designed randomised controlled trials are needed to measure outcomes, durability of effect and effectiveness of cost\(^\text{35}\).

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-Guolin Huang, Sha Hua, Tuanmin Yang, Jibing MA, Wenxing Yu and Xiujin Chen (2018), Platelet rich plasma shows beneficial effects for patients with knee osteoarthritis by suppressing inflammatory factors. A Randomized controlled study concluded that treatment with PRP for patients with knee osteoarthritis presented
beneficial effects in alleviating inflammation of joint, cartilage destruction and bone damage, and repairing joint tissue. These results suggested that PRP may be a potential therapeutic agent for knee osteoarthritis.37

-Bahram Naderi Nabi, Abbas Sedighinejad, Mohnsen Mardani-Kivi, Mohammad Haghighi, Zahra Atrkar Roushan, Samaneh Ghazanfar Tehran, and Gelareh Biazar, (2018), Comparing the Effectiveness of Intra-articular Platelet-Rich Plasma and Corticosteroid Injection under Ultrasound Guidance on Pain Control of Knee Osteoarthritis. In this A Randomized Controlled study concluded that three intra-articular injections of Triamcinolone and PRP could decrease pain and improve articular function in patients with grades II-III knee OA. However, pain relief and improvement in the outcomes were more effective and more prolonged secondary to PRP injections than corticosteroids.38

Discussion

The purpose of the present study was to demonstrate the efficacy and safety of PRP in patients with knee osteoarthritis. It was observed that PRP not only decrease inflammation through humoral and cellular immune responses, which was consistent with a previous study.39 Platelet-rich plasma therapy is a simple, cheap and minimally invasive treatment option which is feasible to deliver in primary care to treat degenerative diseases of articular cartilage of the knee. Previous studies have investigated the effect of PRP on arthritis of different origins.40-42

Conclusion

Osteoarthritis is a serious chronic degenerative disease that affects the health of patient and quality of life. Although osteoarthritis may affect all joints of body, knee osteoarthritis is the most common type of arthritis among adolescents and adults.40 In recent years, non surgical treatments for knee osteoarthritis have become more widely used, such as PRP, corticosteroid injection and hyaluronic acid.40-42 A previous study described various method for treatment of knee osteoarthritis, including decompression with bone morphogenic proteins, growth factors, bone grafting and stem cells.45 Therefore, it is necessary for clinicians to monitor clinical responses and tolerability when patients are treated with PRP. In conclusion, the present study indicate that PRP treatment for patients with knee osteoarthritis has beneficial effects in regulating inflammatory factors, and alleviating joint inflammation, cartilage destruction and bone damage. In futureresearchers should also focus on developing a better PRP product by combining it with various molecules such as gelatin, chitosan and others. PRP is definitely there to stay for OA therapy use in future.

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Ethical Clearance: Not been taken

Conflict of Interest: Author declares no conflict of interest in relation to this paper.

References


Quality of Life After Stroke Patients with Disability

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Abstract

**Background:** Stroke Specific Quality of Life Scale (SS-QOL) is a recognized and important outcome after stroke. Patients are socially, physically, psychologically affected due to stroke. An increased survival and the presence of moderate impairment in long-term stroke patients impact their SS-QOL.

**Methodology:** Observational study was used in this study. Conducted in Saveetha hospital. 16 subjects with chronic stroke were recruited with mild to severe disability. For disability outcome measure Modified Rankin scale is used. Assessment of the post-stroke Quality of Life done using SS-QOL.

**Result:** There were 2 stroke patients with slight disability, 6 stroke patients with moderate disability and 8 stroke patients with severe disability. There were 7 female and 9 male stroke patients. Mean values of SS-QOL -129.93.

**Conclusion:** Patients who have severe disability have poor quality of life compared to mild to moderate disability in who came to Saveetha medical college and hospital for this last one month.

**Keywords:** Quality of life, stroke, disability, Stroke Specific Quality of Life Scale (SS-QOL), modified rankin scale.

Introduction

Stroke is the sudden loss of neurological function caused by an interruption of blood flow to the brain. It is a major chronic disabling neurological disease that often changes lives in a radical and permanent way. Incidence: 119-145 / 100,000 based on recent population studies. Prevalence: 84-262 / 100,000 in rural areas and 334-424 / 100,000 in urban areas. The entire nervous system in the body is a continuous structure that slides when we move and the movement shows physiological processes such as blood flow to the neurons. Quality of life after stroke affected by impaired consciousness, speech and language disorders, dysphagia, cognitive dysfunction, altered emotional status, convulsions, bladder and bowel dysfunction, cardiovascular and pulmonary dysfunction, deep vein thrombosis and pulmonary embolism. Disability is a disability that can be cognitive, developmental, intellectual, mental, physical, and sensory or a combination of these factors. The stroke-specific quality of life scale (SS-QOL) is a recognized and important outcome after a stroke. The quality of life of stroke can be measured in health-related quality of life (HRQOL) and disability can be measured in Modified Rankin Scale (MRS). Patients are socially, physically and psychologically affected by stroke. Depression is a common consequence of stroke and is known to be associated with deterioration in quality of life. The concept was only vaguely defined. It is generally accepted that quality of life refers to the subjective well-being and satisfaction of the person’s life. Also other activities in the community, personal development and active recreation.

**Methodology**

This study is conducted in Saveetha College of physiotherapy OPD Thandalam, Chennai, India. Patients have participated and were screened for inclusion (patients with chronic stroke) of both the gender within the age group of 60 years or more, the patients were able to understand simple verbal instructions, and exclusion criteria (unconscious, aphasia) samples were selected.
using convenient sampling technique. After the sampling technique due to poor health, refusal, or other reasons, all patients were not investigated but patients were examined based on neurological and neuropsychological after their stroke. Our study is based on the 16 patients who were able to reply to the quality of life questionnaire. Then it was continued by the Assessment of the post-stroke Quality of Life done using SS-QOL.

The questionnaire includes mainly with 12 questions designed to investigate the quality of life was used in addition to regular examinations. The questionnaire was constructed on the basis of the literature as well as on clinical experience with stroke patients. Questions requested information from before and after the stroke covering the following domains of life 1) energy, 2) family roles, 3) language, 4) mobility, 5) mood, 6) personality, 7) self care, 8) social roles, 9) thinking, 10) upper extremity function, 11) vision, 12) work or productivity. The patients answered the questions as to how things were before the stroke and as to how the same things were after the stroke. The differences between the pre-stroke and poststroke answers were used in estimating the changes in the quality of life. Depending upon the domain results before and after stroke the patient quality of life changes gradually, and these may lead to changes in all aspects as in ADL. These changes are overcome by strengthening the patient emotionally and help them in doing exercises required.

Then the disability of the patient is measured through the modified Rankin scale which consists of 0-6 were 0- no symptoms, 1- no significant disability, 2-slight disability, 3-moderate disability, 4-moderately disability, 5-severe disability, 6-dead. Where the scale shows that 2 patients are having slight disability, 6 patients are having moderate disability and 8 patients are having severe disability. Accordingly the patients with slight and moderate are been guided and instructed so that the restoration may take place soon after the post stroke which helps the patients to regain their ADL back to their normal form.

Statistical Analysis: The statistical analysis revealed significant difference (P<0.0001) between pretest and post test values of quality of life of stroke in patients with disability within the group. The pretest mean value SSQOL -118.93 and the post test mean value SSQOL -129.93. This shows that quality of life of stroke in patients with disability of test in posttest values were comparatively less than pretest value- p<0.0001. (table 1)

<table>
<thead>
<tr>
<th>Table 1: Change in the stroke patient through the pre and post test mean value.</th>
</tr>
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<tbody>
<tr>
<td>Result: According to SSQOL scale among stroke individuals conducted in Saveetha medical college OPD. The mean value SSQOL-129.93. For disability modified Rankin scale is used where there were 2 stroke patients with slight disability, 6 stroke patients with moderate disability and 8 stroke patients with severe disability. This shows that quality of life of stroke in patients with disability.</td>
</tr>
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</table>

Discussion

The main aim of our research is to develop a reliable, valid and sensitive measure of the specific quality of life for stroke. The domain of of social roles of the SS-QOL is to measure patients with stroke consider significant changes in social functions after stroke. In future validation studies, additional measures of social roles may be required to establish validation of SS-QOL social role domain. The SS-QOL domains respondes between 1 and 3 months after stroke, and only vision domain had a ceiling effect (63% with the maximum score). More effort is needed to evaluate the responsiveness of SS-QOL in patients with more severe stroke. It is important to emphasize the theoretical nature of the SS-QOL domains. It is possible that in a large sample validation, where the techniques of confirmatory factor analysis and multiple method multimetry can be used, the number of domains can be reduced. The exact number of domains is less important than the content of the elements that make up the SS-QOL. It is crucial to include elements that measure aspects of post-stroke function that are important for patients. Although we are encouraged by the preliminary data of reliability, content and construction validity and response capacity, the SS-QOL is in the initial phase of development and there are still many questions to be answered, including the problems of the respondents, interviewer versus self-administration, weighted versus unweighted domains and performance in patients with more serious stroke.
However, we are encouraged that the SS-QOL appears to detect significant changes, even in patients with mild stroke, and we are re-validating the SS-QOL, including assessing the reliability of the repeat test, the responses by power of attorney and the mode of administration, in a cohort. This includes the most seriously ill patients. Currently, we suggest that resources permitting, the 78 elements of the SSQ-SS be included when populations with moderate to severe stroke are studied, as a modification of these elements may be required for optimal QS-SS performance in these patients. In addition, since we found that the “amount of help” response set was not responsive, probably due to the good functional outcome of our patients, we recommend converting the personal care items to “quantity of help” responses “because of their greater ability to respond to clinically significant changes after stroke. As for recovering the quality of life from stroke in disabled patients by approaching and strengthening them, motivating and energizing them by indicating the best course of action with exercises for slow movement. Therefore, after all that, we find a restoration change in the form of an increase in the average value after a stroke. SS-QOL is a valid and reliable measure of the specificity of stroke. The SS-QOL has excellent content validity. SS-QOL shows reasonable construct validity. Several other determinants and predictors of quality of life have been reported, such as: physical disability of stroke survivor, behavioral disorders after stroke, personal attributes and caregiver depression, and social support. They are more or less similar to the predictors of the direction of change and their role in the quality of life, as well as in the load, can vary between the acute and chronic phases of stroke. It has been demonstrated in the scientific literature that the increased burden is significantly related to the deterioration of health-related quality of life among stroke providers, particularly in the areas of mental health and social functioning. The limitations of this study are the language and the cognitive domains of SS-QOL are not correlated. SS-QOL social role domain scores, but not social functioning subscale scores, were significantly different among patients with various dysfunction reports, suggesting that the SS-QOL social role domain measures this. That stroke patients consider significant changes in social functions post-stroke.

**Conclusion**

Patients who have severe disability have poor quality of life compared to mild to moderate disability. Changes can take place if there is a correct action of course in the mild and moderate patients, where the restoration of ADL takes place. Recommendations are the SS-QOL is a valid and reliable measure of stroke-specific. The SS-QOL has excellent content validity. SS-QOL show reasonable construct validity. The language and cognitive domains of the SS-QOL do not correlate. SS-QOL social roles domain scores but not the social functioning subscale scores were significantly different in patients with varying reports of dysfunction, suggesting that the SS-QOL social roles domain is measuring what stroke patients consider to be meaningful changes in post stroke social functions.

**Ethical Consideration:** The study was approved by Institutional Ethics Committee (Number 015/02/2017/IEC/SU on 28/02/2017) and was done in accordance with Ethical Guidelines for the Human Participants. This study protocol was approved by institutional ethical committee.

**Conflict of Interest:** Nil

**Sources of Funding:** Self

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A Study on Estimation of Chlorine in Drinking Water in an Urban Slum of Guntur District

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Abstract

Background: The share of urban population to the total population of India has increased from 27.81% in 2001 to 31.16% in 2011. This increase has also been accompanied by rapid growth of slums in cities. The 2011 Census of India reveals that 17.4% of urban households in India live in slums. This survey was conducted in the urban slum area of Anandapet, Guntur.

Objective: estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area and also to estimate chlorine levels in the drinking water consumed by the residents in the wake of the recent GE (gastroenteritis) epidemic in Guntur.

Methodology: A community based Cross-sectional study was carried out during May to June 2018 with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area.

Results: 77 (38.5%) houses do not follow any method of disinfection of water. Whereas 70 (35%) houses follow boiling. 38 (19%) houses use filter, and 15 (7.5%) use water purifier for disinfection of water. Among those 70 houses that boil the water, 59 houses use different well maintained vessel for storage of boiled water and 11 houses use same vessel for storage of boiled water.

Conclusions: Majority of the households in the study area had access to improved source of drinking water. But a few households practiced unhealthy storage and treatment practices like cleaning the overhead tank/sumps once a month or once in 15 days, not treating water prior to consumption, dipping the glass into the water drum. Absence of free chlorine suggests the need for attention by the concerned authorities and the households.

Keywords: Sanitation; Slum; Disinfection, Safe Drinking Water; Sanitary Latrine.

Introduction

Access to safe water in adequate quantity is one of the biggest challenges in the recent times. Despite the national commitment to supply safe drinking water, access to water is difficult especially in the rural areas. (1) Water scarcity in terms of quantity and quality has severe implications on the overall development and health of citizens. Factors such as poor availability, affordability and distance between water source and home may lead households to depend on less safe sources and reduce the volume of water used for hygiene purposes, (2) resulting in water-related infections.

Many infectious diseases such as bacterial, viral, and protozoal are result of drinking unclean water. Major etiological agents. responsible for more than a million diarrheal deaths are Escherichia coli, Rotavirus, Vibrio cholerae, Shigella, etc., which spread through unsafe drinking water. Worldwide, diarrhea is the second leading cause of mortality among children <5 years. In India, pneumonia and diarrhea are responsible for...
50% of deaths of children <5 years and this is because of drinking contaminated water; however, the recent studies from India reported even higher prevalence of water-borne diarrheal disease. In diarrhea, cholera is one of the most virulent and if left untreated, it will lead to fatality rate 25%–50%.[3]

In India, 66% of the rural population practices open air defecation. Despite comprehensive programs like total sanitation campaign, Swacch Bharath Mission open defecation still remains the predominant norm and poses one of the biggest threats to the health of the people.[4]

A significant proportion of water may be contaminated at the source itself and the local geographical conditions may have a role to play in it. Hence, water treatment assumes utmost importance in order to ensure the safety of the water consumed. At the community level, it is the responsibility of the municipalities to chlorinate the water being supplied to the households and public taps. Also it is up to the individual household to ensure that the drinking water they consume is adequately safe.[5]

This survey was conducted in the area of Anandapet, Guntur with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area and also to estimate chlorine levels in the drinking water consumed by the residents in the wake of the recent GE (gastroenteritis) epidemic in Guntur as several patients were admitted to the Government General Hospital, Guntur especially from the region of Anandapet. The data obtained is for the purpose of getting a clear cut idea about the current situation of Anandapet so that necessary measures can be undertaken to prevent the occurrence of such epidemics in the future.

Methodology

A community based Cross-sectional study was carried out during May to June 2018 at Anandapet, Guntur District, Andhra Pradesh with the objective of estimating the quality of drinking water, storage method at household level and waste disposal of both solid and sewage in that area. Approval from the institutional ethical committee was obtained before the start of the study. Initially a pilot study was conducted to assess the chlorination practices in the study area. It was found that 20% of the households used chlorination as one of the method of disinfecting drinking water source.

Sample size was calculated using the formula \(4pq/L^2\), considering \(p=20\%\) and an allowable error of \(6\%\) the minimum sample size was estimated to be 180 which was approximated to 200.

A semi-structured questionnaire was used to collect relevant data from the households regarding the sanitary practices at the household level. Drinking water samples are collected from each house and chlorine levels are estimated with iodometric method of chlorine testing. The results were duly noted, analysed & organized to look up on for easier evaluation.

The final data obtained was analyzed using Microsoft Office Excel 2007 and IBM SPSS statistics 20.

Results: Among the 200 households interviewed, majority were Muslims (70%), followed by Hindus (15%), Christians (14%) and others (1%). 39% of the study population was illiterate. The socio-economic grading of the households in the study according to modified Kuppuswamy classification was as follows: upper lower class (19%), lower middle class (46%), upper middle class (29%), upper class (5%) and lower class (1%). Based on the type of family, 63% were nuclear in nature and 37% were joint families.

The main source of drinking water among the households in the study was municipal water 159 (79.5%) houses, followed by mineral water in 34(17%) houses, public tap water by 7(3.5%) houses and bore well by 1 house (0.5%). The main alternative source of drinking water in the study area was mineral water followed by bore water and water tanker.

About 57.5% of the households surveyed, used buckets/drums to store water. Other method of storage were overhead tanks (35%) and sumps (1%). 6.5% of the study population do not use a proper sanitary method for storing the water. 68% of those who store water in either drums/tanks, clean them once in 7 days. The rest of the population do not have the habit of cleaning the drums/tanks regularly.

77(38.5%) houses do not follow any method of disinfection of water. Whereas 70(35%) houses follow boiling. 38(19%) houses use filter, and 15(7.5%) use water purifier for disinfection of water. Among those 70 houses that boil the water, 59 houses use different well maintained vessel for storage of boiled water and 11 houses use same vessel for storage of boiled water.

The method used for dispensing water from stored vessel include dipping glass directly into the vessel by
98 (49%), pouring into the glass by lifting the tumbler 30(15%), by filter tap 35(17.5%) and normal tap by 2(1%). 

Among the study population 198 (99%) houses follow hygienic practice of washing the hands with soap after defecation and 197(98.5%) houses responded the importance of washing hands before eating food and after defecation.

Among the houses surveyed, 49 houses (24.5%) had the history of water related diseases in the past 1 year. Among the surveyed population, all the houses responded that purest form of water is clear water without odour. 184(92%) houses follow the hygienic practice of disposing the solid waste by segregating it and disposing it by the help of municipal waste collectors. The rest 16(8%) houses are indiscriminately thrown the solid waste outside their houses.

Orthotoludine test was used to test for chlorine in the water samples and it was identified that 100 out of 200 houses were tested negative for OT test. Which predispose them for water related diseases.

![Drinking water source](image1)

**Figure 1: Drinking Water Source.**

![Alternate Source of Drinking Water](image2)

**Figure 2: Alternate Source of Drinking Water**
Table 1: Type of Water storage.

<table>
<thead>
<tr>
<th>Water storage:</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumps</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Overhead tank</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>No storage</td>
<td>13</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Table 2: Frequency of cleaning.

<table>
<thead>
<tr>
<th>Frequency of cleaning</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once in 2 days</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Once in 3 days</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Once in 4 days</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Once in 7 days</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Once in a month</td>
<td>27</td>
<td>13.5</td>
</tr>
<tr>
<td>Once in 2 months</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Once in 3 months</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Once yearly</td>
<td>13</td>
<td>6.5</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3: Washing hands with soap post defecation.

<table>
<thead>
<tr>
<th>Washing hands with soap post defecation</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>198</td>
<td>99</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4: History of water related diseases in family in the past 1 year

<table>
<thead>
<tr>
<th>History of water related diseases in family in the past 1 year</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typhoid</td>
<td>17</td>
<td>8.5</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>37</td>
<td>18.5</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Jaundice</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>No history of disease</td>
<td>151</td>
<td>75.5</td>
</tr>
</tbody>
</table>

Discussion

The majority of study population were Muslims and About 39% of Head of the families are illiterate. Most of the families belong to lower-middle class (46%) according to modified kuppuswamy classification. 63% of families are of nuclear type. The major source of drinking water to the area is from the Municipal water supply (79.5%) and the major alternate source of drinking water is through Mineral water cans (46%). Buckets & drums are the primary mode of storage of water. In 43% of the houses, residents clean their sumps/drums daily. 38.5% of household do not follow any method to maintain cleanliness of drinking water while the majority of others follow boiling method (35%) & candle filters (18%). Almost the entire population knows the importance of washing hands before eating food & post-defecation. 100 homes out of the 200 we surveyed are being supplied unsafe/unchlorinated water. Around 14 of the homes in Anandpet 2nd line complained of muddy water with bad odour being supplied to their homes. Some of the houses in Anandapet 4th line are lacking water connections as a whole. Most of the GE cases were treated in a government facility, some of them only requiring outpatient treatment whereas others were admitted in the hospital for an average duration of 7 days. All the people who suffered from GE have completely recovered and did not require dialysis during their hospital stay among the houses we surveyed. Majority of the households hand over their solid waste to the Municipal Waste Collector. In conclusion, safe water practices have to be enforced by the municipality and in every house.

Conclusion

Majority of the households in the study area had access to improved source of drinking water. But a few households practiced unhealthy storage and treatment practices like cleaning the overhead tank/sumps once a month or once in 15 days, not treating water prior to consumption, dipping the glass into the water drum. Absence of free chlorine suggests the need for attention by the concerned authorities and the households.

Recommendations: Health education is very important for better use of existing facilities and also to prevent the incidences of water and sanitation related diseases. Emphasis needs to be given to behavioural change communication to create awareness among the households regarding the importance of water and sanitation practices by using various media for education.

Source of Funding: Self

Conflict of Interest: Nil
References


Prevalence of Developmental Tongue Lesions in South Indian Population

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Abstract

Background: The presence of developmental anomalies on the tongue is relatively common reason that patients visit dental clinics. Diagnosis of a wide variety of developmental anomalies is an essential part of a daily dental practice.

Objective: The aim of this study was to evaluate the type and prevalence of developmental anomalies of tongue in patients in South Indian population.

Study Design: A total of 800 patients were screened for developmental tongue lesions. The developmental tongue lesions were found in 32 of 800 patients examined. The prevalence pattern was examined.

Result: The most prevalent tongue lesion was found to be fissured tongue 14(44%). The least prevalent was found to be macroglossia 1(%). The tongue lesions such as microglossia, hairy tongue and lingual nodule were not present. The developmental tongue lesions were found to be more in males (75%) than females (25%) in the survey.

Keywords: Developmental Tongue lesions, Ankyloglossia, fissured tongue, Bifid tongue, geographic tongue, median rhomboid glossitis, macroglossia, microglossia, hairy tongue.

Introduction

The tongue is the most accessible organ of the oral cavity. The tongue shows lesions just like other parts of the mouth. The tongue is the site and source of a symptom, which is unique to it. Traditionally, tongue lesions have been considered disorders of primary concern regarding oral and general health.

The presence of developmental anomalies on the tongue is relatively common reason that patients visit dental clinics. Diagnosis of a wide variety of developmental anomalies is an essential part of a daily dental practice. It is important for every dentist to have knowledge of the type and prevalence of developmental anomalies of tongue.

In recent years, epidemiological studies have shown that tongue lesions constitute a remarkable proportion of oral mucosal lesions and that prevalence rates vary in different parts of the world. These variations may be the result of race, sex and age differences of the examined samples as well as because of differences in diagnostic criteria, methodology and sampling procedures of the different investigators. The aim of this study was to evaluate the type and prevalence of developmental anomalies of tongue in patients in South Indian population.

The various developmental tongue lesions assessed are as follows. Ankyloglossia which is also known as tongue-tie. Hypoglossia is congenitally short tongue. Macroglossia is an abnormally large tongue, seen in some disorders such as Down syndrome. Median rhomboid glossitis is a condition characterized by an area of redness and loss of lingual papillae, situated on the dorsum of the tongue in the midline. Geographic tongue is a common disorder which causes a burning sensation without pain. Hairy tongue is a condition of the tongue

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where the filiform papillae elongate with brown or black discolouration, giving a black and hairy appearance. Fissured tongue is a benign condition characterized by deep grooves in the dorsum of the tongue. Bifid tongue is a congenital structural defect of the tongue in which its anterior part is divided longitudinally for a greater or lesser distance.

Method

A total of 800 patients attending the dental clinic for routine dental check-up or dental treatment were screened for our study. The patients were interviewed regarding their medical history, drug history, occupation, habits like smoking and drinking.

The 800 patients were screened dividing them into different age groups, children (1-18), adolescents (19-30), adult (31-45), old age(46-60). These included 100 males and 100 females in each group. (Table 1)

The study was performed during the period of January 2015 to April 2015. All the patients were examined for the presence of any one of the following tongue lesions: 1) ankyloglossia, 2) bifid tongue, 3) fissured tongue, 4) geographic tongue, 5) median rhomboid glossitis, 6) lingual nodule, 7) hairy tongue, 8) macroglossia, 9) microglossia.

The criteria for a positive finding in the 9 tongue lesions studied were as follows:

1) **ankyloglossia:** A thick frenulum on the ventral surface of the tongue that does not allow protrusion of the tip of the tongue beyond the vermilion border of the lower lip.

2) **bifid tongue:** Bifurcation at the tip of the tongue.

3) **fissured tongue:** Multiple linear fissures of various depths on the dorsal surface of the tongue.

4) **geographic tongue:** Patchy areas of papillary atrophy with partly sharp demarcation and partly surrounded by whitish serpiginous lines. In this condition, there is the recurrent appearance and disappearance of red areas on the tongue.

5) **median rhomboid glossitis** is an abnormality in the midline of the dorsum of the tongue at the junction of the anterior two-thirds with the posterior third. It may be rhomboid, diamond shaped, or irregular.

6) **lingual nodule:** A nodule of variable size located on the dorsal surface of the tongue at the foramen cecum.

7) **hairy tongue:** The filiform papillae can become elongated and air-like, forming a thick fur on the dorsum of tongue.

8) **macroglossia:** Congenital enlargement of the tongue.

9) **microglossia:** Abnormal smallness of the tongue.

The patients were examined sitting on a dental chair, in light, using a pair of disposable mouth mirrors. The personal data such as gender, age, occupation, and the different tongue lesions to be identified were recorded on specifically designed survey forms.

The exclusion criteria was the medical history of a systemic disease that results in a reduction of several functions of tongue and receiving medication that could have side effects on the oral mucosa and tongues.

The photographs of the representative cases of the various conditions were taken. Data were recorded. Statistical analyses were performed using the computer package of SPSS, version 12.

Table 1: Survey of Study Samples.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-18</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>19-30</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>31-45</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>46-60</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>400</td>
<td>800</td>
</tr>
</tbody>
</table>

Results: The developmental Tongue lesions were found in 32 of 800 patients examined. The prevalence rate of these tongue lesions was assessed in this survey. The developmental tongue lesions were found to be more in males (75%) than females (25%) in the survey. (Table 2).

Out of 32 samples in our study, the most prevalent tongue lesion was found to be fissured tongue (44%). The least prevalent tongue lesion was found to be macroglossia (1%). The tongue lesions such as microglossia, hairy tongue and lingual nodule were not present. (Table 2 and 3).

In our study, out of 5 cases, ankyloglossia was seen in 4 males (80%) and 1 female (20%). The most predominant age group in ankyloglossia was found to be 1-18 age group -5 cases (100%). (Table 2 and 3)

In our study, Out of 14 cases, fissured tongue was seen in 9 males (64%) and 5 females (36%). The most
predominant age group in fissured tongue was found to be 31-45 age group – 7 cases (50%). (Table 2 and 3)

In our study, out of 2 cases, bifid tongue was seen in 2 males (100%) and 0 female (%). The most predominant age group in bifid tongue was found to be 1-18 age group – 2 cases (100%). (Table 2 and 3)

In our study, Out of 6 cases, geographic tongue was seen in 5 males (83%) and 1 female (17%). The most predominant age group in geographic tongue was found to be 31-45 age group – 3 cases (50%). (Table 2 and 3)

In our study, out of 4 cases, median rhomboid glossitis was seen in 3 males (75%) and 1 female (25%). The most predominant age group in median rhomboid glossitis was found to be 46-60 age group – 3 cases (75%). (Table 2 and 3)

In our study, Out of 1 case, macroglossia was seen in 1 male (100%) and 0 female. The most predominant age group in macroglossia was found to be 19-30 age group – 1 cases (100%). (Table 2 and 3)

Table 2: Prevalence Pattern of Developmental Tongue Lesions Along With Gender Wise Distribution.

<table>
<thead>
<tr>
<th>Developmental Tongue Lesions</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankyloglossia</td>
<td>4 (80%)</td>
<td>1 (20%)</td>
<td>5 (16%)</td>
</tr>
<tr>
<td>Fissured Tongue</td>
<td>9 (64%)</td>
<td>5 (36%)</td>
<td>14 (44%)</td>
</tr>
<tr>
<td>Bifid Tongue</td>
<td>2 (100%)</td>
<td>-</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Geographic Tongue</td>
<td>5 (83%)</td>
<td>1 (17%)</td>
<td>6 (19%)</td>
</tr>
<tr>
<td>Median Rhomboid Glossitis</td>
<td>3 (75%)</td>
<td>1 (25%)</td>
<td>4 (12%)</td>
</tr>
<tr>
<td>Macroglossia</td>
<td>1 (100%)</td>
<td>-</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Microglossia</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hairy Tongue</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lingual Nodule</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24(75%)</td>
<td>8(25%)</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 3: Prevalence Pattern of Developmental Tongue Lesions According to the Age Group:

<table>
<thead>
<tr>
<th>Tongue Lesions</th>
<th>Age Groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-18</td>
<td>19-30</td>
</tr>
<tr>
<td>Ankyloglossia</td>
<td>5(100%)</td>
<td>-</td>
</tr>
<tr>
<td>Fissured Tongue</td>
<td>-</td>
<td>6(43%)</td>
</tr>
<tr>
<td>Bifid Tongue</td>
<td>2(100%)</td>
<td>-</td>
</tr>
<tr>
<td>Geographic Tongue</td>
<td>-</td>
<td>2(33%)</td>
</tr>
<tr>
<td>Median Rhomboid Glossitis</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Macroglossia</td>
<td>-</td>
<td>1(100%)</td>
</tr>
<tr>
<td>Microglossia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hairy Tongue</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lingual Nodule</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Discussion

There are many published studies on the prevalence rates of several tongue lesions in different geographic locations of the world. But the reports on prevalence of developmental tongue lesions vary greatly, depending on the investigated population, race, age, gender, diagnostic criteria, methodology and sampling procedure of the different investigators. There are only very few studies on the epidemiology of developmental tongue lesions in Indian populations. So, this study was done to evaluate the prevalence pattern of developmental anomalies of tongue in patients of South Indian population.

The prevalence of ankyloglossia is between 0.1% and 3.7% in different studies. In our study, the prevalence rate of ankyloglossia was 16% and was seen in more predominantly in males (80%) than females (20%). The most predominant age group in ankyloglossia was found to be 1-18 age group-5 cases (100%). In a study performed in Nigeria, the prevalence of ankyloglossia was as low as 0.2%, and in a Saudi Arabian study, this prevalence was 0.1%. Sedano et al examined Mexican children and found ankyloglossia prevalence relatively higher than others (0.8%), and a much higher prevalence for ankyloglossia in the boys than in the girls. Ankyloglossia can be complete or partial. Inextreme cases of ankyloglossia, nursing and feeding may become a problem shortly after birth, necessitating the surgical removal of the fibrous band. Mild cases of ankyloglossia may go noticed for a few years, until the time that speech becomes impaired. Children with ankyloglossia may have difficulties pronouncing certain words. Therefore, their phonetic developmental is interfered with, and this affects personality development. So, we strongly suggest treatment of this congenital developmental condition at an early age.

In our study, the prevalence rate of fissured tongue was 44% and was seen in 9 males (64%) and 5 females (36%). The most predominant age group in fissured tongue was found to be 31-45 age group-7 cases (50%). There are varied prevalence reports for fissured tongue in the literature, from 0.8-16%, depending on the populations studied. Fissured tongue is thought to be of multifactorial etiology. Although developmental nature seems most likely, we can also consider extrinsic factors such as chronic trauma or vitamin deficiencies as possible causes of fissured tongue. Therefore, we can attribute this difference between the prevalence to different exposure factors of the groups. In the literature, there is no consistency in the distribution of this anomaly between genders. In this study, the occurrence of fissured tongue was more common in males than in females. This result is in accordance with Sawyer et al and Kullaa-Mikkonen et al.

In our study, the prevalence rate of bifid tongue was 2% and was seen in 2 males (100%) and 0 female (%). The most predominant age group in bifid tongue was found to be 1-18 age group-2 cases (100%). Sedano et al’s survey indicates a prevalence of bifid tongue as 5.3% per 1000, with a higher proportion of boys affected, and a prevalence ratio of approximately 2 boys per one affected girl. In Sedano et al results also, it was found that boys (0.6%) were high likely to be affected compared with girls (0.4%).

In our study, the prevalence rate of geographic tongue was 19% and was seen in 5 males (83%) and 1 female (17%). The most predominant age group in geographic tongue was found to be 31-45 age group -3 cases (50%). The reported prevalence rates of geographic tongue varies from 0.1% to 14.4%, and most studies report the condition in about 1-2% of the subjects examined. According to the study of Rezaei et al (2015), the prevalence of geographic tongue was about 7% in Iran. Other studies reported the prevalence of geographic tongue to be 2% among people in the United States (Greenburg et al., 2014). Sedano et al values showed a slight, nonsignificant male predilection when compared with females. Salem et al and Sawyer et al found geographic tongue with approximately equal frequency in both gender in their population. Kullaa-Mikonen et al on the contrary, found that the percentage of geographic tongue was higher in females than in males. Avcu et al showed Geographic tongue with prevalence rate of 1.2% and had no difference between sexes. No sex differences was seen in study by Redman et al.

In our study, the prevalence rate of median rhomboid glossitis was 12% and was seen in 3 males (75%) and 1 female (25%). The most predominant age group in median rhomboid glossitis was found to be 46-60 age group - 3 cases (75%). The reported prevalence rates of median rhomboid glossitis vary from 0% to 3.35%. The female to male ratio of median rhomboid glossitis in the Turkish dental outpatients is 12:1. Median rhomboid glossitis is once thought to be a congenital abnormality. The possible role of Candida albicans has been stressed, as many of these observed “lesions” have been associated with candidal infection and the clinical changes disappear or are greatly improved following
antifungal treatment. However, some uncertainty remains, since some of these lesions are not controlled by the use of antifungal agents (17).

In our study, the prevalence rate of macroglossia was 12%. The prevalence of macroglossia in the study done by patil et al was 1.5%. Macroglossia is associated with Down’s syndrome, tuberculosis, sarcoidosis, hypothyroidism, amyloidosis, multiple myeloma, neurofibromatosis, infection and allergic reaction.

In our study, the tongue lesions such as microglossia, hairy tongue and lingual nodule were not present.

**Conclusion**

It can be concluded that the prevalence pattern of developmental tongue lesions in South Indian population was relatively similar to the studies from other parts of the world with some geographic differences. Variations in results when compared to other studies may be due to differences in sample size and different ethnicity. Still more studies are required in this field.

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**Source of Funding:** self

**Ethical Clearance:** was obtained from Saveetha university institutional ethical committee board.

**References**

Factors Underlying Dental Fear: A Fresh Insight

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Abstract

Background: Dental fear leads to lower use of oral-healthcare services, and, thereby, forming a dynamic vicious cycle of an important psycho-social factor causing avoidance of dental treatment and lack of attendance to dental treatments. The present study attempted to contextualize the dental fear scale, drawing on extant literature.

Method: The study instrument was circulated through social networking sites and online professional groups. Factor analysis was the major analytical tool.

Results: The results found a low and moderate level of dental fear among the respondents. The results, further, offer evidence to infer that education and employment are significant predictors of dental fear, but fail to establish the role of age structure on dental fear.

Conclusions: The moderate level of dental fear signals favourable attitude towards preventive dental care leaving lesser room for the occurrence of any avoidable dental health emergency and its inherent spill-overs in future.

Keywords: Dental fear, Dental fear scale, Factors underlying dental fear.

Introduction

Oral health is an inherent component of the overall general health and well-being of an individual thereby affecting his/her quality of life, appearance and self-esteem as well. Oral health conditions are universal public health challenges creating burden among all sections of population. The burden, however, can be reduced through home care and professional dental care, which, when received appropriately, on a regular basis, helps prevent and diagnose conditions through seeking of early intervention. Dental care is defined by many parameters such as dental visits per person annually, emergency versus routine care, and lack of dental visits in a given period of time. Nevertheless, plethora of studies confess that the attitude of the society, with respect to their oral health status, does not seem to be conducive to an overall favorable oral health environment.

Cohen et al. concede that those disadvantaged at receiving treatments for their oral health concerns are more likely to exhibit behavioural impacts that have effects on activities of daily living. Gender, age, education, feelings of vulnerability, need perceptions, language problems, treatment costs, transportation, dental workforce, individual’s health status, residence, charisma and beliefs of dental health care personnel are major barriers to utilization.

Context of the Study

A major reason for dental diseases is because of dental fear and anxiety that patients face, which, in turn, leads to their cancelling of appointments with the dentist or complete avoidance of treatment. Dental fear, delayed dental visits, increased dental problems and symptom-driven treatment forming a vicious cycle that feeds back into the fear experience of the patients, leading to an insoluble psychological problem. Multiple studies indicate that treatment avoidance owing to dental fear is a major public health problem.

In this backdrop, a quasi-exploratory study was undertaken using a structured instrument. The study
also endeavoured to contextualise the dental fear scale compatible to comparable socio-cultural situations.

**Review of Literature**

Armfield et al.\(^{15}\) have clearly delineated the difference between dental anxiety and dental fear, though they are often used interchangeably. Fear is a *physiological, behavioural and emotional response to a feared stimulus, whereas anxiety is a feeling of dread or worry focused on exposure to a feared stimulus*.\(^{14}\) Dental practitioners often find it easier to treat patients with dental anxiety but when it comes to dental fear, psychological and pharmacological strategies need to be adopted.\(^{18}\) Al-Madi and AbdelLatif\(^{19}\) clearly demarcate dental fear from dental anxiety.

An antecedent of dental anxiety and a widely experienced problem is dental fear\(^{20}\) which has been found to vary across cultures and across populations in regard to the content, pattern and levels. Considering demographic variables, prior study\(^{14}\) reports variation of fear among males and females, where in women were found to have higher levels of dental fear among different age groups, with the middle aged group, signaling high levels of dental fear.\(^{14}\) Individuals with poor socio-economic strata feared dental visits extensively. Additionally, dentate individuals, and people with fewer remaining teeth visit dentists less often\(^{14}\)

**Methodology**

The study followed a cross-sectional design and net survey method was used to collect data from prospective respondents. The study assessed dental fear using relevant scale. A structured questionnaire was designed drawing upon extant literature of dental fear. Dental fear was measured using a modified dental fear scale drawn upon Cohen et al.\(^{9}\), Goyal et al.\(^{13}\), Domoto et al.\(^{17}\), Nakazono et al.\(^{21}\), Al-Shammari et al.\(^{22}\), Armfield et al.\(^{23}\), Jakkola et al.\(^{24}\), and Abrahamson et al.\(^{25}\) Total number of 15 items were finalized in the deliberations and in consultation with experts.

The survey instrument was shared in various social networking sites and online professional platforms soliciting responses. Responses from those subjects, who never visited a dentist before, were excluded from the study to meet the stated objectives. A total number of 180 cases were considered for analysis after scrutiny. Principal component analysis\(^{26}\) was used to elicit modified dimensions of dental fear.

**Result and Analysis**

**Demographic profile of respondents:** Personal information of the respondents was considered crucial for better analysis and comparisons. Results of demographic profile of the respondents are presented in table 1.

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>52</td>
</tr>
<tr>
<td>31-50</td>
<td>35</td>
</tr>
<tr>
<td>Above 50</td>
<td>13</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
</tr>
<tr>
<td>Educational qualification</td>
<td></td>
</tr>
<tr>
<td>School level</td>
<td>11.1</td>
</tr>
<tr>
<td>Degree/Diploma</td>
<td>35</td>
</tr>
<tr>
<td>Post-graduation</td>
<td>54</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>58</td>
</tr>
<tr>
<td>Unemployed</td>
<td>38</td>
</tr>
<tr>
<td>Retired</td>
<td>04</td>
</tr>
<tr>
<td>Place of residence</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>78</td>
</tr>
<tr>
<td>Rural</td>
<td>22</td>
</tr>
</tbody>
</table>

*Source: Present study*

The minimum and maximum ages of the respondents covered in the study 18 years through 80 years respectively. When considering age groups, it is noticed that larger number of respondents belonged to the age group of 18 – 30 years (52 per cent). The survey responses were gender skewed with more number (56 per cent) of female respondents. Relatively high proportion of respondents with post-graduate and above level of education (54 per cent), with employment (58 per cent) and who hailed from urban location (78 percent) were the notable demographic attributes of the respondents.

**Factors underlying dental fear:** Factor analysis was conducted to identify the latent dimensions of dental fear. Principal component method was used for the analysis in Varimax rotation process. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test offered a value (0.789) well above the threshold level to ensure the sampling adequacy with respect to the number of items being considered for factor analysis.\(^{28}\) The Bartlett’s test of sphericity confirmed the suitability of factor analysis and which gives an indication of the inter-item co-relation, with an estimated Chi-square value 867.520 with p value of 0.000. The relevant result (rotated component matrix) of factor analysis is presented in the table 2.
Table 2: Factor loadings

<table>
<thead>
<tr>
<th>Components</th>
<th>PsF</th>
<th>PrF</th>
<th>FL</th>
<th>HC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not co-operate with treatment</td>
<td>.801</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dislike when asked to open mouth</td>
<td>.762</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afraid of going to dentist</td>
<td>.738</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncomfortable seeing white coat</td>
<td>.662</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancelled appointments with dentist</td>
<td>.573</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home remedy</td>
<td>.559</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait till I get pain</td>
<td>.556</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scared of injection inside mouth</td>
<td>.888</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>afraid when dentist drills tooth</td>
<td>.880</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel uncomfortable</td>
<td>.599</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had to miss work cause of tooth pain</td>
<td>.814</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain lowers ability to work</td>
<td>.809</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moody cause of dental problem</td>
<td>.650</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble while eating sleeping</td>
<td>.756</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worried about general health</td>
<td></td>
<td></td>
<td>.656</td>
<td></td>
</tr>
</tbody>
</table>

Eigen Values: 4.055 2.575 1.443 1.094
Variance Explained: 27.031 17.166 9.619 7.292
Factor Reliability co-efficient: 0.807 0.765 0.734 0.551
Overall (Concept) Reliability: 0.761

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

The factor loadings table attests the multidimensionality of the concept of dental fear. Dimension reduction process elicited four factors. These factors are Psychological fear, Procedural fear, Functional limitation, and Health concern. All indicators hold moderately high factor loadings to validate impeccable correlation between a particular factor and an item loaded under it. The total variance explained all the four factors is 61.12 per cent, signifying higher level stake of these factors in determining the dental fear of the respondents. The scale reliability is 0.793, showing high level internal consistence among the indicators. All the factors, except health concern, display reliability co-efficient above the threshold level.

Psychological fear is understood to be the most prominent component of dental fear, with maximum number of indicators loaded under this factor. The relatively higher eigen value (4.055) and variance (27.031) associated to this factor also subscribe to this fact. The factor reliability co-efficient of this factor is also the highest (0.807), ascribing higher inter-item consistency among the group. Health concern is a weak factor, comparing to its counterparts, with only two indicators loaded under it. This factor holds a reliability co-efficient (0.551) well below the threshold level.

An examination of the status of dental fear has disclosed the presence of a moderate level of the same, as indicate in table 3. The study has also attempted to understand the relative levels of fear across the four dimensions of dimensions of dental fear. The results disclose that procedural fear outweighs its other three factor counterparts. Two major indicators of procedural fear are discomfort due to drilling teeth and administering of injection inside mouth. Though psychological fear is the most underlying element of dental fear, its is the lowest among the group pertaining to the status of dental fear.
Table 3: Status of Dental Fear.

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Fear</td>
<td>1</td>
<td>5</td>
<td>2.16</td>
<td>.865</td>
</tr>
<tr>
<td>Procedural Fear</td>
<td>1</td>
<td>5</td>
<td>2.78</td>
<td>1.185</td>
</tr>
<tr>
<td>Functional Limitation</td>
<td>1</td>
<td>5</td>
<td>2.36</td>
<td>1.098</td>
</tr>
<tr>
<td>Health Concern</td>
<td>1</td>
<td>5</td>
<td>2.17</td>
<td>1.055</td>
</tr>
<tr>
<td>Dental Fear</td>
<td>1</td>
<td>4</td>
<td>2.37</td>
<td>.643</td>
</tr>
</tbody>
</table>

Source: Present study

Role of demographics on dental fear: The study considered five demographic factors such as gender, location of residence, age group, level of education and employment status to be instrumental for dental fear. Two-sample t-Test was used to examine the role of gender and domicility on dental fear and its various dimensions. The results are recorded in table 4.

Table 4: Independent t-Test

<table>
<thead>
<tr>
<th>Items</th>
<th>Equal variances assumption</th>
<th>t-Statistic</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Fear</td>
<td>Yes</td>
<td>-3.107</td>
<td>Yes</td>
</tr>
<tr>
<td>Procedural Fear</td>
<td>Yes</td>
<td>-.890</td>
<td>Not</td>
</tr>
<tr>
<td>Functional Limitation</td>
<td>Yes</td>
<td>-1.215</td>
<td>Not</td>
</tr>
<tr>
<td>Health Concern</td>
<td>Yes</td>
<td>-.394</td>
<td>Not</td>
</tr>
<tr>
<td>Dental Fear</td>
<td>Yes</td>
<td>-2.132</td>
<td>Yes</td>
</tr>
<tr>
<td>Role of location of residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Fear</td>
<td>Yes</td>
<td>-.366</td>
<td>Not</td>
</tr>
<tr>
<td>Procedural Fear</td>
<td>Yes</td>
<td>.756</td>
<td>Not</td>
</tr>
<tr>
<td>Functional Limitation</td>
<td>Yes</td>
<td>.128</td>
<td>Not</td>
</tr>
<tr>
<td>Health Concern</td>
<td>Not</td>
<td>-1.554</td>
<td>Not</td>
</tr>
<tr>
<td>Dental Fear</td>
<td>Yes</td>
<td>-.429</td>
<td>Not</td>
</tr>
</tbody>
</table>

Source: Present study

Gender has shown statistically significant impact on the overall dental fear. However, with respect to its various dimensions, psychological fear is the single most factor that has recorded any statistically relevant impact due to gender aspect. The location of residence, rural-urban dichotomy, manifests no impact either on dental fear or its various individual dimensions.

The role of age structure, education and employment status, as antecedents to dental fear, was examined using one-way ANOVA. The results, as presented in table 5, convey no evidence of statistically significant role of age structure, which is attributable on dental fear and its various dimensions. Whereas, the results offer evidence to infer that education and employment are significant predictors of dental fear. With respect to the dimensions, education has statistically significant bearing on procedural fear and functional limitation. Whereas, employment status is instrumental for psychological fear.

Table 5: Role of Age Structure.

<table>
<thead>
<tr>
<th>Role of Age structure</th>
<th>Test Statistic &amp; Significance</th>
<th>PsF</th>
<th>PrF</th>
<th>FL</th>
<th>HC</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F value</td>
<td>.431</td>
<td>.331</td>
<td>.158</td>
<td>.065</td>
<td>.089</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Role of Education</td>
<td>F value</td>
<td>6.014</td>
<td>.050</td>
<td>4.430</td>
<td>1.146</td>
<td>3.193</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>Yes</td>
<td>Not</td>
<td>Yes</td>
<td>Not</td>
<td>Yes</td>
</tr>
<tr>
<td>Role of Employment</td>
<td>F value</td>
<td>4.774</td>
<td>1.311</td>
<td>1.395</td>
<td>.439</td>
<td>3.779</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>Yes</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Present study
PsF: Psychological Fear; PrF: Procedural Fear; FL: Functional Limitation; HC: Health Concern; DF: Dental Fear.

Discussion

The current study offers evidence to Hmud and Walsh's27 notion of the prevalence of oral health problem, despite improved awareness. as majority of respondents have reported minimal level of dental fear. The effects of demographic variables of dental fear and dental anxiety varied in different studies.A study by Domoto et al.17 clearly specifies that dental fear did not vary with age, which is consistent with results of the current study.

Patients tend to have greater levels of knowledge about their health that they question their doctors if they notice any discrepancy in the type of treatment provided to them. As such, the fear and anxiety levels that forbid patients to visit healthcare services has also reduced. The rise in health and beauty consciousness drive more people to visit their healthcare providers. When it comes to oral health people opt to have cleaner and beautiful smiles and visit the dentist more often which was observed in this study.

The major limitation wasthat it could not conduct a longitudinal assessment to validate the scale. Future researchers can focus on this lacunae. Empirical relation between dental fear and dental anxiety need to be examined for proper policy intervention.

Conclusion

The current study, therefore, aimed to determine the factors underlying dental fear of a cross section of society. The prevalence of dental fear, leading to dental anxiety, is on the decline owing toincrease in knowledge and awareness of oral health related factors. An increase in general and oral health consciousness through means of adoption of preventive healthcare practices gives an indication of an improved general and oral health-seeking behaviors among the masses. Findings of this study offer evidences of a moderate dental fear, which signals no room for the occurrence of any avoidable dental health emergency and its inherent spill-overs in future.

Conflict of Interest: The authors report no-conflict of interest.

Source of Funding: The authors received no funding for this study.

Ethical Clearance: The research team had not sought the Ethical Clearance committee of any hospital, as the survey was conducted outside hospital. The data collection process was no way coercive.

References


An Analysis of College Teachers’ Attributions Stress level especially with Students in Cheyyar Taluk

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Abstract

Background and Purpose: The word stress typically describes the negative concept where it affects the physical and mental fitness of human. Teacher’s stress is a real phenomenon and associated with number of variables. Stress among the College teachers is caused mainly because of student’s attitudes.

Method: This study is based on both primary and secondary data. The primary data is collected from Female Government College Teachers working in Cheyyar. The researcher distributed 100 questionnaires to the Select Female Government College teachers working in Cheyyar Taluk. The researcher used convenience sampling method.

Results: The highest stress score of 368 is attributed to ‘Responsibility to increase the pass percentage of the slow learners makes me to get stress’. Professional development is needed in order to grow and them reflect professionally. In order to reduce stress and increase retention, teachers need better professional development that they can see as useful contributions to their teaching.

Conclusion: Promote new learning experiences among staff, they should actively participate in organizational committees and groups in correlation with their council; engage staff in the change process and reward positive changes in behavior and practices. More motivated activities can be organised to help teachers develop their positive relationships with students.

Keywords: Stress, Female Teachers, Students, College, Government.

Introduction

The word stress typically describes the negative concept where it affects the physical and mental fitness of human. Hans Selye struggled unsuccessfully all his life to find a satisfactory definition of stress. In attempting to extrapolate his animal studies to humans so that people would understand what he meant and he redefined stress as “The rate of wear and tear on the body”.

Teacher’s stress is a real phenomenon and associated with number of variables. Stress among College teachers is caused mainly because of students’ attitudes. The widely prevalent belief that College teachers’ role is quite simple having no complexities, tensions and conflicts is not correct because this is the outsider’s perception on the role of women College teachers. The stress faced by women College teachers’ is substantial. Psychosocial hazards can severely damage the working environment in Colleges and the main stress factors for teachers are students’ inadequate knowledge and ignorance, behavioural attitudes, disciplinary problems, teasing mentality and so on. These problems can lead to physical and emotional exhaustions.

Review of Literature: Hargreaves (2000) explained in his article that the organizational structure of secondary education can make it somewhat more difficult for secondary teachers to feel personally connected with their students. He told that secondary teachers experienced more alienation from students and more often felt unknown and stereotyped by their students, which was repeatedly mentioned as a source of negative emotion.

Geving (2007) found that poor student behavior is a main contributor to teacher stress, especially secondary level teachers. Other cited reasons for (2005) teacher stress or lack of administrative support and the excessive number of tasks that are required of new teachers who have not acquired successful task-management skills.
Kyriacou (2001) in his study divided coping strategies into direct action and palliative techniques. Direct action refers to strategies that teachers can do to eliminate sources of stress. For instance, if time pressures and deadlines are creating stress, a direct action to reduce the problem would be to seek a time extension, or to seek a change in deadline. Palliative techniques do not deal with the source of stress itself, but it focuses on reducing the feelings of stress from those sources.

Pianta (2001) defined in his article ‘conflict or anger’ depicts the relationship between teacher and students conflict that evoke anger in teachers.

Yoon (2002) indicated that teacher’s stress predict the negative impact in teacher and student relationship. In his study he found the significant correlations among teacher’s stress and negative relationship between teacher and student. He also found that teacher’s stress arises from being unable to discipline pupils in the way they would prefer.

Vivek B. Waghachavare (2013) assessed stress among students of various professional colleges and its association with various academic, social and health-related factors. The calculated total sample size was 1,200. A pretested self-administered questionnaire was used for the data collection. Analysis was done using percentage, the chi-square test, binary logistic regression and multinomial logistic regression. Students from all the three fields studied were exposed to stress. Academic factors were one of the most important stressors.

Minarik et al., (2003) in their article found that the rate at which teachers leave the profession is significantly higher than the departure rate in other professions.

Kokkinos (2007) Organizational and social pressures such as administration workload, classroom management issues, and lack of supervision and team support have been extensively studied.

A review of relevant literature revealed that the teaching profession is an extremely stressful occupation globally.

Statement of the Problem: Stress in teaching profession have been a major worldwide problem till now. The critical analysis of the literature on teacher-student relationship and the female teacher stress management illustrates the different levels of stress among the female teachers by the reason of students attitudes. Questions have been raised about female College teachers service, encounters stress, outcomes of stress and coping strategies. It is noted that the different causes of stress have been studied about the demographics and stress level. But this research intends to look beyond the outcomes of stress due to the service encounters. The review concludes that causes of stress mainly related to work dissatisfaction, job environment, insufficient pay and professional conflict.

In Tiruvannamalai District, particularly in Cheyyar Taluk as far as the researcher’s knowledge goes, no study has been carried out about the stress of female College school teachers. This study will fill the gap in research that hasn’t done so far.

Objectives of The Study

1. To examine the demographic details of the Female Govt. College teachers.
2. To identify the service encounters among the Female Govt. College teachers.
3. To evaluate the outcomes of stress among Female Govt. College teachers.
4. To find out the coping strategies of the Female Govt. College teachers.

Research Methodology

Research Design: This study is based on both primary and secondary data. The primary data is collected from female Government College teachers working in Cheyyar Taluk. The secondary data depends upon magazines, research articles and periodicals.

Data Collection: The researcher distributed 100 questionnaires to the Select Female Government College teachers working in Cheyyar. The researcher used convenience sampling method to collect data from the respondents.

Questionnaire Design: The primary data is collected through the well-structured questionnaire which consists of both optional types as well as scaling type questions. The questionnaire consists of 4 parts. The first part deals with demographic variables of female Government College teachers. Second part is useful to find out the level of service encounters stress among the female Government College teachers using Likert’s 5 point scale. Third part contains outcomes of stress. It helps to find out to what extent the stress has affected the female Government College teachers in their day-to-day work. The fourth part was completely framed to assess how
often they apply some techniques and actions to cope up with their stress level.

**Tools used for Data Analysis:** The collected data from female Government College teachers in Cheyyar Taluk is systematically tabulated and arranged for the data analysis process. The following statistical tools are systematically used to anatomically analyze the primary data.

1. Anova is used to find the significant differences between demographic details and Service encounters.
2. Mann-Whitney U test is used to find the significant differences between demographic details and Service encounters, Coping strategies.
3. Wilcoxon W test is used to find the significant differences between demographic details and Outcomes of stress.
4. Z test is used to find the significant differences between demographic details and Service encounters.
5. Correlation is used to find the relationship between experience and total stress.

**Analysis and Interpretation**

**Service Encounters:** Service encounters score is calculated by adding up the ratings on five point scale. The first service encounter (‘Students’ response to teacher and teaching is good.’) and the seventh service encounter (‘I condemn the irregularity of the students’) are reverse scored as higher score indicates less stress level. The analysis of service encounters is tabulated in Table 1.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Description of Service encounters</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Responsibility to increase the pass percentage of the slow learners makes me to get stress.</td>
<td>368</td>
</tr>
<tr>
<td>2</td>
<td>Stressed of students’ inadequate knowledge and ignorance.</td>
<td>357</td>
</tr>
<tr>
<td>3</td>
<td>Students’ behavioural attitudes.</td>
<td>323</td>
</tr>
<tr>
<td>4</td>
<td>Unable to punish the students for their indisciplinary activities.</td>
<td>318</td>
</tr>
<tr>
<td>5</td>
<td>Discipline problems in the classroom pollute my day to day activities.</td>
<td>316</td>
</tr>
<tr>
<td>6</td>
<td>Students’ family background give me an effect.</td>
<td>302</td>
</tr>
<tr>
<td>7</td>
<td>Teasing mentality among the students create stress.</td>
<td>289</td>
</tr>
<tr>
<td>8</td>
<td>Irregularity of the students.</td>
<td>253</td>
</tr>
<tr>
<td>9</td>
<td>Threats from the students’ parents.</td>
<td>237</td>
</tr>
<tr>
<td>10</td>
<td>Students’ response to teacher and teaching</td>
<td>197</td>
</tr>
</tbody>
</table>

In can be concluded that the highest stress score of 368 is attributed to ‘Responsibility to increase the pass percentage of the slow learners makes me to get stress’. This aspect puts unnecessary stress on college teachers.

The second most stress to college teachers with a score of 357 is caused by students’ inadequate knowledge and ignorance.

The factors ranked third to ninth relate to discipline and students attitude which has to be dealt with firmly by both teacher and the management. The tenth ranked service encounter is found to be least stressful as most of the respondents get good response for their teaching from students.

**Outcome of Stress**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Stress Outcome</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tiredness</td>
<td>332</td>
</tr>
<tr>
<td>2</td>
<td>Restless sleep</td>
<td>303</td>
</tr>
<tr>
<td>3</td>
<td>Frequent Headache</td>
<td>299</td>
</tr>
<tr>
<td>4</td>
<td>Nervousness</td>
<td>262</td>
</tr>
<tr>
<td>5</td>
<td>Irritation</td>
<td>262</td>
</tr>
<tr>
<td>6</td>
<td>Emotional outbursts</td>
<td>250</td>
</tr>
<tr>
<td>7</td>
<td>Lack of satisfaction with the job</td>
<td>246</td>
</tr>
<tr>
<td>8</td>
<td>Irregular periods</td>
<td>244</td>
</tr>
</tbody>
</table>
The top three ranked stress outcomes are Tiredness, Restless sleep and Frequent Headaches. These outcomes of stress for 23.86% of total stress outcome score. Psychological outcome Nervousness, Irritation, Emotional outbursts and Lack of satisfaction with job have score above mean (244.62) and are ranked fourth, fifth, sixth and seventh hence these needs to be addressed as priority by the management.

**Coping Strategies**

The stress coping strategy which is used frequently is ranked.

**Table 3: Coping Strategies Score.**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Coping Strategy</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drinking water</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>Planning the time and work for a day.</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>Thinking positively</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>Involving in religious activities</td>
<td>51</td>
</tr>
<tr>
<td>5</td>
<td>Reading interesting books.</td>
<td>47</td>
</tr>
<tr>
<td>6</td>
<td>Listening to music</td>
<td>43</td>
</tr>
<tr>
<td>7</td>
<td>Sleeping</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>Taking balanced diet</td>
<td>37</td>
</tr>
<tr>
<td>9</td>
<td>Talking to neighbours and friends</td>
<td>34</td>
</tr>
<tr>
<td>10</td>
<td>Forgetting the unwanted things that happened in the school.</td>
<td>32</td>
</tr>
<tr>
<td>11</td>
<td>Watching TV</td>
<td>27</td>
</tr>
<tr>
<td>12</td>
<td>Avoiding strenuous posture</td>
<td>21</td>
</tr>
<tr>
<td>13</td>
<td>Avoiding confrontations</td>
<td>18</td>
</tr>
<tr>
<td>14</td>
<td>Shopping</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>Deep breathing</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>Social support network</td>
<td>13</td>
</tr>
<tr>
<td>17</td>
<td>Doing more exercises and sports</td>
<td>12</td>
</tr>
<tr>
<td>18</td>
<td>Doing yoga/Meditation</td>
<td>11</td>
</tr>
</tbody>
</table>

Surprisingly, drinking water to cope with stress is the most frequent mechanism which is used by teachers. Planning the time and work for a day and Thinking Positively are ranked second and third.

**Marital status and Coping Strategy:**

**Table 4: Marital status and Coping Strategy**

<table>
<thead>
<tr>
<th>Coping Strategy</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep breathing</td>
<td>669.000</td>
<td>3444.000</td>
<td>-2.507</td>
<td>.012</td>
</tr>
<tr>
<td>Thinking positively</td>
<td>718.000</td>
<td>1069.000</td>
<td>-2.274</td>
<td>.023</td>
</tr>
</tbody>
</table>

Mann-Whitney U Test reveals significant difference in ‘Deep breathing’ coping strategy’s frequency of use between Single (Mean = 2.08, n = 26) and Married (Mean = 1.68, n = 74) teachers, U = 669, z = –2.5, p = 0.012.

Mann-Whitney U Test reveals significant difference in ‘Thinking positively’ coping strategy’s frequency of use between Single (Mean = 2.35 ,n = 26) and Married (Mean = 2.66, n = 74) teachers, U = 718, z = –2.27, p = 0.023.

**Major Findings of the Study**

- The highest stress score of 368 is attributed to ‘Responsibility to increase the pass percentage of the slow learners makes me to get stress’.
- The first service encounter ‘Students’ response to teacher and teaching is good ‘ and the seventh service encounter ‘ I condemn the irregularity of the students’ are reverse scored as higher score indicates less stress level.
- The second most stress to teachers with a score of 357 is caused by students’ inadequate knowledge and ignorance.
- The tenth ranked service encounter is found to be less stressful as most of the respondents get good response to their teaching from students.
- There was a strong, positive, partial correlation between experience of teachers and total stress, controlling for age of teachers, r = 0.723, n = 100, p < .0005, with high levels of experience being associated with higher levels of total stress.
- It is found that higher experience has partial, strong correlation of 0.723 to total stress, which indicates 52.27 per cent (0.723 x 0.723 x 100) shared variance.
- Experience helps to explain nearly 52.27 per cent of the variance in respondents’ scores of total stress experienced by teachers.

**Suggestions:** The results supports the hypotheses that the effect of occupational stressors on professor’s psychological well being vary depending on the level of perceived Student’s attitudes. However, although Students’ response to teachers and teaching is good support buffered with the effects of some occupational stressors, Students’ inadequate knowledge and ignorance exacerbated the adverse effects of others. Disciplinary student attitude can be resolved by a mix of empathy and firm disciplinary action. This will help bring down
teachers’ stress level. Psychological outcomes like Nervousness, Irritation, Emotional outbursts and Lack of satisfaction with the job are reduced by proper emotional support and social network support of colleagues and family. Singleteachers are thus more likely to use Deep Breathing and Thinking Positively as a method of coping with stress.\(^9\)

**Conclusion**

Teaching is a stressful career and few will refute the significance amount of stress involved in the career. Professional development is needed in order to grow and reflect professionally. Teachers desire this form of collaboration. In order to reduce stress and increase retention, teachers need better professional development, with that they can see useful contributions to their teaching. Professional development activities can range from simple school-level tasks for new teachers such as copy machine usage and how to complete administrative tasks to more advanced sessions on content knowledge or best practices.

To be more effective the practice of coping strategies may be followed regularly. It may be beneficial to begin using it after the school day when it is possible to take a few minutes to reflect on the day’s events. With practice, it will be helpful to begin using these techniques during stressful situations, not just after they have subsided. More motivated activities can be organised to help teachers develop positive relationships with students.

**Ethical Clearance:** (Annamalai University, SCSVMV, VISTAS)

**Source of Funding:** Self

**Conflict of Interest:** Nil

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**References**


The Exploring Strategies for Reducing Occupational Stress of Female Physiotherapist

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¹Assistant Professor, Department of Commerce, Vels University (VISTAS), Pallavaram, Chennai

Abstract

Background and Purpose: Stress is a part and parcel of our very existence, and probably the only stress free state is death. Physiotherapists help people affected by injury, illness or disability through movement and exercise, manual therapy, education and advice. The objective of this study is to find out the work stress in Female physiotherapist and to reduce their stress by the way of remedial strategies.

Method: This study is based on both primary and secondary data. The primary data is collected from female Physiotherapist working in Thiruvannamalai and Kanchipuram District. The researcher distributed 30 questionnaires to the Select Female Physiotherapist. The researcher used convenience sampling method to collect data from the respondents. Pearsons chi-square test is used to anatomically analyze the primary data.

Results: Stress causing factors should be detected and procedures should be followed to balance these factors. The results show that the level of stress in most of female Physiotherapist is in medium level. These results are similar to other studies.

Conclusion: Promote new learning experiences among staff, they should actively participate in organizational committees and groups in correlation with their council; engage staff in the change process and reward positive changes in behavior and practices. In short, this work provides some insight about the level of stress among female physiotherapists Thiruvannamalai and Kanchipuram District.

Keywords: Stress, Female, Physiotherapists, Outcomes, Coping Strategies, Occupational Stress.

Introduction

In the fast changing world of today, no individual is free from stress and no profession is free from stress. Stress is a part and parcel of our very existence, and probably the only stress free state is death. Stress cannot be avoided totally in any society. One has to learn to live with it, manage it and cope with it, if possible try to overcome it.

Women are important to society in the workforce and in the home. Women today are busier than ever. As working parents, they work long hours or hold multiple jobs. As a stay-at-home mothers, they take care of active and busy children while managing their home and sometimes even working from home. They are creating new possibilities, starting or running businesses and pursuing their dreams. With all that’s going on in a woman’s life, it seems almost impossible to find ways to de-stress. But it depends on how a woman adopts to it. Women continue to juggle multiple roles, including those roles related to the home and family, for which the women may have sole or major responsibility.

Review of Literature: Yuri Kawano (2008) explained in his article, stress factors are also associated with mental and physical health of nurses. The physical and mental health of nurses might affect their time off, the quality of care and patient satisfaction. However, many Japanese studies of nurses focused on the association of job related stress factors with job satisfaction or burn out.

Marc A. Campo (2009) et al., determined the levels of psychological job demands and job control reported by physical therapists in a national sample, compared those levels with national norms, and determined whether high demands, low control, or a combination of both increases the risk for turnover or work-related pain. More than one half of the therapists reported work-
related pain. Risk factors for work-related pain included low job control and job strain.  

Elisah Margretha Buining (2015) et al., explore the so-called ‘therapist-effect’, by looking at the influence of intrinsic therapist factors, specifically personality traits, on treatment outcome in patients with CD. Therapist variables were measured using a questionnaire consisting of demographics and the Big Five traits: Extraversion, Neuroticism, Agreeableness, Conscientiousness and Openness to experiences.  

N. Nathiya et al., (2017) found that Community physiotherapists are under increasing pressure and managing their time for working with small amount of resources and management skills. The aim of their study are concentrated the musculoskeletal injury for finding the occupational stress factors over sixty five physiotherapists in top ten hospitals using subjective scale study. Two groups were formed using the participants, i.e., physiotherapists from government hospital (GH) and physiotherapists from private hospital (PH).  

Statement of the Problem: Stress in the medical profession has been a major worldwide problem for quite something now. Work-related stress problems are on the increase among caring professions, such as nursing, in developing countries. The critical analysis of the literature on stress management of Female Physiotherapist illustrates the different levels of work stress among the Female Physiotherapist. Questions have been raised about their work related stress, outcomes of stress and coping strategies. It is noted that the different causes of stress have only been studied at the demographics and stress level. But this research intends to look beyond the outcomes of stress due to the work stress. The review concludes that causes of stress mainly related to work dissatisfaction, job environment, insufficient pay and professional conflict.  

In Thiruvannamalai and Kanchipuram Districts far as the researcher’s knowledge goes, no study has so far been carried out about the stress of Female Physiotherapist. This study will fill the gap in research that has not been well researched into.  

Objectives of The Study: The objective of this study is to find out the work stress in female nurses and to alleviate their stress by the way of remedial measures. Several questions are designed to obtain more detailed information about stress and its management. The study is done based on the data collected from the select Female Physiotherapistin working in Thiruvannamalai and Kanchipuram District.  

Research Methodology  

Research Design: This study is based on both primary and secondary data. The primary data is collected from Female Physiotherapist working in working in Thiruvannamalai and Kanchipuram District. The secondary data depends upon magazines, research articles and periodicals. The researcher distributed 30 questionnaires to the Select Female Physiotherapist working in working in Thiruvannamalai and Kanchipuram District. The researcher used convenience sampling method to collect data from the respondents.  

Questionnaire Design: The primary data is collected through the well structured questionnaire which consist of both optional types as well as scaling type questions. The questionnaire consists of 4 parts. The first part deals with demographic variables of Female Physiotherapist. Second part is useful to find out the level of work stress among the Female Physiotherapist working in Thiruvannamalai and Kanchipuram District using Likert’s 5 point scale. Third part contains outcomes of stress. It helps to find in what extent the stress has affected the Female Physiotherapist in their day-to-day work. The fourth part completely framed to assess how often they apply some techniques and actions to cope up with their stress.  

Tools used or Data Analysis: The collected data from Female Physiotherapist in Thiruvannamalai and Kanchipuram District is systematically tabulated and arranged for the data analysis process. The following statistical tools are systematically used to anatomically analyze the primary data.  

1. Simple percentage analyzes is used to describe the demographic profile.  
2. Pearsons chi-square test  

ANALYSIS AND INTERPRETATION  

Hypothesis Testing  

$H_0 = $ There is no significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Work Related Stress.  

$H_1 = $ There is Significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Work Related Stress.
Table 1: Relationship Between Demographic Variables and Work Related Stress

<table>
<thead>
<tr>
<th>Types of Work Related Stress</th>
<th>Variables</th>
<th>P Value at 0.05 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am affected due to delayed promotion.</td>
<td>Experience</td>
<td>.007**</td>
</tr>
<tr>
<td>There are adequate facilities for staff</td>
<td>Distance</td>
<td>.013</td>
</tr>
<tr>
<td>I worry about unnecessary interference of co-staff.</td>
<td></td>
<td>.032</td>
</tr>
<tr>
<td>There is groupism among staff in my workplace.</td>
<td></td>
<td>.055**</td>
</tr>
</tbody>
</table>

** at .10 percent level

Chi-Square was used to test the independence, homogeneity and goodness of fit among the various factors with the demographic variables. The main purpose of using the test was to test whether there is a significant association between two variables.

The pearsons chi-square calculated value for all the “Work related stress” was significant at 0.05 level. Using, SPSS, if the significant value is less than 0.05 then reject null hypothesis and accept alternate hypothesis. In the above obtained results the significant value is less than 0.05 so, reject null hypothesis. Hence, there is significant association between all the mentioned variables and work related stress mentioned above in the table.

Hypothesis Testing for Outcomes of Stress

H₀ = There is no Significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Stress Outcome.

H₁ = There is Significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Stress Outcome.

Table 2: Relationship Between Demographic Variables and Outcomes of Stress.

<table>
<thead>
<tr>
<th>Types of Outcome of Stress</th>
<th>Variables</th>
<th>P Value at 0.05 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulcer problem due to stress</td>
<td>Nature of Employment</td>
<td>.073**</td>
</tr>
<tr>
<td>Frequent Headache</td>
<td></td>
<td>.071**</td>
</tr>
<tr>
<td>Nervousness</td>
<td></td>
<td>.028</td>
</tr>
<tr>
<td>Non-Cooperation and misunderstanding from spouse</td>
<td>Marital Status</td>
<td>.000</td>
</tr>
<tr>
<td>Unable to manage the problems of children</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

** at .10 percent level

Chi-Square was used to test the independence, homogeneity and goodness of fit among the various factors with the demographic variables. The main purpose of using the test was to test whether there is a significant association between two variables.

The pearsons chi-square calculated value for all the “Outcome of stress” was significant at 0.05 level. Using, SPSS, if the significant value is less than 0.05 then reject null hypothesis and accept alternate hypothesis. In the above obtained results the significant value is less than 0.05 so, reject null hypothesis. Hence, there is significant association between all the mentioned variables and work related stress mentioned above in the table.

Hypothesis Testing for Coping Strategies

H₀ = There is no Significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Coping Strategies.

H₁ = There is Significant relationship between age, education, monthly income, nature of employment, experience, family type, travel distance, monthly income and Coping Strategies.
Chi-Square was used to test the independence, homogeneity and goodness of fit among the various factors with the demographic variables. The main purpose of using the test was to test whether there is a significant association between two variables.

The pearsons chi-square calculated value for all the “Coping Strategies” was significant at 0.05 level. Using, SPSS, if the significant value is less than 0.05 then reject null hypothesis and accept alternate hypothesis. In the above obtained results the significant value is less than 0.05. So, reject null hypothesis. Hence, there is significant association between all the mentioned variables and work related stress mentioned above in the table.

**Major Findings of the Study**

- There is a significant association between all the mentioned variables and work related stress.
- There is significant association between all the mentioned variables and outcome of stress.
- There is a significant association between all the mentioned variables and coping strategies.

**Suggestions:** The results show that the level of stress in most of Female Physiotherapist in Thiruvannamalai and Kanchipuram Districts is in medium level. These results are similar to other studies. The most effective coping strategies which would decrease work stress are doing yoga, exercises and meditation. In general, salary hike to employees make less stress and will improve the sense of autonomy, confidence and responsibility. Support of spouse is very important to reduce their stress level. To give proper monetary incentives and a good working.

The Female Physiotherapist can be made to work in a stress free or less stress environment by assigning them proper work load considering their abilities and skills, makes them to realize their responsibilities, giving them opportunities to participate while taking decisions, providing them with all the facilities, making bases for a social links, paving way to their job improvements.

**Conclusion**

In conclusion, health care professionals are more susceptible to occupational stress because of intense daily activity. Female Physiotherapist are not ever thought of as needing help but only as the care givers, and applying some techniques for Female Physiotherapist stress burnout prevention is more important than we ever thought. To reduce occupational stress among Female Physiotherapist, create fun work environment, encourage and reward creativity among staff to generate ideas and implement new practices, discuss opportunities with staff to increase sense of autonomy such as shared governance and self-scheduling; use case studies to reinforce problem-focused strategies versus stress reduction. In short, this work provides some insight about the level of stress among Female Physiotherapist. It acknowledges the need for further research to explore source of stress among Female Physiotherapist their possible solution and preventive measures and also to determine the effect of any change secondary to implementation of preventive strategies at different levels.

**Ethical Clearance:** (Annamalai University, Scsvmv, Vistas)

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**


An Anatomical Study on Position of Mandibular Foramen in Dry Adult Human Mandibles

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Abstract

In dentistry field the inferior alveolar block technique is most common. The aim of this paper is to summaries the knowledge about the anatomy of the mandible and with the localization of anteroposterior and superoinferior position of the mandibular foramen in adult mandible and also to emphasize the most significant clinical suggestion of the current studies regarding anesthesia carried out in the area of the mandible.

Keywords: Mandible, human anatomy, inferior alveolar nerve block, mandibular foramen.

Introduction

The mandibular foramen is an opening in the internal or medial surface of the ramus of the mandible. The mandibular vessels and nerve to pass through the mandibular foramen. The foramen is guarded by a bony protrusion called lingula. The mandibular canal starts at the mandibular foramen and descends obliquely forward in the ramus, and later in the body of mandible accommodates the inferior alveolar neurovascular bundle1.

Knowledge of the position and its exact localization of the mandibular foramen are important for both diagnostic and clinical purposes. Clinically, during routine block injection application during tooth extraction and surgical procedures like sagittal split osteotomy2,3 the inferior alveolar nerve could be injured. The most frequent technique failure in anesthesia of the inferior alveolar lies in the inappropriate setting of the needle, due to the inaccurate location of anatomic structures mandible foramen4.

In different populations, this foramen occupies different position. But its most frequent position on the mandible is found to be in the mid of ramus5-7. Therefore, the purpose of this study is to investigate any difference occurs in the position of the mandibular foramen of dry adult human mandible.

Materials and Method

For this study 50 dry adult human mandibles of unknown sex and age were collected and studied in Department of Anatomy, Sree Balaji Dental College and Hospital, Bharath University. In order to standardise the measurements, the subsequent mentioned points were determined: (A) mandibular foramen; (B) mandibular notch; (C) inferior border of the ramus; (D) anterior border of the ramus; and (E) posterior border of the mandible (Fig 1). The line connecting B-A-C and D-A-E determined the height and the width of the mandible, respectively. Any mandible with signs of defects were noticed and barred for the study. We have also excluded the edentulous mandible. The height and the width of the mandible were taken on both sides using vernier caliper.

All bones were subjected for the measurements as:

• Vertical measurement (Superoinferior position)
• Horizontal measurement (Anteroposterior position)

The measurements was made by taking the references spot like

• AB-MF: Nearest point on the anterior border of the ramus of mandible to the mandibular foramen (AB- anterior border, MF – mandibular foramen)

• MF- PB: Nearest point on the posterior border of the ramus of the mandible to the mandibular foramen. (PB- posterior border, MF – mandibular foramen)

• MN-MF: Mandibular notch to the mandibular foramen.

• MF-IB: From mandibular foramen to the inferior border of the mandible

The distances from the mandibular foramen to various bony landmarks were recorded. The mean and standard deviation were calculated separately for right and left sides and tabulated (Table 1)

The A-P position of the MF on the ramus was determined by drawing a perpendicular line from the MF to the tangent of the posterior border of the ramus (AP line) as described by Fujimura et al. 8.

All the measurements were taken on the either side of the mandible. The mean values and standard deviation were calculated using SPSS version 20.0. The parameter were compared using students T test with significance of p=0.05.

Result

The purpose of this study is to locate the position of mandibular foramen in relation to the anteroposterior and superoinferior directions. Different investigators have adapted different method to study the position of mandibular foramen. In certain studies radiographs 9, 10 were used while others used the dry mandibles for foramen localization 11, 12.

In our study the superoinferior dimension on the right side the mean distance from mandibular notch to the mandibular foramen is 22.26 ± 0.258 SD and from mandibular foramen to the inferior border is 23.5± 24.1 SD. On the left side the mean distance from mandibular notch to the mandibular foramen is 22.7 ± 0.282 SD and from mandibular foramen to the inferior border is 24.1± 0.268 SD (Graph 1). In anteroposterior dimension (Graph 2) the mean distance from anterior border to mandibular foramen is 17.7 ± 0.188 SD and the mean distance from mandibular foramen to posterior border is 15.8 ± 0.320 SD on the right side. On the left side the mean distance from anterior border to mandibular foramen is 17.14 ± 0.292 SD and the mean distance from mandibular foramen to posterior border is 15.2 ± 0.174 SD (Table1). The pronounced deviations were observed in these measurements may due to alter in the shape of the foramen. The mandible foramen is located near the centre or at the centre of the mandible ramus. However there is no marked change were observed in the position of the mandibular foramen on the right and left sides.

Legends:
Table 1: Showing the mean and standard deviation of the present study on the position of the mandibular foramen

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Landmarks</th>
<th>Side of the mandible</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td>1.</td>
<td>MN - MF</td>
<td>22.26</td>
<td>22.79</td>
</tr>
<tr>
<td>2.</td>
<td>MF- IB</td>
<td>23.5</td>
<td>24.1</td>
</tr>
<tr>
<td>3.</td>
<td>AB-MF</td>
<td>17.7</td>
<td>17.14</td>
</tr>
<tr>
<td>4.</td>
<td>MF-PB</td>
<td>15.86</td>
<td>15.2</td>
</tr>
</tbody>
</table>

Graph 1: Showing the mean values of the superoinferior measurements of the medial side of the mandible on right and left side.

Graph 2: Showing the mean values of the anteroposterior measurements of the medial side of the mandible on right and left side.
Discussion

The mandibular foramen which is considered as an important landmark for orthosurgeries in vertical ramus osteotomy, inverted L-ostectomy, endodontic treatments and lesions diagnosis, accomplish inferior alveolar block. During these surgical procedures the inferior alveolar nerve is at great risk of injury. Failure to locate neurovascular bundle will result due to inaccurate localization of mandibular foramen. Incorrect estimations of its location might be the reason for the unsuccessful anesthesia of the inferior alveolar nerve. Our present study investigated the location of the mandibular foramen and compared to the other studies done in south Indian population. A study carried out by Lavanya Varma et al stated that the mean distance of MF from 3rd molar tooth was 1.5 cm and 1.8 cm in right and left side of the mandible in South Indian population. Padmavathi et al found that the distance of mandibular foramen was situated at an average distance of 0.9 ± 0.8 mm posterior to the center of the width of the ramus and at an average distance of 1.4 ± 0.6 mm superior to the center of the vertical height of the ramus. One of the most common reasons for the failure in the technique of inferior nerve block is due to the lack of the proximity between anesthetic needle and mandibular foramen and thus the inaccurate localization of the structures of the mandibular foramen. Thus our current study explains the position of the MF with references to the various landmarks. In this study the position of the mandibular foramen seems to be bilateral symmetry in adult human dry mandibles. The result shows no significant difference between right and let sides which coincide with Gopalakrishna et al., 2016. The knowledge of the position of the MF is of a great importance for many procedures in dentistry. Its accurate location enables a more effective anesthesia, which in turn leads to an easier patient conditioning.

Conclusion

The understanding of the landmarks for location of mandibular foramen is a considerable importance for the surgeons and radiologists to perform successful inferior alveolar nerve anesthesia, dento alveolar surgeries, endodontic treatments and lesions diagnosis and prevent the damage of neurovascular structures passing through it and subsequent complications. Thus our study is very useful for clinicians who work in the area of the mandible.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

Source of Funding: Nil

Conflict of Interest: Nil

References


Protective Effects of Plants Against Nicotine Induced Reproductive Toxicity in Male Animal Models: A Literature Review

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Abstract

Nicotine the major ingredient in Cigarette is said to have many adverse effects on Spermatozoa and its parameters and affects various other fertility factors. The damages caused by cigarette smoking are due to the biological finding that Nicotine increases the level of free radicals, which results in oxidative stress. These increased the free radicals which also causes DNA damage and lipid peroxidation in human sperm, thus resulting in impairment of sperm quality. Nicotine administration in experimental animals affect spermatogenesis, epididymal sperm count, motility and the fertilizing potential of sperms. A huge number of medicinal herbs have been listed in siddha system that improve spermatogenesis and increase the quality of sperm. This review provides an overview on the association between male fertility induced by nicotine and protective effects of various herbal plants against sperm damages.

Keywords: Nicotine, Tobacco, Male infertility, Free Radicals, Antioxidants, Testosterone.

Introduction

In developing countries infertility is an understudied concern in sexual and reproductive health, yet its impact can be staggering. An inability to conceive or bear children can result with psychological, economic, and medical implications. The quality of human sperm is deteriorating in South India over the years, most probably due to environmental, nutritional, life style or socioeconomic causes1. Nicotine, a pharmacologically active alkaloid, is the most important component of tobacco. Administration of nicotine compounds through any route decreases the sperm count and motility. Only a few Scientific analyses are done on the Impacts of cigarette smoking on male infertility. 30% of studies reveals the cause of infertility as reduction in sperm count 42% of studies reveals the cause as reduction in sperm morphology and 40% of studies reveals the cause as reduction in sperm motility3. Nicotine can damage sperm membrane and DNA and induce apoptosis in interstitial cells of testis. The role Anti-oxidant properties of herbal plants on reproductive hormones, epididymis pathway, and sperm count and motility in nicotine induced infertility have not been investigated so far. In Siddha system many herbs are used to improve the sperm quality and other fertilizing characters of sperm. Many Plants and their extracts that are rich in antioxidants play a major role in protecting testicular damages caused by nicotine. The plants listed in this review may be of high scientific relevance. There is need to conduct Preclinical and Clinical studies to support the traditional claims and thus to work out cellular and molecular mechanism of infertility induced by nicotine.

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Nicotine Dosage: The Tobacco in a single Tobacco Cigarette rod containing approximately 1–2% nicotine is equal to 1–2 g per 100 g or 0.8–1.9 mg nicotine. An average cigarette delivers roughly 10–30 μg kg⁻¹ peak
plasma levels of Nicotine\textsuperscript{4,5,6}. In most of the preclinical studies nicotine is administered intraperitoneally\textsuperscript{(7)}. In a few studies nicotine is administered intramuscularly. Nicotine is administered either in salt form (Nicotine tartarate) or as Liquid Nicotine. The most common dosage of Nicotine are as follows 0.1 mg/100 g BW\textsuperscript{(12)}, 0.25 mg/100g/day\textsuperscript{(2),(11)}, 0.3 mg/100g, 0.4 mg/100g \textsuperscript{(17)}, 0.5 mg/100g \textsuperscript{(63),(14)} and dose of liquid nicotine is 0.5 ml/kg body weight of animal\textsuperscript{(9)}. Nicotine (free base) \textsuperscript{162} g mole\textsuperscript{−1} MW, whereas nicotine hydrogen tartrate=498 MW.

In calculating the amount (mg) of the salt form needed to be administered, the following equation is useful\textsuperscript{76}: 
\[ \text{dose, mg/kg } \times \text{ BWt, kg } \times \frac{\text{nicotine salt form MW}}{\text{nicotine free base MW}} \]/injection volume, ml

Nicotine on reproductive tissue: The Nicotine which is consumed is oxidized to its metabolite cotinine, which has a long half-life period. This nicotine and the cotinine adversely affect spermatogenesis and decrease epididymal sperm count, motility, and the fertilizing potential of sperms. Presence of increased amount of Nicotine in the body stimulates high amount of collagen fibres deposition under the basal lamina leading to thickening of Tunica propria. It also causes degeneration of Junctional specifications between the Sertoli cells\textsuperscript{8}. Tubulin is a protein particle that is abundant in the cytoplasm of all multiplying cells that plays a major role in cell division. Nicotine reacts with Tubulin and causes disorders in cell division\textsuperscript{3,4}. Nicotine produces both reversible and irreversible damages in most tissues of all living beings and the extent of damage is species specific and depends on age, gender, genetic background, period of exposure and route of administration. The oral administration of nicotine in rats at a dose of 2.5 mg/kg body weight/day for the duration of four weeks is equivalent to the constant exposure to nicotine in smokers in humans\textsuperscript{(2)} Nicotine (0.5 mL/kg) significantly decreased the motility, count and normal morphology of sperms (p<0.05)\textsuperscript{(9)}

List of Plants That Prevent Nicotine Damages:
In Siddha system many herbal plants are used in the treatment of male infertility. Only a few scientific studies are available to prove the efficacy of those plants and their extracts that combat nicotine-induced toxic effects on spermatogenesis. Some of those plants are reviewed and listed for future reference.

Curcumin, an extract from Curcuma longa is useful in the treatment of male infertility owing to oligospermia and decreasing male sexual hormones\textsuperscript{(9)}

Coconut water, the liquid endosperm of coconut, contains sugars, vitamins, minerals, proteins, free amino acids and growth promoting factors which promote Spermatogenesis.

Aqueous extract from the plant Chlophytum borivilianum result in amelioration of sexual dysfunction, and improves sexual performance.

Date Palm pit reduces the toxicity produced by Nicotine on testis and result in significant increase of testosterone level in serum and stimulates spermatogenesis\textsuperscript{10}

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Plant- Botanical Name</th>
<th>Family</th>
<th>Chemical/Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Turmeric/Curcuma longa\textsuperscript{(9)}</td>
<td>Zingiberaceae</td>
<td>Curcumin</td>
</tr>
<tr>
<td>2.</td>
<td>Eruca sativa\textsuperscript{(2)}</td>
<td>Brassicaceae</td>
<td>Natural antioxidants such as polyphenols</td>
</tr>
<tr>
<td>3.</td>
<td>Nigella sativa\textsuperscript{(59)}</td>
<td>Ranunculaceae</td>
<td>Thymoquinone</td>
</tr>
<tr>
<td>4.</td>
<td>Coconut water, the liquid endosperm of coconut/Cocos nucifera\textsuperscript{(38)}</td>
<td>Arecaceae</td>
<td>Sugars, vitamins, minerals, proteins, free amino acids</td>
</tr>
<tr>
<td>5.</td>
<td>Urtica dioica\textsuperscript{(55)}</td>
<td>Urticaceae</td>
<td>Flavonoids</td>
</tr>
<tr>
<td>6.</td>
<td>Chlophytum borivilianum\textsuperscript{(57)}</td>
<td>Liliaceae</td>
<td>Natural antioxidants</td>
</tr>
<tr>
<td>7.</td>
<td>Zingiber officinale\textsuperscript{(2)}</td>
<td>Zingiberaceae</td>
<td>Natural antioxidants</td>
</tr>
<tr>
<td>8.</td>
<td>Date palm/Phoenix dactylifera\textsuperscript{(14)}</td>
<td>Arecaceae</td>
<td>Natural antioxidants</td>
</tr>
<tr>
<td>9.</td>
<td>Green Tea/Camellia sinensisLeaves\textsuperscript{(11)}</td>
<td>--</td>
<td>Natural antioxidants</td>
</tr>
<tr>
<td>10.</td>
<td>Saffron/Crocus sativus</td>
<td>Iridaceae</td>
<td>Crocin</td>
</tr>
</tbody>
</table>
Effects on Sperm Count and Abnormal Sperms:

Common abnormalities seen in nicotine treated rats were sperm head twisted body, detached head, abnormal neck, round tail. The sperm count can be calculated by Johnson criteria, a convenient and rapid method for quantitative analysis of spermatogenesis. Gradual increase in dose of curcumin for 50 days significantly increased the Sperm count and normal morphology of sperms. \(^{(9)}\)

Tender Coconut water and Mature Coconut water administered with nicotine showed significantly \((p \leq 0.05)\) higher epididymal sperm density, improvement in vas deferens weight and sperm count in comparison with the nicotine treated control rats. The percentage of spermatozoan with progressive movement was considerably \((p \leq 0.05)\) reduced on plant toxin treatment. Coconut water supplementation significantly protected the sperms from the damaging effect of nicotine and exhibited a significant \((p \leq 0.05)\) decrease in percentage of sperm abnormality. Tender Coconut water showed good improvement in progressive movement of sperm. Mature coconut water also showed significant \((p \leq 0.05)\) sperm protective effects and decreased the sperm abnormality. Coconut water commonly increased sperm motility.

Eruca sativa seed oil showed a significant improvement in all the testicular parameters of nicotine treated rats. Eruca sativa seed oil play a major role in stimulating the process of spermatogenesis in rats immediately.\(^{(2)}\)

Green tea prevented the appearance of few scattered pyknotic nuclei in the basal cell layers. It also increased the Interstitial Leydig cells \(^{(11)}\).

Zingiber officinale was very effective in preventing the nicotine induced testicular damages by increasing the pro infertility potentials in nicotine induced male and also female rats.

The plants that are rich in antioxidants improve the sperm quality by increasing the expression of antioxidant genes in rats.

Effects on Morphometry and Sperm Motility:

Curcumin decreased all types of toxicity induced by nicotine in the fatty tissue.\(^{(9)}\) Reduction in Testicular weight is an important marker of gonadal toxicity. Minimal administration of nicotine for 21 days showed a markable reduction in weight of testes. Nicotine \((0.5 \text{ mL/kg})\) caused a significant decrease in the diameter seminiferous tubules in comparison with control \((\text{ethanol-saline})\) group \((p<0.05)\). Curcumin played a significant role in regulating diameter of seminiferous tubules \(^{(9)}\).

As a result of Genotoxic effect of nicotine there is excess production of two highly mutagenic nitrosamine, \(N’-\text{nitrosonor nicotine (NNN)}\) and \(4-(\text{methyl nitrosamine})-1-(3-\text{pyridyl})-1- \text{butanone (NNK)}\) which is a by product from nicotine during tobacco curing or burning. Green tea improved the capacity of spermatozoa to penetrate oocytes.

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**Fig. 1:** Analysis of the effect of control, nicotine, plant - nicotine on testicular weight.
**Effects on Hormonal Imbalance:** Nicotine degenerates the germ cells by reducing intra testicular concentrations of testosterone, which is essential for the normal spermatogenesis as well as for the maintenance of the structural morphology and normal physiology of the seminiferous tubules. The plants listed here are rich in unsaturated fatty acids that stimulate the activity of 17 β-hydroxysteroid dehydrogenase, the most important key enzyme in the testosterone biosynthesis pathway. Crocin elevated testosterone level (P=0.00) even in highly toxic animals. Nicotine caused a significant decrease in spermatogenesis quantity and Johnson’s score, sperm parameters, and sex hormones. Plants that increase Melatonin production can increase sperm chromatin integrity, and improves spermatogenesis.

**Conclusion**

This review was conducted to evaluate the protective effects of various herbs plants and their extracts against sperm damages in nicotine administered male rats. Though a number of evidences were available in literature, for plants used as aphrodisiacs and those increase sperm count and quality, Only a very few has been listed and proved scientifically about the mechanism in managing nicotine induced damages. Efficacy of all other herbs and their extracts against nicotine induced infertility needs scientific updation. Various pathways involved must be taken into account to come up to find a lead molecule of herbal origin to treat nicotine induced sexual impairment. All the plants that improve the quality of sperm seems to be rich in natural antioxidants like flavanoids. These antioxidants help in scavenging the free radicals and helps to prevent lipid peroxidation within testes, thus enhancing the testosterone levels and results in normal sperm counts.

**Abbreviations:**

- mg – milligram
- ml – milliliter
- kg – kilogram,
- gm –gram,
- BWt – Body weight,
- os – oxidative stress
- Ros – reactive oxygen species

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Histological Studies on Pancreatic Tissue in High Fat Diet with Low Multiple Dosage of Streptozotocin Induced Type 2 Diabetes After Gymnema Sylvestre Administration

Arumugam Rajalakshmi1-2, Govindarajan Sumathy3

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Abstract

Gymnemasylvestre is a medicinal plant for the potential management of diabetes mellitus. The leaves are used in herbal medicinal preparation. phytochemical study shows its therapeutic value and for treating the patient with type 2 diabetes mellitus(11). The present study deals with the ethanolic extraction from powdered leaves of gymnemasylvestre through the soxhlet apparatus carried out for 48 hours. the active phytochemical component of gymnemagenin and its antidiabetic and hypolipidemic property(6) is tested by standard procedure. The chemical test such as thin layer chromatography shows the presence of gymnemic acid. isolation and quantification of the powdered leaves of gymnemasylvestre is revealed the presence of gymnemagenin(2). Type 2 diabetes is confirmed with the values of fasting bloog glucose and c-peptide level. The ethanolic extract of gymnemasylvestre(14) with dose of 200mg/kg body weight and 400mg/kg is administered to low multiple dose 40mg/kg body weight streptozotocin induced type 2 diabetes mellitus and the parameters of blood glucose, body weight are taken and it is compared to normal control group. The histopathogical study shows a significant changes in the recovery of pancreatic beta cell in the treatment of gymnemasylvestre(7). The result indicates the component of gymnemic acid(5) from gymnema sylvestre is useful in controlling the blood sugar level to treat type 2 diabetes mellitus in the earliest stage of disease.

Keywords: Gymnemasylvestre, gymnemagenin, c-peptide, type 2 diabetes, pancreas.

Introduction

Metabolic syndrome causes many risk factor for cardiovascular problems which includes hyperglycemia, obesity, hypertension. Nowadays there is a tragic increase in the risk of developing type 2 diabetes mellitus across the world. Patients with type 2 diabetes are often associated with obesity which shows reduced insulin sensitivity and causes excess insulin secretion and hyperinsulinemia. Type 2 diabetes mellitus has become common syndrome in society due to sedentary life style and dietary habits. So effort has to be taken to prevent the prevalence of type 2 diabetes mellitus. To achieve this goal, an appropriate experimental animal are used to establish the pathogenesis, disease syndrome such as obesity, hyperlipidemia along with type 2 diabetes mellitus which is exactly close to the humantype 2 diabetes mellitus.

Various drugs are used to induce diabetes mellitus but streptozotocin is the drug commonly used to induce both type 1 and type 2 diabetes mellitus. The dosage and the diet varies to develop type 2 diabetes mellitus. Many studies reported that the rat fed with high fat diet and the combination of low multiple dose of streptozotocin induces type 2 diabetes mellitus, which are more closely
related to the human type 2 diabetes mellitus. Many studies reported that the high fat diet will initiate the insulin resistance which is the important feature of non-insulin dependent diabetes mellitus. Many authors reported that streptozotocin has the capability to induce mild to severe type of diabetes mellitus and the reports indicates low multiple dose of streptozotocin induces type 2 diabetes mellitus in a animal model. In order to induce type 2 diabetes mellitus the present study is planned to use streptozotocin as the drug.

Although there are many anti-diabetic drugs are produced and suggested to the patients. Still, type 2 diabetes mellitus is a major metabolic syndrome in India. Many authors reported that prolong use of these antidiabetic drugs may cause side effects. Sulfonyl urea drugs. In order to avoid the progression of hyperglycemia and destruction of beta cell, progression of insulin resistance in beta cell. Many traditional medicinal plant drugs shows a remarkable changes in reducing the symptoms of disease and use of this reduces the risk of developing side effects and less toxic in nature. In the present study the traditional medicinal plant called Gymnema sylvestre has antidiabetic property and its component gymnemagenin, saponin play a major role to reduce the hyperglycemia, prevent insulin resistance in type 2 diabetes mellitus. The present study was designed to evaluate the protective effect of ethanolic extract of Gymnema sylvestre on hyperglycemia, hyperlipidemia, hyperinsulinemia, obesity and organ weight in male wistar albino rats.

Materials and Method

Streptozotocin was purchased from viva scientific company, chennai. The plant of gymnema sylvestre were collected from nithya herbal gardens from Chidambaram and the plant material was properly identified and confirmed with plant authentication no.PARC/2018/3985. The plant leaves were air dried under shade and the dried were made into fine powder, the powder is kept in a freezer until further use. The present study protocol was approved by animal ethical committee of sathyabama institute of science and technology with CPCSEA noSUS/CLATR/IAEC/XI/100/2018.

Male wistar albino rats, weighted 140 to 160g were used for the study and the animals were kept under polypropylene cage inside a ventilated room. Each cage consist of 4 rats, they are maintained under standard laboratory condition of 12:12 hours light/dark cycle with temperature 22-25 degree c with relative humidity of 50-60% and had a free access of water.

Diet and Chemicals: The animals were fed with high fat diet and water. The high fat diet consists of carbohydrate 43%, fat 40% and protein 17% were used for the study and the regular chow diet for control group which consists of carbohydrate 49%, fat 3% and protein 21%.

Preparation of Ethanol Extract of Gymnema Sylvestre: 100g of dry leaf powder was packed in a soxhlet thimble and then extracted with 80 percent ethanol. The 80 percent ethanol is added until the powder is exhausted, the extraction procedure were carried out for 48 hours till the ethanol extract was obtained. The collected solution from the flask were filtered through whatman no.1 filter paper. The solvent was evaporated under pressure at 90 degree c by rotary evaporator and the extract was stored at -20c in a freeze until for further use.

Preparation of Streptozotocin Solution: Streptozotocin was dissolved in 50Mm sodium citrate buffer (pH 4.5) to a final concentration of 4mg/ml and this solution is always prepare freshly should use it within 5 -10 min. using 1ml syringe and 22-g needle, inject the low multiple dose of streptozotocin solution intraperitonially at 40mg per kg body weight (1.0ml/100g) for 5 consecutive days in the experimental group of animals and the dose were calculated according to the body weight of animals.

Experimental protocol: The animals were divided into six groups. Each group consists of six animal in the study. In this six groups, control group receive normal chow diet and water, control high fat diet group receive high fat diet till the end of experiment, remaining all the four groups receive high fat diet before induction of the low multiple dose of streptozotocin. Before injection, the albino rats were fasted overnight and then given intraperitonial injection in a citrate buffer (pH 4.5) next morning. After induction the group 3 - low multiple dose streptozotocin induced, group 4 - low multiple dose streptozotocin induced + high dose (400mg/kg body weight) Gymnema sylvestre, group 5 - low multiple dose streptozotocin induced + low dose (200mg/kg body weight) Gymnema sylvestre, group 6 - low multiple dose streptozotocin induced + metformin 25mg/kg body weight were fed with normal, the control group and the high fat diet group receive regular and high fat diet respectively. On 43rd day all the animals were fasted.
overnight and sacrificed with deep anesthesia with ketamine. The liver, kidney, pancreas, heart and aorta were dissected and weighted immediately. The tissue were fixed in 10% formalin for histological analysis, body weight was measured weekly, food and water consumption is monitored daily.

**Result**

Blood glucose: Fasting blood glucose level were taken before starting the experiment and after treatment. Fasting blood glucose was measured once every 15 days. It was measured by collecting a drop of blood from tail vein, this was measured by using a rapid glucose analyser with a glucose strip inserted in a glucometer and the values are recorded in terms of milligram per deciliter of blood. The results are given in tabular column below 1

Body weight: Animals were weighed before and after starting the experiment and during respective treatment and after completion of each treatment group. The record of these observation was maintained and given in the tabular column 2.

**C-Peptide Level:** Blood is collected from retroorbital vein and the blood is collected immediately in potassium ethylenediaminetetraacetic acid (EDTA) tube and measured using immunoussay analyser is stable at room temperature. The parameter of c-peptide level is taken before induction of streptozotocin and after administration of streptozotocin which is given in a tabular column below. ref tab.3

**Histopathological Study:** All the animals were sacrificed by cervical dislocation after completion of experiment and the pancreas tissue was fixed in 10% formalin and the tissue were processed, embedded in paraffin wax and section were taken with 5µ thickness in a microtome. Sections were stained with haematoxylin and eosin stain to see the histological changes of pancreas through microscope.

**Statistical Analysis:** All the values are reported with mean ± SD. Statistical analysis was carried out by ANOVA test with the significance of p value.

| Table 1: Effect of fasting blood glucose level of before streptozotocin induced and after streptozotocin administration and during treatment |
|---|---|---|---|
| Group | Mean | Std. Deviation | Std. Error |
| 1 | 79 | 13.11488 | 7.57188 |
| 2 | 85.3333 | 10.01665 | 5.78312 |
| 3 | 91.25 | 6.23832 | 3.11916 |
| 4 | 81 | 6.48074 | 3.24037 |
| 5 | 83.25 | 6.23832 | 3.11916 |
| 6 | 81.375 | 7.43163 | 3.71582 |
| Total | 83.6591 | 8.45631 | 1.80289 |
| Group | Mean | Std. Deviation | Std. Error |
| 1 | 87.3333 | 1.52753 | 0.88192 |
| 2 | 224.6667 | 28.11287 | 16.23097 |
| 3 | 447 | 5.19615 | 3 |
| 4 | 432.6667 | 22.67892 | 13.09368 |
| 5 | 447 | 5.19615 | 3 |
| 6 | 432.6667 | 22.67892 | 13.09368 |
| Total | 352.2105 | 154.5472 | 35.45556 |

STZ-streptozotocin

| Table 2: Effect of body weight before streptozotocin induced and after streptozotocin administration and during treatment |
|---|---|---|---|
| Group | Mean | Std. Deviation | Std. Error |
| 1 | 133.3333 | 20.81666 | 12.0185 |
| 2 | 186.6667 | 16.07275 | 9.27961 |
| 3 | 160 | 39.37004 | 19.68502 |
| 4 | 137.5 | 23.97916 | 11.98958 |
| 5 | 136.25 | 40.9013 | 20.45065 |
| 6 | 142.5 | 30.68659 | 15.34329 |
| Total | 148.4091 | 32.67394 | 6.96611 |
| Group | Mean | Std. Deviation | Std. Error |
| 1 | 140 | 13.22876 | 7.63763 |
| 2 | 202 | 18.68154 | 10.78579 |
| 3 | 108.3333 | 12.58306 | 7.26483 |
| 4 | 115 | 25 | 14.43376 |
| 5 | 116.25 | 33.26034 | 16.63017 |
| 6 | 120 | 7.07107 | 5 |
| Total | 133.3889 | 38.09298 | 8.9786 |
Table 3: Effect of c-peptide level of before streptozotocin induced and after streptozotocin administration

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1967</td>
<td>0.10599</td>
<td>0.06119</td>
</tr>
<tr>
<td>2</td>
<td>1.8</td>
<td>0.95394</td>
<td>0.55076</td>
</tr>
<tr>
<td>3</td>
<td>2.05</td>
<td>0.25166</td>
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<td>4</td>
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<td>5</td>
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<td>0.26458</td>
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<td>6</td>
<td>1.3</td>
<td>0.42426</td>
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**Histological Study:**

The histological study of pancreas of type 2 diabetic group showed shrinkage of islets of langerhans, damage of acini and the number of beta cells are reduced whereas in treatment group there is regeneration of islets of langerhans and beta cell number also increased due to the ethanolic extract of *gymnema sylvestre*. According to hafizurrahman improvement of beta cell function was observed in *gymnema sylvestre* treated diabetic rat in his immunohistochemical study\(^7\).

**Discussion**

According to diago the low dose streptozotocin with high fat diet induces type 2 diabetes\(^3\), in the present study the food and water intake is observed, the result shown a significant reduction in body weight and increased water intake and food intake of type 2 diabetic group of wistar albino rats when compared with control group. In the treatment group administration of *gymnema sylvestre* showed a significant raise in body weight. The high intake of food and water intake after streptozotocin injection is a significant characteristic of type 2 diabetes mellitus. According to wang\(^15\) in his study the 30-40mg/kg were utilized to induce type 2 diabetes mellitus when combined with high fat diet. In the present study 40mg/kg were chosen to induce type 2 diabetes mellitus. In the present study here is
marked increase in fasting blood glucose level after streptozotocin injection and during treatment with Gymnemasylvestre, the fasting blood glucose level is markedly reduced this shows the hypoglycemic activity of ethanolic extract of Gymnemasylvestre. The fasting blood glucose level is raised in a diabetic group of wistar albino rats when compared with control group and there was a recovery of fasting blood glucose is seen in the treatment group. In the present study the streptozotocin induced type 2 diabetes mellitus shows a marked decrease in body weight and pancreatic tissue weight the body weight is slightly increased after giving the treatment with ethanolic extract of gymnemasylvestre. According to Nath s.k(10) in his study he reported the pancreatic gland weight is decreased in high fat diet induced type 2 diabetes whereas in the present experiment also reduction in pancreas weight occurs. In the present case of treatment group of gymnemasylvestre with a dose of 400mg/kg body weight, the fasting blood glucose becomes normal than gymnemasylvestre with a dose of 200mg/kg body weight. According to dipak(4) in his study 70% ethanolic extract of gymnemasylvestre is taken for treatment but in the present study 80% ethanolic extract of gymnemasylvestre is given for treatment group of animals which shows increase in pancreatic beta cell regeneration which related to author syed rana(13).

Conclusion
The result indicates high fat diet with low multiple dose 40mg/kg streptozotocin induces type 2 diabetes mellitus and the high dose of Gymnema sylvestre 400mg/kg posses high hypoglycemic activity than the low dose.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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Artemesia Annua L. Nanoparticles Destabilize Membrane Integrity and Induce Apoptosis in a Caspase Mediated Pathway in MDA-MB-231 Cells

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Abstract

Breast cancer exhibits diagnostic and therapeutic challenges due to tumour heterogenicity and poor efficacy of anti cancer drugs at the metastatic sites. Recently, nanomedicines provide a potential benefit to breast cancer treatment by their increased bioavailability, selective targeting, increased efficacy and lower toxicity. This work aimed to evaluate the cytotoxic potential of A. annua silver nanoparticles (AGNPs) on human triple-negative breast cancer cell lines. The mechanism by which A. annua AGNPs exhibit growth inhibition was analysed by using the status of LDH, Mitochondria Membrane potential [MMP], and ATP levels. Finally, the ability of A. annua AGNPs to mediate cell death was studied by protein expressions of Bax, BCL-2, Caspase 3 and Caspase 9. We observed that A. annua AGNPs show a remarkable cytotoxic effect by increasing levels of LDH with loss of MMP and reduced ATP levels. Here in this study, protein expression of Bax, BCL-2 ratio, Cyt C and Caspase 9 protein expression level favors apoptotic induction during AGNPs treatment. Henceforth we prove that A. annua AGNPs can be useful as alleviative regiment against breast cancer and can be explored for other cancers and its related pathologies.

Keywords: Breast Cancer, Bax, Bcl-2, Apoptosis, Mitochondria, Caspase 9.

Introduction

Breast cancer is one of the most common invasive cancers in women with high mortality worldwide. The increased mortality rate is high due to lack of early detection, effective less treatment, severe side effects and drug resistance [1]. Based on molecular markers for hormones breast cancer is of 3 types of Estrogen receptor [ER] positive, Progesterone receptor [PR] positive and Hormone receptor [HR] negative. Currently, triple-negative breast cancer recurs more frequently than the other 2 subtypes due to uncertain benefits of chemotherapy and endocrine therapy which warrants greater attention towards identifying novel drugs to inhibit and as well as to prevent its recurrence.

Artemisinin the active component of Artemisia annua [sweet worn wood] is well known for its unique potential against malarial infection. It is a sesquiterpene lactone containing an unusual endoperoxide bridge that shows marvelous action on apoptotic induction, angiogenesis inhibition, autophagy, cell cycle arrest and metastases prevention on cancer cells [2]. Nanotechnology provides a new frontier for cancer treatment providing an alternate strategy to circumvent multidrug resistance, theranostic action and synergistic effect with plant formations [3,4]. Recently a number of researches have successfully documented the synthesis of AGNPs using plant extract which exploits sustained anti-tumor activity [5,6]. This study describes the effect of AGNPs synthesis by a biogenic method using Artemisia annua against invitro breast cancer MDA-MB231 cells. We aimed to find out A. annua AGNPs cytotoxic effect against breast cancer by determining the levels of LDH leakage, mitochondrial membrane integrity and apoptotic protein expression levels.

Materials and Method

Chemical and Method: Trypsin, Bovine serum albumin (BSA) and Dimethyl sulfoxide (DMSO) were obtained from Sigma (St. Louis, MO, USA). RPMI
1640 medium, fetal bovine serum (FBS) and antibiotics were purchased from Gibco (Carlsbad, CA, USA). FBS was stored at −20°C and then freshly prepared aliquots were used for cell culture complete medium. Primary antibodies [Bax (# CAT No: sc-7480), Bel-2 (#CAT No: sc-7382), Caspase 9 (# CAT No: sc-133109), Cyt-c (#CAT No: sc-13561), and GAPDH (# CAT No: sc-59540)], and secondary antibodies were obtained from Cell Signaling Technology (Beverly, MA, USA). Phenylmethanesulfonylfluoride (PMSF), Radioimmuno precipitation lysis buffer (RIPA buffer) Protease inhibitor coin tail, and sterile PBS, bicinchoninic acid (BCA) Protein Assay Kit were obtained from Thermo Fisher Scientific (Rockford, IL, USA). Rockford, IL, USA. PVDF membranes were purchased from Bio-Rad (Hercules, CA, USA). SuperSignal West Dura extended duration Substrate for ECL was obtained from Thermo Scientific (Waltham, MA, USA). All the other chemicals used were of analytical grade unless otherwise stated.

**Cell line culture:** MDA MB231 was produced from NCCS [national centre for cell science] Pune, cells were maintained in DMEM augmented with 10% FBS and 1% antibiotic penicillin, streptomycin solution at 95% humidity and 5%CO₂ were retained for cell culture.

**Lactate Dehydrogenase release assay (Membrane integrity):** Membrane integrity of MDA-MB 231 cells treated with and without *A. annua* AgNPs was determined by measuring the activity of lactate dehydrogenase (LDH) as per manufacturer’s instructions (CytoScan™ LDH Cytotoxicity Assay kit, 786-324, G-Biosciences). LDH assay is based on the release of LDH, a cytosolic enzyme from cells with compromised membrane integrity. Here the status of *A. annua* AgNPs induced cytotoxicity was assessed quantitatively by measuring the activity of LDH in the supernatant. Briefly, cells were treated with AgNPs for 24 h, then 100 μL cell-free supernatant from each sample was transferred in triplicates into 96-well plates, and added with 100 μL of LDH assay reaction mixture and incubated for 3h under standard conditions. Then the optical density (OD) determined at a wavelength of 490 nm using a Microplate Reader.

**Mitochondrial membrane potential analysis:** MDA-MB 231 cells were treated with *A. annua* AgNPs for 12 h, after treatment cells were incubated with prewarmed 2 μg/ml of lipophilic cationic probe 5, 5′, 6, 6′-tetrachloro-1, 1′, 3,3′-tetraethylbenzimidazolcarbocyanine iodide (JC-1) in fresh medium for 30 min. Followed by incubation, cells were washed with PBS twice, and then the cells were visualized by detecting fluorescence and images were captured using fluorescence microscope.

**ATP Measurement:** ATP levels in MDA-MB 231 cells were measured as per manufacturer’s instructions (ab83355). MDA-MB 231 cells were treated with *A. annua* AgNPs for 24 hrs and the levels of ATP were measured.

**Immunoblot Analysis:** Immunoblot analysis was performed using standardized method with slight modifications based on the method of [37]. Briefly, MDA-MB 231 cells were treated with and without *A. annua* AgNPs for 24 h. Cell lysates were collected and the total protein was immediately extracted using RIPA containing 1% (PMSF) and 1% protease inhibitor cocktail for 30 min at 4°C. Aliquots of proteins were used to estimate the total protein content using BCA™ Protein Assay Kit (Pierce, Rockford, IL, USA). Then equal amounts of proteins loaded on to sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE), electrophoretically separated and transferred to a PVDF membrane followed by blocking in 5% BSA for 1 h at RT. The membrane was incubated with specific primary antibodies against BCl-2, Bax, Cytochrome-C, Caspase-9 (1:1000) and GAPDH (1:2000) overnight at 4°C in a humidified chamber followed by incubation with the corresponding secondary antibodies for 2 h RT. The specific protein bands were visualized with an ECL advanced western blot analysis detection kit (Thermo Scientific, USA).

**Statistical Analysis:** Experiments were performed independently as triplicates (n=3). The mean ± standard deviation (SD) was determined for each group. One way analysis of variance (one-way ANOVA) and Tukey’s’ test were used for statistical analysis. Statistical value of p <0.05 was used for considering statistical difference between groups.

**Results and Discussions**

The present study heed on investigating the *invitro* anti-carcinogenic effect of biogenic AGNPs using *A. annua* against breast cancer MDA MB231 cells. Even though there are several method to asse the cytotoxic effects, the LDH assay seems to be the best for ascertaining cellular cytotoxicity effect with damaged cellular membranes Fig 1B showed that LDH was significantly increased right from 2.5 mg/
ml *A. annua* AGNPs concentration in dose-dependent manner when compared to control and *A. annua* extract alone. LDH is a soluble cytosolic enzyme that can be released extracellularly upon loss of membrane damage. Moreover, MDA MB231 cells treated with *A. annua* extract alone do not show significant cytotoxicity as compared to *A. annua* AGNPs. This denotes that AGNPs was more effective as a cytotoxic agent which is evident from increased LDH release upon AGNPs treatment for 24 h thereby leading to lytic cell death. Our result substantiated with previous reports of cytotoxicity of biogenic AGNPs from streptomyces species [7,8].

Mitochondrial dysfunction plays a vital role in cell death by apoptotic induction. Hence, we intended to determine the status of mitochondrial function by determining the mitochondrial membrane potential (MMP) and ATP levels in MDA-MB 231 cells treated with *A. annua* AgNPs [10]. Mitochondrial membrane potential in MDA-MB 231 cells was determined using the ability of JC-1 to change from red to green fluorescence, with a decrease in MMP. As shown in Fig 4, there is a significant shift in red to green fluorescence in *A. annua* AgNPs and DOX (positive control) treated cells (24 h) compared to control and *A. annua* extract-treated cells. Altered MMP can significantly impact ATP generation. Here, our results showed a significant reduction in ATP levels in *A. annua* AgNPs and DOX treated cells compared to control and *A. annua* treated cells. Our results show that *A. annua* AgNPs induces a change in MMP which can be an underlying reason for the observed loss of cell viability and altered redox status as mentioned in earlier sections. AgNPs induced loss of MMP and ATP levels might eventually result in apoptotic induction.

When the cells are enforced with cytotoxic stress beyond its threshold i.e “point of no return” the prime event can be breaching of MMP with low ATP levels. Such breaching favors the release of mitochondrial proteins like cyt C to release into cytosol that ends up with rapid activation of caspasers [9,10]. So to determine the status of MMP in *A. annua* AgNPs treated MDA-MB 231 cells, we probed using JC-1 fluorescent dye. It is mitochondrial specific and readily shits fluorescence from red to green fluorescence and such a shift in color is directly proportional to loss of MMP. Observed intense green fluorescence in *A. annua* AgNPs and DOX treated cells showed a loss of MMP in MDA-MB 231 cells.

Further to evaluate the status of apoptotic mediators, protein levels of cytochrome-c, Bax, Bcl-2 and Caspase 9 were determined in MDA-MB 231 cells. Protein expressions of Cytochrome-c, Bax, and Caspase-9 were significantly increased in MDA-MB 231 cells treated with *A. annua* AgNPs compared to control and AgNP extract-treated cells (Fig 5), whereas Bcl 2 protein level was significantly reduced as compared to the above.

Collectively our results denote *A. annua* AgNPs induces apoptosis by reducing anti-apoptotic BCL-2 proteins thereby enabling death driving cysteine protease called caspase, which in turn cleaves a range of substrates like nuclear proteins plasma membrane proteins and mitochondrial proteins leading to cell death. Results of the present Study depicting AgNPs inducing apoptosis is similar to other natural products like Heparicidin [11]. Based on our investigation, our future goal is to investigate the mechanisms of *A. annua* AgNPs cellular uptake and its ability to form protein-corona [12] in cellular components of MDA-MB 231 cells and which will enable to promote its anti-cancer efficacy at clinical levels.

Collectively our results denote *A. annua* AgNPs induces apoptosis by reducing anti-apoptotic BCL-2 proteins thereby enabling death driving cysteine protease called caspase, which in turn cleaves a range of substrates like nuclear proteins plasma membrane proteins and mitochondrial proteins leading to cell death. Results of the present Study depicting AgNPs inducing apoptosis is similar to other natural products like Heparicidin [11]. Based on our investigation, our future goal is to investigate the mechanisms of *A. annua* AgNPs cellular uptake and its ability to form protein-corona [12] in cellular components of MDA-MB 231 cells and which will enable to promote its anti-cancer efficacy at clinical levels.
Fig 2: Shows the effect of A.annua AgNPS on MMP and ATP levels

Fig 3: Shows effect of A.annua AgNPS on apoptotic markers in MDA-MB 231 cells

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015).

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Conflict of Interest: Nil

References


Physalis Minima Linn: A Miniscule Review

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Abstract

From ancient period, the plants are used as a treatment for dreadful disease due to the presence of medicinal value. Even in modern generation, many herbal plants are focused in research field to brief about its higher potential of efficacy in curing & also reducing the side effects. In this study, we reviewed the traditional plant physalis minima Linn which is commonly called as native gooseberry are used in treating several disease due to the presence of phytochemical constituent having properties such as anti-inflammatory, antioxidant, anti-proliferative, antibacterial. This paper will give brief review about the all parts of the plant of physalis species to signify the good efficacy on the disease condition.

Keywords: Physalis minima, phytochemical constituent, anti-inflammatory, antioxidant, anti-proliferative, antibacterial.

Introduction

Many fruits & vegetables of plant has valuable effect to reduce the cause of common disease such as cold, dizziness, sneezing, dry cough etc. In response to that nowadays the medicinal value plant are used in treating the dreadful disease such as cancer, cardiovascular disease, muscular dystrophy, Diabetes mellitus, hypertension & obesity. Among these the cancer becomes most common in both the gender, due to overproduction of free radical thus it become a serious issue on human health. The therapeutic value of medicine are altered as the synthetic products by identifying the bioactive compound & are used in current medical field to cure the disease along with reduce the side effects in long term of drug intake. Due to modern lifestyle, the production of reactive oxygen species in an organism is increased, though these ROS plays role in cell signaling processes & protecting mechanisms the increased production accumulates the ROS thus affects the cell & causes various consequences by damaging the lipid, proteins, DNA, & decrease cell survivality. To reduce the cell from adverse effects, the medicinal plants plays a vital role due to the presence of antioxidants such as flavones, isoflavones, flavonoids, anthocyanin, catechins etc. Apart from the above compounds certain foods contains ascorbic acid, tocopherol, beta carotene which also possess the antioxidant potential.

According to the traditional uses of medicine in Indian system the root, seed, leaf, fruit, all parts of the plants are used. The aim of the present study is to review the plant physalis minima Linn to bring out the traditional uses, phytochemical investigation carried out for assessing the maximum potential of the plant. As like many medicinal plant, this plant species were used as traditional medicine in the treatment of ulcers, sores, gonorrhea, and skin disease. Many studies also confirmed that the plant has certain therapeutic value such as hypoglycemic action, anticancer, anti-inflammatory & anti-ulcer action.

The plant physalis minima Linn which belongs to the family solanaceae has other common names such as Native gooseberry, Ground cherry, Sunberry (English), Kupanti, sodakku thakkali, Tholtakkali (Tamil), Ban Tipariya, Chirapati, Rasbhari (Hindi), Gadde Hannu
Pharmacognostical studies on Phyalis minima Linn.

Macroscopical characteristic of seed: The plant stem, root & leaves are fresh green, full grown animal plant growing around 50cm height, found in waste ground near houses, roadsides, in organic soils in the Tropical region. The macroscopic characteristic investigated as small annual herb, leaves are soft & smooth, with many margins 2.5-12cm long, it covered with short soft hair with dark green on upper side, light green on other side, taste like an edible tomato.

Microscopical & Powder Characteristics:

Flower of the plant: The cylindrical portion of plant is straight, axillary, solitary, pedicellate, and yellow with purple colour.

Fruit of the plant: A globose berry, overtopped by inflated calyx, seeds many compressed.

Leaves of the plant: Arranged alternative, simple type, elliptic-ovate shape, acute apex with obliquely rounded acute with coarsely toothed margin.

Seeds of the plant: Cotyledons ovate-lanceolate 6-9 × 2.6mm petiole about 3mm long

The organoleptic study of plant by powder analysis shows that the coarsely powdered with greenish grey colour, bitter in taste & having unpleasant odor.

Physicochemical constants: Total ash (14%), Water insoluble ash (6.2%), Acid insoluble ash (1.1%), moisture content (8%), volatile oil content (0%), sugar content [Total sugar (3.83%), reducing sugar (2.53%)], fibre content (54.34%).


Medicinal uses: In traditional aspects, all parts of the plants are used as a diuretics, antipyretic, alterative, and appetizer. Bitter, diuretic, laxative, tonic, remedy for headache, itches, earache, febrifuge, vermifuge, fevers, hypertension, diabetes, reduce the lower abdominal pain.

Phytochemical studies: According to WHO’s survey about 80% of the population have belief on efficacy of traditional medicine. The valuable medicinal properties of different plants are due to presence of several component such as phenolic compounds, alkaloids, flavonoids, saponin, tannins, terpenoids, quinone, based on this the phytochemical work has been carried out for identification of active component by GC-MS analysis. The whole plant extract are reported to contain 30 compounds such as (i) Tetradecane (CAS n-Tetradecane), (ii) Cyclohexasiloxane, dodecamethyl, (iii) Cylocaptaisoxane, (iv) 1, 2-Benzenedicarboxylic acid, diethyl (v) 2, 4-Imidazolidinedione, 1-[(5-nitro- (vi) Cylocstasiloxane, Hexad (vii) Heneicosanoic acid (viii) 1, 3-Diphenyl-1, 3, 5, 5-Tetramet (ix) Octadecamethylcyclonona (x) Phthalic acid, butyl ester, ester(xi) 2-Pyridinepropanamide, N-P(xii) Bicyclo[4.1.0]

Pharmacological studies: The repute use of plant in cure of multiple disease was highly increased due to belief on the herbal plants with its pharmacological activity. The detailed pharmacological activity of physalis species are such as antitumor activity, antidiabetic activity, cardiovascular activity, gastro protective activity, pulmonary activity, anti-inflammatory activity, nephroprotective activity.

Antitumor activity: In many studies the treatment using P. minima extracts & compound inhibits the cell proliferation, but the mechanism of cell death unclear. The invitro studies on human adenocarcinoma NCI-H23
cells, study reveals that the chloroform extract has ability to inhibit cell proliferation by inducing the apoptosis mechanism\textsuperscript{(11)}. The chloroform extract was found to significantly abolish the growth of NH-H23 cells depend on dosage concentration on time limit. The further observation of apoptotic morphological features was directed in various studies of anticancer agents such as synthetic agent which induce apoptosis in C6 glioma cells\textsuperscript{(12,13)}.

The other similar observation was founded by Lee and Houghton et al 2005 in cytotoxicity potency of methanol crude extract towards the breast MCF-7 & lung COR 123 carcinoma cell\textsuperscript{(14)}. The crude extract brings the anti-proliferation activity by inducing signal cascade mechanism, activation of caspase-3 by four fold increase at the period of treatment, because of activation of downstream process of apoptosis of caspase-3 reported by\textsuperscript{(15)}, in human renal carcinoma A498 cell. The effect of bioactive compound suggesting that it decrease the survival of cancer by increase dosage of plant extract.

\textbf{Antidiabetic activity:} The effects of stem, leaf, root & flower crude extract of P.minima (1100mg/kg) administered for acute toxicity studies, this dose does not produce significant change in physicochemical alteration of the animals. In acute study, the diabetic induced rat after administration of the extracts of various plant parts of P.minima, where observed & the result suggest that he flower & leaf extracts has good efficacy in reducing the fasting blood glucose level towards the normal\textsuperscript{(17)}.

Further, the in-vivo studies are carried on chronic condition, the effect of plant flower extract & leaf extract positively brings down the fasting blood glucose of rats. Thus, it concludes that the extracts may have the properties to stimulate or rejuvenate the β-cells of islets of Langerhans for the secretion of insulin & are most effective for controlling diabetes by various mechanism(ie) the plant extract enhance the glucose utilization in diabetic induced rats or hyperglycemic rats.

\textbf{Anti-inflammatory, Analgesic and antipyretic activities:} Although a large number of studies are carried out to demonstrate the clinically use of anti-inflammatory and analgesic drugs, still the search for new effective drugs with significant safety profile remains dynamic. An in-vivo model was used to investigate the anti-inflammatory, analgesic and antipyretic action of P.minima, in crude methanol (58%) and chloroform fraction(62%) in NMRI mice and Wistar rats of either sex at 200 and 400 mg/kg, respectively. The extract significantly inhibited the carrageenan induced pay edema in rats at 400 mg/kg. The significant activity of the extracts and standard drug observed may be due to inhibition of the mediators of inflammation such as histamine, serotonin and prostaglandin\textsuperscript{(18)}. Both crude extract and chloroform fraction showed noticeable anti-inflammatory and analgesic activities as compared to a control. Thus concludes, the whole plant of Physalis minima Linn could be considered as a potential aspirant for natural anti-inflammatory and analgesic agents.

\textbf{Anti-lipid Oxidation:} The quenching of the free radicals production are proved by using ethanolic extract of P.minima. An in -vivo study of anti -lipid oxidation by using Goat liver as a source & assessment done by MDA (malondialdehyde) of tissue homogenate\textsuperscript{(19)}.

\textbf{Conclusion}

Our review study report concludes that, the investigation of pharmacognostic activities of whole plant of Physalis minima Linn has significantly found be having maximum potential of all pharmacological properties against the dreadful disease & can be used as an available source of natural antioxidants with subsequent health benefits. Even further studies are needed to explore the bioactive compound using pre-clinical trial & clinical trial to clear about the various mechanism of action at molecular level.

\textbf{Ethical Clearance:} Not required since it is a review article.

\textbf{Source of Funding:} Nil

\textbf{Conflict of Interest:} Nil

\textbf{Reference}


Comparative Evaluation of Effect of Preoperative Oral Medication of Ketorolac on Anesthetic Efficacy of Inferior Alveolar Nerve Block in Patients with Irreversible Pulpitis: A Randomized Clinical Trial

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Abstract

Aim: The purpose of this randomized control study was to determine the effect of the administration of the preoperative ketorolac on the success of the inferior alveolar nerve (IAN) block in patients with symptomatic irreversible pulpitis

Materials and Method: Ninety adult volunteers who were actively experiencing pain participated in this study. The subjects were divided into 3 groups on a random basis and were randomly divided into three groups. Group 1 patients were advised to take tablet Ketorol-DT for 2 days as per the dosage recommendation by the manufacturer before the endodontic procedure. Group 2 patients were given tablet Ketorol-DT 1 hour before anesthesia and group 3 patients receive no preoperative medication. All patients received standard inferior alveolar nerve block of 2% lidocaine with 1:80,000 epinephrine. Endodontic access preparation was initiated after 15 minutes of initial inferior alveolar nerve block. Pain during treatment was recorded by using Heft Parker visual analog scale. Success was recorded as none or mild pain.

Result: Preoperative administration of tablet Ketorol-DT before 2 days has a significant effect on success rate of Inferior alveolar nerve block in patients with irreversible pulpitis. There is no statistical difference between group 2 and group 3.

Conclusion: Preoperative administration of tablet Ketorol-DT before 2 days has a significant effect on success rate of Inferior alveolar nerve block in patients with Irreversible pulpitis.

Keywords: Premedication, Ketorol, Pain management.

Introduction

The standard and most commonly used technique for achieving pulpal anesthesia in mandibular molars is the inferior alveolar nerve block (IANB). But in patients with irreversible pulpitis, there is decreased rate of success of its anesthetic efficacy which could be due to the activation of nociceptors by inflammation. Inflammatory mediators reduce the threshold for activation of nociceptor neurons to a point that a minor stimulus now might fire these neurons. This inflammatory process is mediated via prostaglandins (PGs), which are end products of Arachidonic acid (AA) metabolism, produced via Cyclo oxygenase (COX) pathway. PGs act by sensitizing nerve endings to Bradykinins and histamines and hence enhance the pain and tenderness of inflammation.¹ ² IANB has a high

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failure rate, ranging from 7%–77%. Various mechanisms have been hypothesized to explain the failure of local anesthetics including anatomic variations like cross innervations and accessory innervations, decreased local pH, tachyphylaxis of anesthetic solutions. Non steroidal Anti inflammatory drug (reversible inhibitors of COX) Ketorolac, a pyrrolo-pyrrole derivative, is as effective as morphine or meperidine for pain relief. Many researchers have identified inflammation as an important component of the pathogenesis of hyperalgesia and failure of local anesthesia.\(^3\)\(^,\)\(^4\) Because NSAIDs reduce nociceptor activation by decreasing the levels of inflammatory mediators, it is hypothesized that premedication with NSAIDs will affect the success rate of local anesthesia in patients with irreversible pulpitis. The present study was planned to evaluate the effect of premedication with tablet Ketorol-DT on anesthetic success rate in terms of pain during endodontic procedure. No other studies in the literature stated the effectiveness of taking tablet Ketorol-DT 2 days before endodontic procedures. Therefore, the aim of this study randomized control study was to determine the effect of the administration of the preoperative tablet Ketorol-DT on the success of the inferior alveolar nerve (IAN) block in patients with symptomatic irreversible pulpitis. The null hypothesis stated is that tablet Ketorol-DT has no influence on the success rate of inferior nerve block in patients with irreversible pulpitis.\(^5\)\(^,\)\(^6\)

**Methodology**

Ninety adult volunteers who were actively experiencing pain participated in this study. The subjects were divided into 3 groups on a random basis (Computer generated random numbers) and were randomly divided into three groups. Ethical clearance was taken from the ethical committee. Informed consent from the patients were taken after explaining to them about the possible discomfort and risks involved in the procedure.

Inclusion criteria were adults [age >18 years], in good health with vital mandibular molars with moderate to severe pain. Exclusion criteria were patients allergic to ketorolac, gastrointestinal problems, pregnancy, lactating mothers and who could not give informed consent. Patients were randomly divided into 3 groups with 30 patients in each group. Group 1 patients were advised to take Tablet Ketorol-DT for 2 days as per the dosage recommendation by the manufacturer before the endodontic procedure. (1st day -10mg for four times; 2nd day-10mg for three times). Group 2 patients were given Tab Ketotorol-DT, 1 hour before the administration of local anesthesia. Group 3 patients receive no preoperative medication. All patients received standard Inferior alveolar nerve (IAN) block of 2% Lidocaine with 1:80,000 epinephrine. After 15 minutes of the initial IANB, each patient was asked if his or her lip was numb. If profound lip numbness was not recorded within 15 minutes, the block was considered unsuccessful, and the patients were excluded from the study. Endodontic access preparation was initiated after 15 minutes of initial Inferior alveolar nerve block. Pain during treatment was recorded by using a Heft Parker visual analog scale. Success was recorded as pain present or absent.

**Results**

Premedication with Ketorol DT given before 2 days gave 78% success rate. Premedication with Ketorol DT given before 1 hr gave 24% success rate. Premedication without ketorol DT gave 0% success rate. There was statistically significant difference between the 3 groups.
**Discussion**

Inferior alveolar nerve block is an effective tool in management of mandibular endodontic procedures by reversibly interrupting the propagation of inferior alveolar nerve impulses. IANB might provide successful anesthesia in 70% of uninflamed pulp, but the success rate drastically decreases to 30%\(^7\). The literature suggests activation of nociceptors by inflammatory mediators such as PGs as a major cause of increased incidence of failure of IANB in patients with irreversible pulpitis. Pathogenesis of irreversible pulpitis includes inflammation of pulp, leading to breakdown of damaged cell membranes and release of AA, mediated by either secretory (sPLA2) or cytoplasmic (cPLA2) phospholipases. In response to various inflammatory stimuli, AA is acted on by COX or prostaglandin H synthase (PGHS) enzymes and gets converted into 20 carbon chain molecules called eicosanoids, which are further converted by various cell-specific isomerizes and syntheses to produce 5 biologically active primary PGs that include PGD2, PGE2, PGF2a, prostacyclin (PGI2), and thromboxane A2 (TxA2).\(^8,9\)

COX is available in body in 2 isoforms, COX-1 and COX-2. COX-1 regulates normal cell activities in the stomach, kidneys, and platelets by synthesizing prostanoids that have cytoprotective functions. The COX-2 is normally not present in tissues (except kidneys) and is present only in areas of tissue injury and inflammation. Traditional Non steroidal anti-inflammatory drugs (NSAIDs) act by nonselective inhibition of COX activity, resulting in some gastrointestinal side effects. Specific COX-2 inhibitors were developed to deliver equivalent pain relief to that of the nonselective NSAIDs, but without the accompanying risk of gastrointestinal complications. Because of efficacy of NSAIDs to effectively block the COX pathway, it was hypothesized that premedication with NSAIDs will help in management of patients with irreversible pulpitis by inhibiting the formation of PGs and thus minimizing the activation of nociceptors. In the present study, effect of premedication with ketorolac was studied by using pain response on modified Heft Parker VAS in a prospective, randomized, single-blind trial.\(^10\)

**Conclusions**

Preoperative administration of tablet Ketorol-DT before 2 days has a significant effect on success rate of Inferior alveolar nerve block in patients with Irreversible pulpitis then the preoperative administration of ketorol DT before 1 hr of the procedure

**Conflict of Interest:** Nil

**Source of Funding:** Nil

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Effect of CPP ACP and Nano Hydroxyapatite Incorporated GIC on Remineralization of Dentin

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Abstract

The objective of this invitro study was to investigate, whether the remineralization potential of conventional GIC in human dentin could be improved by combining with CPP - ACP and nano hydroxyapatite. Class I cavities were prepared in sound human extracted third molars and they were randomly assigned to 3 groups according to the restorative materials. Group I: Conventional GIC, Group II:Conventional GIC and CPP-ACPand Group III: Conventional GIC powder & Nano hydroxy apatite. The samples were subjected to remineralizationand demineralization cycles for period of 2 weeks. Energy dispersive X-ray analysis was used to evaluate the remineralization. The elemental compositions were analyzed using One way ANOVA, Post Hoc and Mann Whitney tests. The calcium and phosphate concentration were statistically significantly greater in Group III than Group I and II (P<0.05).Nanohydroxy apatite with GIC remineralized the demineralized dentin almost equal to normal dentin.

Clinical Relevance: GIC with nanohydroxy apatite might be superior restorative/base with an improved remineralization potential of dentin.

Keywords: GIC, DENTIN, HYDROXYAPATITE.

Introduction

The caries process is a dynamic balance between demineralization and remineralization of the dental hard tissues that may eventually result in cavitation.[1] The metabolic products of dental plaque bacteria, including lactic, acetic, and citric acid, reduce pH in the microenvironment of the tooth surface and demineralize the dental hard tissues. Thus, any mechanism that inhibits such acid production, increases the resistance to demineralization, and/or facilitates remineralization and is of considerable clinical interest.

Remineralization is the repair process of the demineralized teeth and relies on calcium and phosphate, and is enhanced by fluoride to rebuild a new surface on existing crystal remnants in the sub-surface lesions. Some restorative materials release fluoride, which may help to inhibit recurrent caries.[2-8] It appears that the primary mechanisms by which fluoride prevents caries are both by improving resistance to demineralization and by facilitating remineralization of hard tissues.

Glass ionomer cements (GIC) are commonly used in minimal invasive dentistry. The advantages of conventional glass ionomer cements are anticariogenic property by incorporation of fluoride, chemical adhesion to tooth structure.[10] non–shrinking setting reaction

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and biocompatibility\cite{9}. Physical properties of GIC can be modified by changing the powder/liquid ratio or chemical formulation.\cite{11}

Bioactive agents based on milk products (Tooth Mousse) have been used in remineralization of the enamel and dentine. This is based on a nano complex of the milk protein casein-phosphopeptide (CPP) with amorphous calcium phosphate (ACP). It has been claimed that it promotes remineralization of the carious lesions by maintaining a supersaturated state of enamel mineral.\cite{12} The presence of CPP-ACP on dentine surfaces provoked lower demineralization and higher remineralization in comparison with the dentine surfaces without CPP-ACP.\cite{13}

Hydroxyapatite (HA) is one of the most biocompatible and bioactive materials and is widely applied to tooth roots.\cite{14} Nano-sized particles have similarity to the apatite crystal of tooth enamel in morphology, crystal structure and crystallinity.\cite{15} An increasing number of reports have shown that nano-hydroxyapatite has the potential to remineralize artificial carious lesions following addition to toothpastes, mouthwashes, etc.\cite{16-18} Tan et al., proved the remineralizing potential of demineralized human dentin, treated with hydroxyapatitenano particles suspension.\cite{19}

Though GIC has an ability to remineralize dentin, Massara et al.\cite{20} observed morphological changes and increased levels of calcium in dentine underneath GIC after 3 months. Conventional GIC showed higher reactionary dentin formation only after 60 days.\cite{21} Therefore, the objective of this invitro study was to investigate, whether the remineralisation potential of conventional GIC in human dentin could be improved by combining with CPP - ACP and nano hydroxyapatite.

**Materials and Method**

**Preparation of teeth specimens:** Thirty sound human impacted third molars, extracted within one month period and stored in saline solution at 4°C, were selected. Class I cavities were prepared in each tooth using 245 carbide bur at high speed with an air/water spray. Cavity outlines were previously traced with a marker pen, determining mesiodistal - 6mm, bucco lingual - 3mm a measure; the depth of the cavity - approximately 2 mm, calibrated by a pre-marked periodontal measuring probe. The cavity finishing was accomplished with a hand instrument. The teeth were sectioned into two equal halves buccolingually.

The cavities were randomly assigned to 3 groups according to the restorative materials. The groups were as follows, Group I: Conventional GIC (Fuji II GP, GC Co., Tokyo, Japan), Group II: Conventional GIC and CPP-ACP, the GIC containing CPP-ACP (Recaldent\textsuperscript{TM}) was prepared by manipulation of GIC powder with 1.56% w/w CPP-ACP followed by mixing with GIC liquid.\cite{22} Group III: Conventional GIC powder & Nano hydroxy apatite (Skyspring nanoparticles, Houston, Texas) [20:1 (w/w)] was mixed together.\cite{23} Then, the mixture was mixed to GCliquid. The restorative materials were manually mixed and the powder: liquid ratio used, was as recommended by the manufacturer. The cavities were restored in a single increment with the restorative materials, after dentin conditioning and placed in a humidor for 24 hours at room temperature.

**Preparation of acetate demineralizing solutions:** The demineralizing solution was an acetate buffered solution at pH 4.3 as described by Ten Cate and Duijsters.\cite{24} The solution contained glacial acetic acid (50 mM/L), CaHPO\textsubscript{4} (2.2 mM/L) in deionized distilled water (DDW) with pH adjusted to 4.3. Thymol crystals were added to make a 0.1% solution to prevent growth of mould. The solution was stored in tightly sealed bottles until ready for use.

**Preparation of remineralizing solutions:** The remineralizing buffer was as described by Zuidgeest et al.\cite{25} and consisted of the following: 20 mM HEPES Buffer; 1.5 mM calcium as CaCl\textsubscript{2}; 0.9 mM phosphate as K\textsubscript{2}HPO\textsubscript{4}; 10 ppm fluoride as NaF, with the pH adjusted to 7. Thymol crystals were added to provide a 0.1% solution.

**Demineralization/remineralization cycles:** The teeth were submitted to 14 cycles of demineralization and remineralization. Each cycle consisted of the immersion of specimens in 5 ml of demineralization solution for 6 hr, washing with 5 ml of deionized water and immersion in 5 ml of remineralization solution for 18 hr in the container having separate chambers for each samples. The specimens were cycled for 14 days.\cite{26}

**Energy dispersive X-ray analysis:** The restored teeth specimens were re-sectioned again into two equal halves buccolingually. Element content in weight % of Ca, P and F was measured with energy dispersive X-ray analysis (EDX) (Hitachi S3400N, Japan). The surfaces were photographed at a magnification of 27x. The values of the spots at 0.5 - 1mm from restorative material
towards pulp space and 1-1.5mm from restorative material towards pulp were measured (Fig. 1 and 2) and statistically evaluated using One way ANOVA, Post Hoc.

**Results**

The results of mineral analysis of dentine have been presented in Tab. 1. In areas 0.5 – 1 mm and 1-1.5 mm from restorative material, calcium and phosphate concentration were statistically significantly greater in Group III than Group I and II (P<0.05). No statistically significant difference was found between the two different areas analyzed (0.5-1mm and 1-1.5mm) and inter group comparison of other elements (Al, Si, Sr, F) (P>0.05). The mineral analysis of dentin treated only with demineralization and remineralization solution for 14 cycles had Ca – 15.17 % and P – 11.21 %. Calcium and phosphate of normal dentin was 39.82% and 9.01%.

**Fig. 1: 0.5-1 mm from restorative material towards the pulp space**

**Fig. 2: 1-1.5 mm from restorative material towards the pulp space**
Table 1: Mean of elements in restored dentin

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>0.5-1 mm</th>
<th>1-1.5mm</th>
<th>1-1.5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Al</td>
<td>Si</td>
<td>P</td>
</tr>
<tr>
<td>GROU I GIC</td>
<td>0.367</td>
<td>0.29</td>
<td>13.37</td>
</tr>
<tr>
<td>Mean</td>
<td>0.29</td>
<td>0.27</td>
<td>0.44</td>
</tr>
<tr>
<td>GROU II GIC &amp; CPPACP</td>
<td>0.20</td>
<td>0.22</td>
<td>13.61</td>
</tr>
<tr>
<td>Mean</td>
<td>0.07</td>
<td>0.08</td>
<td>0.83</td>
</tr>
<tr>
<td>GROU III GIC &amp; NanoHA</td>
<td>0.30</td>
<td>0.28</td>
<td>15.33</td>
</tr>
<tr>
<td>Mean</td>
<td>0.14</td>
<td>0.13</td>
<td>0.49</td>
</tr>
</tbody>
</table>

**Discussion**

Dental caries progression or reversal depends upon the balance between demineralization and remineralization.[27] This balance is based on various factors e.g. salivary Ca and P concentration, bioavailability of fluoride, pH and prevention of secondary caries. To prevent secondary caries, remineralization of the dentine left in the cavity is likely to occur due to the application of highly bioactive adhesive restorative materials. Permeation of elements from restorative materials to dental tissues has been reported in several studies. Studies carried out in vitro by Hott et al.[28] and Extercate et al.[29] on bovine teeth revealed elevated fluoride levels in the dentine adjacent to glass ionomer fillings. Energy dispersive X-ray analysis was used in the present study to evaluate the remineralization of dentin as it provides a reliable data of the surface composition of objects non-destructively.[36]

In the present study, nanohydroxyapatite was combined with conventional GIC, as nanohydroxyapatite and has bioactive, biocompatible properties and increased penetrability, since the surface area and proportion of atomicity increases with decreasing particle size.[30] Nano-sized particles have similarity to the apatite crystal of tooth enamel in morphology, crystal structure and crystallinity.[31] Kim et al.[17] demonstrated that surface hardness of the demineralized enamel increased with increasing nanohydroxyapatite concentration when nanohydroxyapatite was added to a NaF mouthwash. Moshaverinia et al proved nanohydroxyapatite added to GIC, exhibits higher compressive strength, diametral tensile and biaxial flexural strengths.[23]

An increasing number of reports have shown that nano-hydroxyapatite has the potential to remineralize artificial carious lesions following addition to toothpastes, mouthwashes, etc.[17,32] Studies have found no significant difference between NaF and nanohydroxyapatite on the effect of remineralization of initial enamel lesions.[33] Tan et al.[19] reported that nanohydroxyapatite caused remineralization of dentin. The results of the current study using Energy dispersive X-ray analysis also showed a remarkable increase in Ca and P of dentin restored with GIC and nanohydroxyapatite than conventional GIC. This could be due to sedimentation and penetration of acicular crystals of nanohydroxyapatite into the demineralised tooth surface which acts as a template and attracts large amount of Ca$^{2+}$ and PO$_4^{3-}$ from the remineralisation solution. These crystals directly fill up defects and micropores on demineralized teeth.[34]

CPP-ACP release elements that enhance remineralization of the enamel and dentine, under cariogenic conditions. Rahiotis and Vougiouklakis.[35] reported that the presence of agent CPP-ACP on dentine surfaces provoked lower demineralization and higher remineralization in comparison with the dentine surfaces.
without the presence of any agent. Incorporation of 1.56% w/w CPP-ACP into a GIC was shown to increase compressive strength and microtensile bond strength. [22] Mazzaoui et al concluded that GIC with CPP – ACP enhances remineralization of dentin by the release of Ca, P, & F from the restored material in acidic PH which was calculated by the measurement of ions realized in the solutions. [22] On the contrary, the results of the present study showed, CPP - ACP with GIC had increased remineralization than GIC, assessed by energy dispersive X-ray analysis. But, the results were not found to be statistically significant, which may be due to decrease in bioavailability of calcium and phosphate from CPP - ACP when reacted with polyacrylic acid.

As GIC, CPP - ACP and nanohydroxyapatite individually favors remineralization of tooth, we intended to investigate the effects of remineralization of dentin when used in combination. Further research is required to find the adhesive properties of GIC combined with CPP ACP and nanohydroxyapatite to tooth.

**Conclusion**

Nanohydroxy apatite with GIC remineralized the demineralized dentin almost equal to normal dentin. Thus, GIC with nanohydroxyapatite might be superior restorative/base with an improved remineralization potential of dentin.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/ TN/2015).

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An Invitro Comparison of Dissolution of Human Pulp in Sodium Hypochlorite, Ethanolic Extract and Digestive Secretion of Insectivorous Plants

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Abstract

The tissue dissolution property of irrigating solutions is important for successful endodontic treatment. Sodium hypochlorite (NaOCl) is a well-known tissue dissolvent, but no data have been published on herbal alternative to NaOCl. The purpose of this study was to investigate the pulp tissue dissolution capacity of sodium hypochlorite, ethanolic extract of Drosera rotundifolia and digestive fluid of Nepenthes khasiana. Freshly extracted intact vital teeth, extracted for orthodontic and impaction reasons were collected and stored at – 20 °C. The pulp tissues were removed by splitting of the teeth when required.

Method: The pulp tissues were randomly divided into 4 groups (n = 10), individual sample was weighed 7 mg each. The groups were as follows, Group I: 5% NaOCl, Group II: digestive fluid of Nepenthes khasiana, Group III: Drosera rotundifolia (ethanolic extract), Group IV: distilled water. The test solutions were added to tubes containing tissue samples, the tissues were removed from the test solutions at 5, 15, 20, 30 min, 1,2,3,4,5,6,7 hr blotted dry with the tissue paper and weighed using precision balance.

Results: The results showed complete dissolution of pulp tissue in Group I at 20 minutes, Group II at 7 hr, Group III and IV showed no dissolution of pulp at the investigated time intervals.

Conclusion: The digestive fluid of Nepenthes khasiana could be considered as an herbal alternative to NaOCl for pulp tissue dissolution as it completely dissolved the pulp tissue similar to 5% NaOCl, but at different time intervals.

Keywords: Sodium Hypochlorite, tissue dissolution, Insectivorous plants, Nepenthes, digestive.

Introduction

The major role of endodontic treatment for a tooth is to clean the root canal by removal of the infected pulp and microorganisms. Irrigation is an indispensable aid in achieving thorough debridement and in preparing and disinfecting the canal¹. The complex anatomy of root canals favors the persistence of residual pulp tissue, infected dentin or bacteria in the root canal system which might be responsible for treatment failures². The tissue
dissolving capability of irrigating solutions enhances root canal cleansing by removing pulpal remnants in the inaccessible areas of the tooth.

Sodium hypochlorite (NaOCl) has been the favored endodontic irrigant as it is effective in dissolving both vital and nonvital tissues\(^{(3-5)}\). It is an effective antimicrobial agent\(^{(6)}\), and acts as a lubricant for instrumentation \(^{(7)}\). The cytotoxicity of 5.25% NaOCl towards periapical tissues\(^{(8-12)}\) remains a principal concern especially in open apices and causes disastrous effects such as paralysis of muscles and permanent nerve damage\(^{(13)}\). Hence, a diluted concentration of 2.5% was recommended\(^{(19)}\), but was found to be cytotoxic\(^{(14)}\). NaOCl in concentrations higher than 0.01% was lethal to the cells\(^{(15)}\). NaOCl has also caused allergic reactions\(^{(16, 17)}\).

Traditional herbal medicines have gained attention in the global health market due to their various advantages like complete absence or negligibility of side effects and are preferred to the drugs manufactured using chemical substances. The carnivorous/insectivorous plants trap their prey, mainly insects, and digest their proteins primarily by their endogenous proteinase(s) and absorb the digested products as the nitrogen source\(^{(18)}\). The Drosera and Nepenthes are the two important Genuses of carnivorous plants. Drosera was found by Charles Darwin, characterized by leaves covered with glandular hairs, which trap and digest insects. These plants contain 100 species distributed widely in tropical and temperate areas of the northern and southern hemispheres\(^{(19)}\). Drosera rotundifolia is commonly used in the treatment of epilepsy and whooping cough\(^{(20)}\). African or Asian Drosera species (e.g. Drosera madagascariensis DC. and Drosera peltata Smith) have been used for medicinal purposes\(^{(21)}\). The antimicrobial activity of extracts of Drosera peltata against oral bacteria has been proved to be due to flavonoids and naphthoquinones\(^{(22)}\). However, the tissue dissolving property of these plants has not been studied so far.

Unlike Drosera, Nepenthaceae offers a special condition, where the pitchers secrete a quantity of digestive fluid before they open for digestion of insects. The digestive fluid is secreted in far greater quantities within the pitchers of Nepenthes (several tens of ml by pitcher) compared to the micro liters quantities secreted by leaves of Drosera\(^{(18, 23)}\). The digestive fluid is colorless, odourless, tasteless and of varying consistency\(^{(18)}\). The fluid contains several hydrolytic enzymes such as proteases and phosphatases\(^{(24)}\) and potassium, sodium, magnesium, calcium, chlorine (as hydrochloric acid) and organic acids\(^{(18)}\). Nepenthes comprises of approximately 90 species of carnivorous plants\(^{(25)}\), distributed in the tropical region. They use highly specialized pitcher-shaped leaves to capture insects\(^{(26)}\). The bottom part of each pitcher is filled with a digestive fluid in which the captured insects drowns and subsequently gets digested.

In this study, carnivorous plants were considered to serve as an herbal alternative to NaOCl due to its enzymatic proteolytic activity. Hence, the aim was to investigate the pulp tissue dissolution capacity of NaOCl, ethanolic extract of Drosera rotundifolia and digestive fluid of Nepenthes khasiana.

**Materials and Method**

**Plant Material:**

**Drosera Rotundifolia:** A commercial product of Drosera rotundifolia mother tincture, 100ml (Dr. Willmar Schwabe India Pvt. Ltd, Noida, India) contains powdered plant extract in 60% of ethanol.

**Nepenthes Khasiana:** Fresh digestive secretion was collected from the pitchers of the carnivorous plant, Nepenthes khasiana using sterile pipettes from Tropical Botanic Garden and Research Institute, Trivananthapuram, Kerala, India.

**Analysis of pH:** The pH of ethanolic extract of Drosera rotundifolia and digestive fluid of Nepenthes khasiana were analyzed using pH meter (Elico; LI 612, Hyderabad, India).

**Pulp tissue sample preparation:** Freshly extracted, intact vital teeth, extracted for orthodontic and impaction purposes were collected and stored at -20°C. The teeth were thawed to room temperature. Two longitudinal grooves on the proximal surfaces of the teeth were made with diamond disc. The teeth were split into two halves with chisel and mallet. The pulp tissue was removed with tweezers and washed with distilled water to remove excess blood and then blotted dry. All pulp samples were combined to create a random mix of tissues. Then, 40 pulp tissue samples of similar weight (7 mg each) were prepared using sterile scalpel. Initial weight of each specimen was measured with a precision balance (Sartorius; BS 2235, Germany). Throughout the experiment, the tissues were handled only with tweezers to avoid errors in weight as a result of perspiration \(^{(27)}\). Then, the samples were randomly divided into 4 groups...
(n = 10) and individually placed into 2 ml propylene tubes. The tubes were randomly assigned to 4 groups of 10 each, corresponding to the type of solution tested.

The groups were as follows, Group I: 1ml of 5% NaOCl (positive control), Group II: 1ml of digestive fluid of Nepenthes khasiana, Group III: 1ml of Drosera rotundifolia (ethanolic extract), Group IV: 1 ml of distilled water (negative control). The test solutions were added to the tissue samples, the tissues were removed from the test solutions at 5, 15, 20, 30 min, 1, 2, 3, 4, 5, 6, 7 hr, blotted dry with the tissue paper and the tissues were weighed with precision balance.

**Results**

The results showed complete dissolution of pulp tissue by Group I within 20 minutes. Group II dissolved the pulp tissue completely within 7 hours. Group III showed no dissolution of pulp. Instead, had initial weight loss and the weight was maintained constant for 7 hours. Group IV showed no change in weight.

The mean weight change of the pulp tissue (table 1 and figure 1) by the test solutions were compared using one-way analysis of variance (ANOVA) followed by Tukey HSB test for post hoc multiple comparisons. A P value < 0.05 was considered to indicate a significant difference between the groups. Among the groups, at all time intervals, P value was found to be < 0.001** by one-way analysis of variance. The result was statistically significant between Group I and other groups at all time intervals, except Group II, 7 hours. Statistically significant result was found between Group IV and other groups at all time intervals except with Group II, 5 min.

**pH:** The pH of ethanolic extract of Drosera rotundifolia, and Nepenthes khasiana was found to be 4.1 and 4.4.

**Discussion**

The tissue dissolving property of irrigating solutions is important because they dissolve and removes the pulp tissue from the root canal. Among the different irrigating solutions, NaOCl has the unique tissue dissolution property. When NaOCl is added to water, hypochlorous acid (HOCl) is formed. The HOCl is responsible for strong chlorinating and oxidizing action on tissue and provides the property of tissue dissolution to NaOCl. The tissue dissolution efficacy of root canal irrigants were investigated using bovine pulp(27). The concentration of collagen was comparatively lower in bovine than in human pulp(28). Hence, vital human pulp tissue and its dissolution by irrigants were checked at room temperature to simulate clinical conditions.

Different method were used for assessing the pulp dissolution like analyzing the hydroxyproline content(29), measuring the amount of total phosphate extracted, loss of tissue collagen(30). Hydroxyproline content is 13% of the collagen content of pulp. Therefore, analyzing the tissue dissolution based on any single content cannot reflect the dissolution of the whole tissue. Hence, a simple, reliable, weighing method was used to quantify specimen dissolution. In this study, distilled water served as a control instead of isotonic saline because, saline dissolved a mean 10.48% of bovine pulp tissue(30). The digestive fluid of unopened pitchers are sterile, whereas, the fluid of opened pitchers, whether containing insects or not, invariably contained bacteria in large numbers(18). Hence, the fluid of unopened pitchers was used in this study.

In the present study, NaOCl dissolved the pulp tissue in 20 minutes due to several chemical reactions such as, saponification, neutralization and chloramination reaction(31). These reactions occur simultaneously and synergistically leading to liquefaction of organic tissue.

The ethanolic extract of Drosera rotundifolia was used for pulp tissue dissolution assuming that along with flavonoids and naphthoquinones, the active components present in the digestive fluid, responsible for digestion of insects could also be extracted from whole plant using ethanol as a solvent. But, the tissues were not dissolved, become firm in consistency and revealed an initial mild reduction in weight in 5 minutes, which could be due to dehydration by alcohol. Alcohol, when used as a solvent denatured the proteins i.e., proteolytic enzymes which are responsible for the tissue digestion by disruption of the side chain intramolecular hydrogen bonding between amide groups(32).

The digestive fluid of Nepenthes khasiana caused complete dissolution of pulp at 7 hours. It has been attributed to the presence of protease in digestive fluid, which belong to a category of acid protease such as pepsin(33), called as nepenthesin(34). Similar to pepsin, nepenthesin acts on proteins, splitting them into protease, peptones and polypeptides(35). Pepsin is most efficient in cleaving peptide bonds between hydrophobic and preferably aromatic amino acids such
as phenyl alanine, tryptophan, and tyrosine. Athauda et al purified two acid proteinases (nepenthesins I and II) from the pitcher fluid of Nepenthes distillatoria and found that the proteolytic activity was largely due to two groups of Nepenthesins. Both Nepenthesins I and II were remarkably stable at or below 50˚C and extremely stable over a wide range of pH from 3 to 10 for over 30 days. Nepenthesin I and II had a high content of cysteine residues (12 residues/molecule), which were assumed to form six unique disulphide bonds. The presence of carbohydrate moieties in Nepenthesins reduces the possibility of autolysis and/or denaturation of Nepenthesins.

Further studies are required to reduce the pulp tissue dissolution time, by increasing the concentration of digestive fluid. It might be used as an alternative to NaOCl to achieve pulp tissue dissolution especially in patients, allergic and prone to NaOCl accidents, such as open apices.

Conclusion

The digestive fluid of Nepenthes khasiana could be considered as an herbal alternative to sodium hypochlorite for pulp tissue dissolution as it completely dissolved the pulp tissue similar to 5 % NaOCl, but at different time periods. The ethanolic extract of Drosera rotundifolia was found to be ineffective in dissolution of pulp.

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Conflict of Interest: Nil

References

Permanent Mandibular Central Incisor with Two Root Canals: A Case Report

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Abstract

The main reason for endodontic failure of mandibular incisor is the inability to detect the presence of second canal. Varying number of the root canals, their anatomy and interconnections in different teeth have been studied and reported. This case report describes the successful endodontic treatment of mandibular incisor having two root canals.

Keywords: Mandibular incisor, additional canals, Endodontic management.

Introduction

The most complex among all phases of anatomic study in human system is the morphology of pulp cavity morphology. The main reason for failure of endodontic therapy is the lack of knowledge about the anatomical variation of root canals. Lack of knowledge of root canal morphology or lack of experience and skill to negotiate the canal is the reason the canal being unnoticed and treated. The dentist must have a complete understanding of the root canal morphology before starting endodontic treatment. The entire root canal system must be explored, adequately debrided, and filled to attain a good prognosis after root canal treatment. The root canal system of single rooted teeth often have three pulp horns and a single root canal, but some studies have demonstrated that the root canal anatomy of mandibular incisors is not as easy as it appears to be on periapical radiographs, and that it may be complicated by the presence of bifurcated and lateral canals.

The incidence of two canals at the tooth apex was reported to be as low as 11% to as high as 43%. It is generally accepted that many mandibular incisors have two canals, which may merge into 1 canal before reaching the apex. In rare cases, separate foramina may form. This case report presents the endodontic treatment of mandibular incisor having two separate canals which merge into a single canal before exiting the tooth through a single apical foramen.

Case Report: A 55-year-old male patient reported to the department of Conservative dentistry and Endodontics with the chief complaint of pain in lower front tooth region for past 1 day. History of pain is mild, intermittent, nocturnal, aggravates on mastication and relieves at rest. There was no previous dental history and Patient’s medical history did not reveal any systemic diseases and on intraoral examination generalized attrition was seen and 41 had dental caries with tender on percussion. Pulp sensibility test showed negative response. On radiological examination attrition was seen and 41 had dental caries. Tooth was isolated using rubber dam. Access cavities of 41 were slightly modified.
in labiolingual direction using an endo access bur to gain straight-line access into the second canal. Canals revealed Vertucci type II morphology of root canals (Figure 2). The patency was checked using a no. 10k file. Working length was determined in the buccal and lingual canal as 17 and 16mm respectively using digital radiography (Figure-3). Biomechanical preparation was carried out using conventional hand instruments, 2.5% of sodium hypochlorite and 17% EDTA were used for irrigation. After each instrument change the canals were rinsed with normal saline. Master apical cone radiograph was taken (Figure-4) obturation was done using lateral condensation technique (Figure-5).


Discussion

It is assumed that mandibular incisor is the most easy tooth to treat but sometimes these teeth are difficult to treat because of presence of extra canal which is present more linguually and often misdiagnosed and leads to treatment failure. Success of root canal treatment depends on careful diagnosis of additional canal and thorough debridement of root canal space and obtaining a fluid-tight seal. According to Benjamin and Dowson 41.4% of the mandibular incisors showed two separate canals in a radiographic study of 364 specimens; of these, only 1.3% had two separate foramina. In a study of 1,085 specimens by Miyashita et al J Endod 1997 reported that only 3.1% of the samples had separate canals and foramina. Of the two hundred seventy-nine teeth examined in this study, 27.6% (77) had the center of the plotted straight-line access facial to the incisal edge, whereas 72.4% (202) had straight-line access at the incisal edge. No teeth had straight-line access plotted lingual to the incisal edge. The amount of incisal wear can be used as a guide to show where access should be made. In mandibular incisors with unworn incisal edges, the crown slopes toward the lingual from the long axis of the tooth. In these teeth, ideal access will be positioned facially 68.1% of the time. When teeth show “extensive” or “moderate” incisal wear, the access should be made in the incisal edge 86.5% of the time.
The crown of the mandibular incisor slopes toward the lingual, as the incisal edge wears the access moves more to the incisal relative to the incisal edge. An isthmus is an intercanal connection between two root canals comprising dental pulp and pulp-related tissue. In the same root between any two root canals isthmus can be seen. As the isthmus contains the dental pulp, it might serve as a potential site for the growth of bacteria thus, making complete debridement impossible. An isthmus should be suspected whenever two or more canals are seen and all attempts should be made in detecting and debriding it. Careful interpretation of the radiograph is essential to ensure that additional root canals are not missed. This may necessitate imaging the tooth from different angles so that the root canals may be distinguished in the resulting films. In addition, if an obvious canal ends abruptly, the clinician should be suspicious that there are in fact two canals. Adequate exploration of canal chamber with an endodontic file or endodontic explorer (DG 16) facilitates to navigate extra canal. The practice of endodontics should involve the buccolinguinal extension of access for the mandibular anterior teeth.

**Conclusion**

Clinician might think that treating one canal would be sufficient since the apical foramen would be sealed, but still one would see more failure in these teeth. However, one should not feel secure in treating only one canal since the second canal would become necrotic and can liberate noxious byproducts through the accessory and lateral canals into the periodontal ligament space or moreover through the insufficient apical seal of root canal filling materials. In the recent era, the use of clinical microscope for root canal treatment allows a higher detection of extra root canals and also enables proper visualization and cleaning of the isthmus, thereafter increasing the quality and success rates of the endodontic treatment. A successful treatment is more expected when the experienced clinician has not only adequate armamentarium and technology but also a comprehensive knowledge of the root canal anatomy of the tooth.

**Conflict of Interest:** Nil

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**Ethical Clearance:** Not required for case report manuscript.

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A 3-Dimensional Approach in the Management of Endodontic Pain: A Review

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Abstract

Recent advances in the understanding of pain physiology and pharmacology have provided dental practitioners with more reliable information upon which clinical decisions in the treatment of endodontic pain can be based. One of the effective strategies currently used in these cases is structured to evaluate the painful condition through a 3-D approach which establishes a differential diagnosis, definitive treatment, and rational use of drugs, based on the most appropriate scientific evidence available in the literature. This article provides practical treatment strategies based upon current scientific evidence and uses information presented in the articles.

Keywords: Pain physiology, endodontic pain, 3-D approach.

Introduction

Managing pain can be one of the more challenging aspects of the clinical practice of endodontics, and one by which the skill of the clinician is often judged. Unfortunately, root canal therapy is still perceived by many as a standard against which painful experiences are judged. This is a two-edged sword. Because patients are expecting pain, it often makes their pain management more difficult. On the other hand, advances in local anesthesia and modern pharmacology allow dental practitioners to deal effectively with the patient experiencing odontogenic pain and, in most cases, exceed their expectations. In Endodontics, the management of pre- and post-operative pain should include important aspects for its controlling and prevention, such as anxiety reduction and control of pre/transoperative pain through local anaesthetic techniques and pharmacological drugs [1]. The effective strategy for managing the endodontic pain is based in the pain assessment through a 3-D approach that consists of establishing the differential diagnosis, definitive treatment, and rational use of drugs [2]. This literature review aimed to identify and systematize the clinical approaches for pain control during endodontic emergency care through the accurate diagnosis and clinical and pharmacological intervention.

There are three D’s that needs to be done in order to treat any pain.

1. Differential Diagnosis: The diagnosis should be the starting point for pain control, because the pain cause may involve anatomic and psycho factors [1, 3]. The first D consists of establishing the differential diagnosis based on identifying oral pathologies and their origins through step-guided investigation, obtaining objective and subjective information on the problem. The pain can be defined as an unpleasant sensorial and emotional experience associated to a real or potential tissue damage. Acute pain is defined as a recent damage of limited duration; chronic pain is related to persistent

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duration\(^1\). Although the majority of patients who present with a complaint of tooth pain actually suffer from odontogenic pain, it is clear that this is not always the case. If the pain and origin sites are different, this is so-called referred pain. The radiographic evaluation provides useful information on the involved structures; however, the radiograph is an adjunctive examination complementary to the clinical examination\(^1\). The adjunctive tests for pulp diagnosis, especially the cold test, will determine the pulp sensitivity. Thus, developing a differential diagnosis is an essential first step in effective pain management strategies. Table 1 provides an overview of major clinical conditions that can mimic odontogenic pain.

2. **Definitive Treatment:** The second D is the definitive dental treatment or the emergency dental care required for pain remission. The diagnosis accuracy leads to the safe and correct treatment, using adequate procedures that allows significant pain reduction and the correct drug association that contributes to pain control and relief\(^3\).

Pulp inflammations may cause unbearable pain, and emergency care is required through the complete removal of the inflamed pulp (pulpectomy), especially if pain after percussion is present \(^4, 5\). Notwithstanding, because the patient who search for emergency care is not scheduled, the operative time is very reduced to perform pulpectomy. Thus pulpotomy is an acceptable treatment to cease the pain, aiming at removing the affected coronal pulp tissue without touching the root canals \(^6, 7, 8\). The high success rate of pulpotomy is associated to the alteration in pulp hemodynamics and pressure of the interstitial fluid because the pain relief occurs due to the decompression of the enlarged pulp tissues due to the inflammatory process \(^6\). Partial pulpectomy can be accomplished mainly in multi-rooted teeth by completely removing the pulp tissue of the larger straighter canals (palatal canal of maxillary molars and distal canal of the mandibular molars). Because of the complex morphology of the buccal roots of the maxillary molars and mesial roots of the mandibular molars, it is not advisable to prepare these canals, due to difficult in proper cleaning during emergency care, resulting in hemorrhage and increase in inflammation and patient’s discomfort. In cases presenting pain at percussion, it is recommended to establish the working length, instrument all canals up to file #25, and perform occlusal adjustment \(^9\).

According to Agnihorry et al. \(^10\), the irreversible pulpitis is characterized as one of the main causes motivating the patients to seek emergency care. The most indicated approach is endodontic treatment associated to analgesic or anti-inflammatory drugs. However, a significant number of dentists still prescribes antibiotics to relief the pain during irreversible pulpitis. According these authors, the literature reports little evidence that antibiotics reduce the pain. The authors still recommended that the antibiotics prescription does not replace pulpectomy in these cases \(^9\).

The complete instrumentation is the ideal treatment for symptomatic teeth, mainly when the periodontal ligament is injured, indicating the presence of acute apical periodontitis. Thus, at the emergency appointment, all necrotic tissue must be removed. In single-rooted teeth, complete pulpectomy is easily performed, while multi-rooted teeth demand a more complicated preparation due to anatomical variations. Notwithstanding, the preparation length is at 2-3 mm below the radiographic apex for all canals \(^10\).

A tooth with acute dentoalveolar abscess is extremely sensible to mastication, percussion, and palpation, but does not respond to any pulp test and has many mobility degrees. At the radiographic examination, the periodontal ligament space may be enlarged and shows periradicular radiolucency. At the vestibule bottom and adjacent soft tissues, swelling may occur that complicates the treatment and demands the following-up of the remission of these signs and symptoms after emergency care. The presence of fever, swelling, prostration, cervical and submandibular lymphatic nodes sensible to palpation (lymphadenitis) evidences that the infectious process is not properly controlled by the normal defense mechanisms and requires antibiotic therapy.

The treatment of the acute intraosseous alveolar abscess is not different from that of the necrosed pulp, in which there is the presence of unbearable pain and lack of extra or intraoral edema. In these cases, the exudation is confined to the apical area and the drainage is obtained through the total instrumentation of the canal with the foramen trepanation attempting to drain the pus through the canal \(^11\).
According to Siqueira and Barnett [11], the factors causing pain during endodontic procedures are of chemical or mechanical origin and commonly associated to iatrogeny, microbial factors present in pulp and periradicular pulp, and presence of periapical lesion induced or aggravated during root canal treatment [11]. The microorganisms may cause pain in between appointments due to the following situations: apical extrusion of debris, incomplete instrumentation leading to alterations in the endodontic microbiota, and secondary intraradicular infections [7]. The occurrence of mild post-operative pain is not rare, even with the endodontic treatment followed acceptable standards. The mild pain after chemical-mechanical preparation may occur in approximately 10-30% of the cases, and in most cases, the discomfort is decreased with common analgesic drugs to relieve the symptoms [12]. The development of moderate to severe post-operative pain, with or without swelling, on the other hand, ins uncommon and demands emergency care [11].

3. **Systemic drugs for controlling the pain:** The third D denotes drugs which are needed to control the pain and infection.

Anesthesia techniques for different teeth Various specific techniques have been described to help achieve predictable anesthesia in different teeth. For mandibular central and lateral incisors, a combination of buccal and lingual infiltrations provides significantly higher rates of success of anesthesia compared to either a labial or a lingual infiltration[13,14]. The palatal-anterior superior alveolar (P-ASA) injection has been described for anesthetizing maxillary incisors and canines. However, this technique has a potential for being painful during needle insertion, and also during and after injection. Moreover it can cause swelling, numbness, and parasthesia of the incisive papilla even when a computer aided injection system was employed [15]. For maxillary molar teeth, the combination of buccal and palatal injections significantly increased the duration of anesthesia from 21 to 57 min [16]. Greater palatine and high tuberosity second division nerve blocks are effective techniques for anesthetizing the first and second maxillary molars in most cases, whereas only about two-thirds of second premolars were anesthetized with these techniques. No significant difference was found between the efficacy of these techniques, although more post-injection pain was reported with the high tuberosity second division injection technique [17]. Higher success rate of anesthesia for mandibular molar has been reported when the Gow-Gates mandibular nerve block technique was compared with either conventional IANB or buccal and lingual infiltrations [18]. However, two other studies found no significant differences between different anaesthetic techniques for mandibular molars [19,20]. No significant difference was found between the posterior superior alveolar nerve block, buccal infiltration and buccal plus palatal injection for anesthetizing maxillary first molars with irreversible pulpitis [21].

One study used frequency dependent stimulation for blocking inferior alveolar nerve following IANB and found no significant increase in pulp anaesthesia in mandibular teeth [22]. In conclusion, dentists should employ techniques that provide higher success rates while having less injection pain and less post-injection pain and discomfort for the patient. Supplementary or alternative techniques should be used when the first injected is not successful in providing profound anesthesia.

Other anaesthetic techniques are used for controlling endodontic pain such as intrasosseus, intraligamentary, and intrapulpar [23,3,24]. According to Fan et al. [8], the alveolar inferior nerve blocking may be associated with the anesthesia of the buccal nerve or intraligamentary anesthesia to increase the anesthesia success in cases of irreversible pulpitis [25]. The intrasosseus injection (II) enables placing the local anaesthetic solution directly on the cancellous bone adjacent to the tooth to be anesthetized [21].

Currently, a system is available on dental market so-called Stabident. Stabident is composed by a slow-speed perforator (micro motor) coupled with burs to create a small orifice on the cortical plate. The anaesthetic solution is placed on the cancellous bone through a 27-gauge needle, placed on the orifice previously made by the perforator, a very effective technique if the conventional techniques failed [26].

The intrapulpar infiltrative anaesthesia is an extreme resource in teeth with deep caries and pulp exposure. The anaesthetic solution is directly injected on dental pulp, and the liquid injection should be fast because the injection pain is instantaneous.

The use of drugs to control the pain should be
planned rationally and strictly to situations requiring pharmacological management, adjunctive to the dental treatment \cite{12, 14}. The dentist is allowed to prescribe any drug with proven indication in Dentistry, including those with controlled use. Such approach demands that the dentist knows the prescribed drug, including the side effects, possible interactions, indications, and contraindications \cite{3, 12}. The anti-inflammatory drugs comprise two groups: non-steroidal and steroidal (corticoids). Nonsteroidal anti-inflammatory (NSAIs) are effective against dental pain \cite{23}. The clinician can also use the corticosteroids indicated with safe in Dentistry: dexamethasone and betamethasone \cite{3, 12}.

This problem may directly affect Dentistry because the effectiveness of the most used antibiotics may decrease. According to Andrade \cite{3}, many dentists still considered erroneously. The antibiotics should be considered as adjunctive treatment in controlling the infections (Figure 1)

The indiscriminate and incorrect use of antibiotics may lead to the appearance of multiresistant bacteria that are not sensible to any antibiotics available in the market and whose control can be complex.

The current evidence indicates that local root canal instrumentation procedures, combined with analgesic medications are sufficient for management of the vast majority of symptomatic endodontic cases. When diagnosing a case with odontogenic infection, it is important that the clinician make a distinction between localized infections, which may include cases with periradicular radiolucencies, pain and localized swellings, and those with spreading systemic infections. Antibiotic treatment is generally not recommended for healthy patients with localized endodontic infections.

**Figure 1: Antibiotic recommendation for Symptomatic Endodontic patients**

**Conclusion**

The emergency care because of orofacial pain requires immediate dentist’s attention. Accordingly, the dentist should be apt to identify the pain evolution by analyzing the characteristics and causal factors, to establish a differential diagnosis and treatment plan capable of relieving the pain. A systematic approach to understand the pathologic problem consists of
establishing the precise diagnosis, effective definitive treatment, and rational use of drugs. This review pointed out some important approaches that may be key factors for the effective pain remission, control, and prevention in endodontic procedures. The pain management requires clinical approach based on scientific evidence whenever possible to choose the best treatment alternative in cases of pain. Thus, the constant updating of the therapeutic approaches is necessary.

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Role of Neutrophils in Periodontitis: A Review

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Abstract

Periodontitis is a multifactorial disease caused by periodontopathic bacteria and influenced by both environmental and genetic factors. In a healthy oral environment, there is a balance between symbiotic bacteria and when this balance is breached, inflammation appears and more immune cells are recruited to the site of infection. Neutrophils are the professional antimicrobial phagocytes that form the first line of defense against bacterial invasion in periodontal disease and connect innate and adaptive arms of the immune response. Neutrophils efficiently control pathogens by oxygen-dependent and oxygen-independent antimicrobial mechanisms and by neutrophil extracellular traps. Some studies indicate that excessive neutrophils are responsible for tissue damage and disease progression in periodontitis whereas other studies indicate that neutrophil deficiencies in patients also result in the periodontal condition.

Keywords: Periodontitis, Neutrophil, defensin, neutrophil extracellular traps.

Introduction

Periodontitis is an inflammatory condition and periodontopathic bacteria are recognized by neutrophils, macrophages and other immune cells with the help of pattern recognition receptors (like Toll-Like receptors) that recognize pathogen associated molecular patterns (PAMPs- lipopolysaccharides) of microbes and this interaction triggers the production of inflammatory molecules such as cytokines and chemokines by immune cells. If the inflammation continues, it extends deep into the tissues causing alveolar bone loss and the formation of periodontal pockets characteristic to periodontitis. There is tight control of neutrophil survival after bacterial clearance by induction of apoptosis which exerts protective effects toward host tissues and prevents inflammatory tissue damage. A failure to properly regulate neutrophil abundance and turnover directly contributes to the pathogenesis of periodontitis. In addition to the pathogenic effects of periodontal bacteria, dysregulation of neutrophil activity has been found to play a role in periodontitis. Neutrophils function as a double-edged sword in periodontitis, causing not only the mobilization of defense mediators and tissue-repairing mechanisms but also further tissue damage.

Pathogen Killing strategies of neutrophils

Phagocytosis: Neutrophils recognize pathogens through pattern recognition receptors or opsonins and initiate phagocytosis whereby the pathogen is internalized by the cell into a vacuole called the phagosome. The principal opsonin receptors of neutrophils, Fc receptors and a subgroup of b2 integrins, bind to an immunoglobulin or complement-coated particles, respectively and initiate phagocytosis. After engulfment of bacteria, the nascent phagosome matures by fusing with lysosomes forming phagolysosome. Neutrophils produce an oxidative burst resulting in the rapid release of high levels of bactericidal reactive chemical species that is generation of ROS, such as superoxide anion, hydrogen peroxide (H₂O₂), hydroxyl radicals (HO·), hypochlorous acid (HOCl), nitric oxide (NO) under

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the catalyzation of NADPH oxidase, myeloperoxidase (MPO) or nitric oxide (NO) synthetase\[6\]. ROS create a toxic environment to the pathogen but not all pathogens are killed inside the phagosome. Some have developed advanced strategies to survive inside neutrophils and these strategies include interfering with engulfment, modulating phagosome maturation, and creating a more hospitable intraphagosomal environment\[7\]. Excessive neutrophils as seen in some periodontitis conditions contribute to the destruction of periodontal connective tissues and extracellular matrix through increased production of reactive oxygen species ROS \[8\]. In an in vitro study, the phagocytic activity of crevicular and peripheral blood neutrophils in aggressive periodontitis was found to be reduced. It was also inferred that altered neutrophil function could severely weaken the host defense resulting in the initiation and progression of periodontal disease\[9\].

**Degranulation:** Neutrophils are the most abundant type of granulocytes of white blood cells. They contain primary or azurophilic, secondary or specific, tertiary or gelatinase and secretory vesicles. The primary granules are the main storage site of elastase, myeloperoxidase and human neutrophil peptides (α-defensins). The secondary granule contains alkaline phosphatase, lysozyme, NADPH oxidase, collagenase, lactoferrin and cathelicidin. Tertiary granules contain matrix metalloprotease 9 (also known as gelatinase B), cathepsin. The secretory vesicles in human neutrophils contain human serum albumin and other substances. Granule release is tightly controlled and not released from neutrophils until they receive a signal from receptors in the plasma membrane or phagosomal membrane. *Porphyromonas gingivalis*, the keystone pathogen in chronic periodontitis, inactivate granular enzymes and evade neutrophil-mediated killing and persist in the periodontal pocket\[10,11\].

**Neutrophil Extracellular Traps:** Neutrophil extracellular traps (NETs) comprise decondensed nuclear DNA and associated histones that are extruded into the extracellular space and associated with the web-like strands of DNA is an array of antimicrobial peptides (AMPs), which facilitate the extracellular destruction of microorganisms that become entrapped within the NETs\[12,13\]. Neutrophil's infiltration of gingiva, influx into the crevice and subsequent NETosis is a crucial feature of periodontitis. Exaggerated NETs are unable to maintain periodontal health and contribute to the body's overall inflammatory burden and worsen conditions such as atherosclerosis, diabetes mellitus and obstructive pulmonary disease \[14\]. Oxygen-dependent and oxygen-independent antimicrobial factors and extracellular bacterial traps render neutrophils very efficient at controlling periodontal pathogens and result in the containment of pathogens within the oral cavity.

**Neutrophil components involved in periodontitis.**

**Alphadefensins:** Alpha defensins1-4 (α-defensins) are also known as human neutrophil peptides and are found in the oral cavity whereas α-defensins 5-6 are found in mucosal Paneth cells associated with the gut. α-defensins induce non-oxidative killing in phagocytes or can act directly as an antimicrobial when discharged into the tissue\[15,16\].

Lactoferrin: Lactoferrin, an iron-binding glycoprotein, is an important component of human secretions including saliva, synthesized by exocrine glands and neutrophils and represents an important defense factor against periodontopathic bacteria through its ability to decrease bacterial growth, biofilm development, iron overload, reactive oxygen formation and inflammatory processes \[17\]. Periodontopathic bacteria reside as a biofilm in supragingival and subgingival plaque and lactoferrin were able to reduce their biofilm development \[18\]. The antibiofilm activity of lactoferrin against *P. gingivalis* and *Prevotella intermedia* highlights the potential usefulness of lactoferrin in the prevention and treatment of periodontal diseases and as an adjunct therapy for periodontal diseases.

Cathelicidin: Cathelicidin is abundantly expressed in neutrophils and mucosal epithelia such as airways, buccal mucosa, tongue, esophagus, cervix, vagina and salivary glands \[19\]. Humans express only one cathelicidin known as hCAP-18 (human cathelicidin antimicrobial peptide of 18kDa). The cathelicidin hCAP-18 is characterized by a highly conserved cathepsin-L-inhibitor (cathelin)-like domain which is flanked by a signal peptide domain on its N-terminus and by an antimicrobial peptide region on its C-terminus called LL-37 (37 denotes the length of the peptide and “LL” denotes the first two amino acids formed by Leucine) \[20,21\]. The antibacterial C-terminus region (LL-37) is cleaved from hCAP-18. LL-37 exerts direct bactericidal effect by inserting into the bacterial membrane and triggering cell rupture and leakage of cytoplasm \[21\]. It has been shown that the production of LL-37 is up-regulated in the inflamed gingival tissues compared to healthy gingival tissues \[22\].
and has also been found to possess antibacterial activity against periodontopathic bacteria such as *P. gingivalis, P. intermedia* and *A. actinomycetemcomitans* [23]. A novel missense mutation in cathelicidin antimicrobial peptide gene, serine to asparagine substitution mutation was reported by Turkoglu et al., 2011 and found that generalized aggressive periodontitis was significantly associated with the mutation but not chronic periodontitis and the substitution mutation was a contributing factor for developing generalized aggressive periodontitis [24].

**NADPH oxidase:** Upon activation, neutrophils generate reactive oxygen species (ROS) in a process known as the respiratory burst by NADPH oxidase that belongs to the family of NOX proteins. The leukocyte specific NADPH oxidase is a multi-subunit entity with membrane-bound and soluble components that assemble into a heteromeric complex when the cells are stimulated [5]. The assembled oxidase generates ROS that serve as highly effective antimicrobial agents. Deficiency of NADPH oxidase subunit gp91phox promoted the colonization of *A. actinomycetemcomitans* in the murine oral cavity, leading to severe periodontal bone loss and inflammation after infection and suggested that ROS-dependent mechanisms are involved in the clearance of the periodontopathogen [25]. The mutation in NADPH oxidase p22phox C242T predisposed to aggressive periodontitis through modulation of neutrophil superoxide production. NADPH oxidase p22phox T allele was found to be enriched in aggressive periodontitis patients compared with controls with increased release of superoxide from neutrophils [26]. Excess ROS is likely to contribute to bone loss in periodontitis and the lack of ROS is harmful to periodontal health so there has to be a balance for the maintenance of periodontal health [25].

**Formyl peptide receptor:** Bacterial formylpeptides act as chemotactic stimuli that are recognized by formyl peptide receptors (FPRs) of neutrophils and in response neutrophils migrate toward infection sites. Binding of formylpeptides to FPRs triggers a cascade of intracellular signals that coordinate cytoskeletal reorganization, formation of pseudopodia and migration of neutrophils up a chemotactic gradient [27]. Aggressive periodontitis is associated with impaired neutrophil chemotaxis toward bacterial N-formyl peptides. Gene analysis showed that the homozygous FPR1 348T genotype was associated with an increased risk of aggressive periodontitis and significant impairment of neutrophil chemotaxis [27]. Diseases associated with neutrophil defects.

**Papillon–Lefèvre syndrome (PLS):** Papillon–Lefèvre syndrome (PLS) is a rare autosomal recessive disorder and characterized by palmoplantar hyperkeratosis and severe early-onset periodontitis, leading to premature loss of deciduous and permanent dentition at a very young age [28]. PLS is caused by mutations of the cathepsin C gene (CTSC) and reduction in CTSC activity resulted in reduced host responses against bacterial [29]. It has been shown that in PLS, neutrophils have a substantially reduced capacity for NET production, higher ROS generation and defective chemotaxis. A range of above said functional neutrophil defects have been noted in PLS in addition to the CTSC deficiency and consequent failure to activate neutrophil serine protease (NSPs), these cumulative effects have been found to destroy periodontal tissues [30].

**Neutropenias** In autoimmune neutropenia, autoantibodies attack neutrophil membrane resulting in their destruction or alteration of their function [31]. This leads to an aberration in their homeostasis and increased susceptibility to periodontitis.

**Chediak-Higashi Syndrome:** Chediak-Higashi syndrome (CHS) is a rare autosomal recessive disorder and the primary defect is abnormal granule formation in the cells secondary to a mutation of a lysosomal trafficking regulator gene (LYST) leading to multiple infections including periodontitis [32]. Because of defective intracellular trafficking, giant lysosomal granules develop within neutrophils and other cells (e.g., melanocytes, fibroblasts and neural Schwann cells), leading to abnormal lysosome fusion with phagosome, which subsequently results in impaired function of multiple body cells [33]. LYST mutations in CHS patients affect TLR-2 and TLR-4 expression/function, leading to dysregulated immunoinflammatory response, which in turn influenced the periodontal phenotype in CHS patients [33].

**Leukocyte adhesion deficiency:** Leukocyte adhesion deficiency type I (LAD-I) is an autosomal recessive immunodeficiency disorder characterized by impaired adhesion and chemotaxis due to defects in the integrin receptors of white blood cells [34]. In LAD, individuals had defective neutrophil recruitment to the periodontium (compromised neutrophil adhesion and extravasation to sites of infection) affecting both the primary and permanent dentition leading to aggressive periodontitis [35].
Chronic Granulomatous Disease: Chronic granulomatous disease (CGD) is an extremely rare congenital immune deficiency disease characterized by recurrent severe infections due to the inability of neutrophils and macrophages to mount a respiratory burst and kill invading bacteria and fungi[36]. Mutations in the genes encoding the components of the NADPH oxidase complex cause CGD and the disorder can be inherited in an X-linked or autosomal recessive (AR) manner. The most common form of CGD is the X-linked recessive CGD caused by mutations in the CYBB gene, encoding gp91phox subunit. The other forms of CGD are AR and are due to mutations in CYBA, NCF1 and NCF2, encoding p22phox, p47phox, and p67phox, respectively[37]. Patients with CGD develop oral lesions reflecting susceptibility to oral infections and inflammation[36].

Table 1: Summarizes various periodontal diseases caused due to the defect of neutrophils

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papillon–Lefèvre syndrome (PLS)</td>
<td>mutation of the cathepsin C gene (CTSC)</td>
</tr>
<tr>
<td>Autoimmune neutropenia</td>
<td>autoantibodies attack neutrophil membrane</td>
</tr>
<tr>
<td>Chediak-Higashi syndrome</td>
<td>mutation of lysosomal trafficking regulator gene (LYST)</td>
</tr>
<tr>
<td>Leukocyte adhesion deficiency</td>
<td>immunodeficiency disorder characterized by impaired adhesion and chemotaxis of white blood cells (neutrophils)</td>
</tr>
<tr>
<td>Chronic granulomatous disease</td>
<td>Mutations in genes encoding the components of the NADPH oxidase complex</td>
</tr>
</tbody>
</table>

Conclusion

Neutrophils are an important constituent of the host immune defense mechanism and play a pivotal role in maintaining homeostasis. But when there is excessive activation of neutrophils, these powerful components of immune system work destructively in the periodontium. Neutrophil deficiency results in recurrent and severe periodontal infections while also their unregulated release leads to pathology from excessive inflammation. Therapies should concentrate on preventing detrimental inflammation and periodontal tissue breakdownby inhibiting hyperactivity of neutrophil mediators without compromising the antimicrobial activity of the neutrophils.

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Malignant Hyperthermia: A Systematic Review

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Abstract

Background: Malignant hyperthermia (MH) is a potentially fatal pharmacogenetic disorder of the skeletal muscles that presents as a hypermetabolic response to potent inhalational anaesthetic agents such as halothane, sevoflurane, desflurane, isoflurane and the depolarizing muscle relaxants like succinylcholine, and rarely, due to vigorous exercise and heat.

Method: A systematic review was carried out using the database PubMed central and MEDLINE using the keywords General anaesthesia, malignant hyperthermia, systematic review. This literature search yielded 1174 articles published up to the year 2018. INCLUSION CRITERIA: peer reviewed retrospective and prospective cohort studies, cross sectional studies, case descriptions were included in the study.

Objective: The objective of this systematic review is to provide a wide and objective assessment of the incidence of Malignant Hyperthermia in patients undergoing surgery with or without general anaesthesia

Keywords: Malignant hyperthermia, Anesthesia, Bradycardia.

Introduction

Malignant hyperthermia is a potentially fatal pharmacogenetic disorder triggered on exposure to potent volatile anaesthetic agents. MH is a genetic disorder of calcium receptor that is linked to ryanodine receptor 1 gene. MH causes a progressive depression of almost all the organs.¹²³

Mild Hypothermia:
- Heavy shivering
- Cold diuresis and
- A cold white skin

Moderate Hypothermia:
- Reduced shivering
- Hyporeflexia
- Ataxia
- Bradycardia

Severe Hypothermia:
- The cessation of shivering
- Bradycardia (with possible cardiac arrest),
- Hypotension,
- Hypoventilation (with possible apnea), areflexia, oliguria, coma, and eventually death

Ethical Issues: No funding agency for this study and this systematic review did not require any ethical approval or informed consent since there is no direct contact with the patients and is based only on previously published data.

Inclusion and Exclusion Criteria: Peer reviewed retrospective and prospective cohort studies, cross sectional studies, case descriptions were included in the study.

Reports of neuroleptic malignant syndrome or hyperpyrexia of unclear etiology will be excluded.
Discussion

In 1973 King jo and denborough - King denborough syndrome patients are MH susceptible

In 1980 Gronert and denborough et al Reported patients with awake MH episodes with exercise and heat stroke as potential triggers. All of them responded to dantrolene sodium.

In 1984 Schwartz L et al Succinylcholine induced MMR occurs in one in 100 children with anaesthesia and are susceptible to MH in patients induced by halothane.

In 1994 Lazzell et al Found that the incidence of MH that occurs on induction with succinyl choline is same following induction with sevoflourane and much lesser following induction with thiopental.

In 2009 Browne et al Reported exertional heat stroke as a possible vital trigger linked to MH.

In 2010 Wei et al MMD an early onset congenital myopathy is associated with MH susceptibility.

In 2012 Yuen et al Found that heat stress triggers fulminant MH in mice expressing the rabbit equivalent of human RYR1 gene T4826I mutation.

In 2014 Larach et al Likelihood of complication increases 2.9 times per 2 degree raise in the core body temperature and 1.6 times per 30 minute delay in the use of dantrolene sodium.

In 2015 Albakari et al Dominant or recessive mutations in RYR1 are identified cause of MH susceptibility and there are 48 mutations proven to be causative for MH.

In 2016 Bamaga et al Majority of the reported cases of MH are caused by mutations in two genes RYR1 and CACNA1S which are associated with skeletal muscle calcium regulation.

Conclusion

In individuals undergoing general anesthesia using volatile agents MH remains a serious susceptible risk
factor. Mutation of two genes RYR1 and CACNA1S have been unequivocally linked to causation of Malignant hyperthermia however the potential for the involvement of other genes cannot be discounted. The incidence of death due to MH has decreased in the last thirty years and there is a significant reduction in mortality rate from 80% to 1.4%. Dantrolene sodium is the only curative approach and there should be no treatment delay; all the medical practitioners must be well aware of these measures inorder to facilitate early detection and treatment.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References
Role of Genetics in Dentistry: A Review

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Abstract

Our genome plays a key role in odontogenesis and oral diseases. The dental tissues are unique and share many basic molecular mechanisms that are common to tissues throughout the body. Dental caries, periodontal diseases, malocclusion and oral cancer are the most common manifestation of genetic and environmental interaction and several genes have been primarily involved in human dentition. Consideration of genetic factors is essential for diagnosis that underlies virtually all orofacial anomalies. Common genes involved in orofacial genetic disorders are listed. It is important to identify the genetic factors that cause the existing dental problem, which may also influence the outcome in oral diagnosis. The application of the principles of genetic medicine to the diagnosis and treatment of dental diseases will fundamentally change the delivery of oral health care.

Keywords: Dental diseases, Orofacial disorders, Tooth agenesis.

Introduction

The contribution of hereditary factors to dental diseases has become increasingly evident in dentistry, as there are several implications of systematic genetic disease on oral health care. Genetic makeup influences the healthy teeth and gums, the alignment and strength of the teeth, and susceptibility to oral diseases and tooth decay. During the odontogenesis, the cytodifferentiation of dental epithelial cells produce enamel. Mesenchyme surrounding the tooth bud forms the supporting structure of the tooth. Like other processes during the embryonic development, morphogenesis and differentiation of teeth is the result of complex interactions at the molecular level between the ectoderm and the mesenchyma forming the supporting structure of the tooth. For example, the periodontal ligament anchors the tooth to the alveolar bone. Tooth development is regulated by dynamic interactions encoded either by universally expressed genes or tooth-specific genes that are regulated in a spatiotemporal manner and until now more than 200 genes are involved in these processes [1][2]. Mutations in these genes have pleiotropic effects in addition to causing non-syndromic dental abnormalities and dental anomalies associated with different genetic syndromes.

Genetics of Dental Diseases: Dental caries, periodontal diseases and malocclusion are the most common problem caused by an interaction of genetic and environmental factors. The heritability of these diseases has historically been estimated from twin studies. Further, the genetic linkage studies have been routinely used to locate disease susceptibility genes in the genome; such studies typically involve detailed genetic and phenotypic studies in families that appear to manifest a genetically inherited disease predisposition.

Dental Caries: Genetic studies of dental caries were published by Finn and Caldwell (1963) and by Zengo and Mandel (1972)[3]. Several variables related to caries experience (i.e. the number of teeth present, percentage of teeth restored, percentage of surfaces restored, percentage of teeth affected by caries, percentage...
of surfaces affected by caries) showed statistically significant concordance rates in monozygotic twins, but not in dizygotic twins[^4]. Genome-wide linkage studies on caries using the candidate-gene approaches include three main groups of genes i.e genes involved in enamel development, saliva formation and composition, and in the immune response. Candidate genes for the study of caries in humans are TUFT1, AMELX, ENAM, TFIP11, AMBN, MMP20 AMD many more. TUFT1 is expressed in the developing and mineralized tooth and nonmineralizing soft tissues which showed association with higher caries experience. This association was dependent of the presence of *Streptococcus mutans*. AMELX gene is involved in the mineralization during tooth enamel development and is associated with higher caries experience. TFIP11 genes interact with tuftelin and play a major role in spliceosome disassembly in Cajal bodies which is associated with the initiation of carious lesions and higher caries experience[^5].

**Periodontitis:** In periodontitis, the host-activated inflammatory and immunological cascades cause destruction of connective tissue and bone under genetic control. Evidence suggest for a genetic contribution to individual differences in risk of early onset periodontitis. In case of chronic periodontitis, studies of adult twins indicated that a substantial proportion of the population variance for periodontal measures-such as pocket depth, attachment loss, and bone loss may be attributable to heritable factors. Aggressive periodontitis is often familial and the likelihood of inheriting aggressive periodontitis was high in family studies[^6]. There are several potential difficulties in periodontal disease research: First, genetic heterogeneity in the etiology of adult periodontal disease detection of a specific mode of inheritance. Second, it may be difficult to determine affected status or to measure periodontal health in edentulous family members, adults who had early-onset periodontitis rather than adult periodontal disease. Third, there are other factors that affect periodontal disease susceptibility, some of which may be heritable themselves, such as a propensity for tobacco use, or which may cluster in families and oral hygiene habits. Cytokines such as interleukins (IL-1A, IL-1B, IL-6, and IL-10, among others), surface receptors such as the Fcy family (FCGRs), and cyclooxygenase- (COX-) 2 and matrix metalloproteinase (MMP) genetic polymorphism are considered key factors in the progression of periodontitis[^7].

**Malocclusion:** Genetic factors play an important role in the etiology of malocclusion. Genetic pathways that play a role in anteroposterior and vertical skeletal variation observed in patients with malocclusion and in skeletal malocclusion. Genetic basis of dental disorders provides the evidence for the heritability of various type of malocclusion from family and twin studies[^8]. The single nucleotide polymorphisms within FGFR2, EDN1, TBX5, and COL1A1 showed associations with type of skeletal malocclusion[^9]. Extensive cephalometric studies determined the heritability of certain craniofacial parameters in class II division I malocclusion. Most malocclusion studies to date have focused on Class III malocclusion. Several candidate genes within a linkage region on chromosome 12q22-q23 harbouring DUSP6 gene are implicated in the regulation of maxillary or mandibular growth[^10]. Genetic studies for Class I and II malocclusions are rarer. Single nucleotide polymorphism in rs6504340 within the HOXB cluster for Class I malocclusion was associated with delayed tooth eruption and occlusion irregularities[^11] that genetic identification might be required orthodontic therapy.

**Oral Cancer:** Chromosome segregation, telomere stability, genomic copy number, loss of heterozygosity, telomere stabilities, regulations of cell-cycle checkpoints, DNA damage repairs and defects in notch signalling pathways are involved in the progression of oral cancer. These changes cause loss of tumour suppressor activity and give rise to a phenotype capable of increasing cellular proliferation, weakening cell cohesion and causing local infiltration and metastasis. More than 90% of oral cancer is oral squamous cell carcinoma is caused due to genetic alterations the genes COX-2, EpCAM and MMP-2,6[^12]. Several biomarkers have a major role in oral cancer. Su et al[^13] studied that defined like guanine nucleotide exchange factor proteins was highly expressed and favoured anchorage-independent growth in oral cancer tissue compared to adjacent normal tissue. The overexpression in cells promotes cell migration and induces cell invasion in cancer cell lines. Saintigny et al.[^14] demonstrated the gene expression profiles in oral leukoplakia patients. The microRNA-based strategies might, therefore, be considered in future chemoprevention studies. The keratinization and high miR-21 levels were important indicators of oral cancer patient prognosis and two keratinization-associated miRNAs (miR-7 and miR-21), could contribute to the regulation of the tumour suppressor gene RECK in oral cancers[^15].
Genetic disorders of orofacial regions: Most of the disorders affecting the orofacial region are an autosomal dominant trait. The disorder mainly affects jaws, dental tissues and oral mucus membrane. Mutations in genes and single nucleotide polymorphism are the genetic risk factors of orofacial disorders.

Cleft lip and palate: Cleft lip and palate (CLP) is a congenital deformity that affects the upper lip and the roof of the mouth. CLP is a multifactorial condition comprising both genetic and environmental factors. Defects of growth factors and their receptors have been shown to cause non-syndromic or syndromic oral clefts in humans. Three genes - T-box transcription factor-22, poliovirus receptor-like-1, and interferon regulatory factor-6 - are responsible for causing X-linked cleft palate, cleft lip/palate-ectodermal dysplasia syndrome and Van der Woude and popliteal pterygium syndromes, respectively[16]. Linkage and sequencing studies of families have identified mutations in the FGF8 and FGFR1 genes causing non-syndromic cleft lip and palate[17]. TGF3 genes have also been involved in oral cleft formation in humans[18]. The inactivation of the growth factor BMP7, another member of the TGF family caused defects in tooth development and clefts in the soft and hard palate[19]. A mutation of the T-box transcription factor-22 gene was found in a large Icelandic family with X-linked cleft palate (CPX) and in several smaller families from other countries[20]. TBX22 is a major genetic determinant in human palatogenesis.

<table>
<thead>
<tr>
<th>Orofacial Disorders</th>
<th>Genes involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypohydrotic Ectodermal Dysplasia</td>
<td>EDA</td>
</tr>
<tr>
<td>Witkop Tooth and Nail Syndrome</td>
<td>MSXI</td>
</tr>
<tr>
<td>Reiger Syndrome</td>
<td>PITX -2</td>
</tr>
<tr>
<td>Amelogenesis Imperfecta</td>
<td>AMELX, ENAM, MMP-20, KLK-4, MMP-20</td>
</tr>
<tr>
<td>Dentinogenesis Imperfecta</td>
<td>COL1A1, COLIA-2, DSPP, COL</td>
</tr>
<tr>
<td>Van Der Woude Syndrome</td>
<td>IRF-6</td>
</tr>
<tr>
<td>Crouzon Syndrome</td>
<td>FGFR-2</td>
</tr>
<tr>
<td>Apert Syndrome</td>
<td>FGFR-2</td>
</tr>
<tr>
<td>Treacher Collins Syndrome</td>
<td>TCOF-1, EFTUD2</td>
</tr>
<tr>
<td>Cherubism</td>
<td>SH3BP2</td>
</tr>
<tr>
<td>Cleidocranial dysplasia</td>
<td>RUNX2</td>
</tr>
<tr>
<td>Nevoid basal cell carcinoma syndrome</td>
<td>PTCH 1</td>
</tr>
<tr>
<td>Osteogenesis imperfect</td>
<td>COL1A1, COL1A2, CRTAP, and P3H1</td>
</tr>
<tr>
<td>Apert syndrome</td>
<td>FGFR 2</td>
</tr>
<tr>
<td>Cleft lip and palate</td>
<td>FGFR1, TGFBR1, TGFBR2, SOX9, IRF6, WNT3</td>
</tr>
</tbody>
</table>

Tooth agenesis refers to the failure of tooth development. In humans, tooth agenesis involves one or more teeth (or classes of teeth). Failure of development of the third molars is the most common agenesis (10–25%). Although agenesis is occasionally caused by environmental factors (trauma in the dental region such as fractures, surgical procedures, chemotherapy, radiotherapy), in most cases the causes are genetic. 4 genes have been identified to be associated with non-syndromic hypodontia/oligodontia [21]. The major genes involved in tooth agenesis are PAX, MSX, DLX, AXIN, EDA, LHX, BARX, RUNX. MSX1 gene plays an important role in craniofacial development, including odontogenesis. Vastardis et al[22] identified an Arg to Pro substitution in MSX1 gene homeodomain that causes hypodontia and inherited in the next 4 generations. The PAX9 gene which encodes a transcription factor is involved in the development of teeth[23]. The sequencing of PAX9 gene showed a transition of A → G in the initiator AUG codon, in samples from a Chinese family.
with many cases of oligodontia. This is the first mutation found in an initiator codon that caused a severe inhibition of translation in tooth development [24]. The genetic variability in these genes influences the growth of teeth and lead to orofacial disorders.

### Conclusion

We still do not know all the causes of dental diseases, but their genetic basis is not a neglected factor. The genetic causes of dental pathologies are multiple and its severity depends on the affected gene, the type and location of the mutations. Improved method in diagnosis, treatment and prevention have enabled the investigators to focus more of their attention on the role of genetic in oral and dental disorders.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Fosfomycin Susceptibility among Urinary Enterococcus Faecalis with High Level Aminoglycoside and Glycopeptide Resistant Phenotypes

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Abstract

Fosfomycin, a broad spectrum bactericidal agent had been recommended by the Food and Drug Administration for the treatment of uncomplicated urinary tract infections. However, studies on the susceptibility rate of Enterococcus faecalis against fosfomycin are inadequate. Hence, this study was aimed to determine the in vitro susceptibility to fosfomycin among urinary E. faecalis. A total of about 70 non-repetitive isolates of Enterococcus faecalis isolated from the urine samples were included in the study. Susceptibility to fosfomycin, linezolid, teicoplanin, high level gentamicin, high level streptomycin was determined by Kirby Bauer disk diffusion method. Preliminary screening to minimum inhibitory concentration of high level aminoglycosides was assessed by agar dilution method. Vancomycin resistance was detected by agar screening method and further confirmed with e-test and interpreted as per CLSI guidelines. Our results indicate, increased susceptibility to teicoplanin (98.57%) followed by fosfomycin (95.71%) and linezolid (68.57%). Of note, none of the isolates were resistant to vancomycin. Of the 70 E. faecalis isolates screened, 61.43% isolates exhibited HLGR phenotype and 37.14% exhibited HLSR phenotype. HLG R HLS R phenotype was observed among 32.9% of the isolates. MIC of gentamicin and streptomycin was found to be ≥512µg/mL (HLGR isolates) and ≥2000µg/mL (HLSR isolates) respectively. 91.3% of our HLAR isolates (93% HLGR, 92.3% HLSR) were susceptible to fosfomycin. Hence, it could be speculated that fosfomycin can be considered in the treatment of uncomplicated urinary tract infections caused by high level aminoglycoside/linezolid resistant/glycopeptide resistant E. faecalis.

Keywords: Enterococcus faecalis, fosfomycin, HLRG, HLSR.

Introduction

Urinary tract infections (UTI) are the most common infections in clinical practice. According to the annual estimates of 2018, over 150 million uncomplicated and complicated cases of urinary tract infections are reported worldwide[1]. The increasing incidence of multidrug-resistant (MDR) uropathogens is worrisome. UTIs are the most common of the enterococcal infections associated with significant morbidity[2]. Enterococci especially,
Enterococcus faecalis and Enterococcus faecium are the frequently encountered etiological agents of UTI[3,4]. The astounding ability of Enterococci to exhibit intrinsic resistance to myriad of antibiotics limits the therapeutic options and hence is a cause of concern[5,6].

Fosfomycin, a phosphonic acid derivative is known to possess a broad spectrum of activity against Gram positive and Gram negative bacteria and had been recommended by the FDA (Food and Drug Administration) for the treatment of uncomplicated urinary tract infections[6]. The current CLSI guidelines also recommends the testing and reporting of the susceptibility of E. faecalis urinary isolates to fosfomycin[7]. However, clinical data on the efficacy of fosfomycin in the treatment of UTI caused by multidrug resistant E. faecalis is inadequate. Hence, the present study was aimed to ascertain the in vitro efficacy of fosfomycin against urinary tract infections caused by multidrug resistant E. faecalis.

Materials and Method

A total of 70 isolates of urinary E. faecalis isolated were included in the study. In vitro antibiotic susceptibility testing was done by Kirby Bauer disk diffusion method and the results are interpreted as per CLSI guidelines[7]. Antibiotics tested includes high level aminoglycosides such as high level gentamicin (120µg), high level streptomycin (300µg), vancomycin (30µg), teicoplanin (30µg), linezolid (30µg) and fosfomycin (200µg) (each disc containing 50 µg of glucose-6-phosphate). Determination of minimum inhibitory concentration (MIC) of gentamicin and streptomycin against the urinary isolates of E. faecalis was determined by agar dilution method. Resistance to vancomycin was detected by agar screening method (6 µg/mL) and further confirmed by determination of MIC by e-test.

Results

Table 1 depicts the antibiotic resistance profile of the study isolates. Agar screening method revealed that, none of the isolates were resistant to vancomycin i.e. 100% susceptible to vancomycin. High rate of susceptibility was observed for teicoplanin (98.57%) followed by fosfomycin (95.71%) and linezolid (68.57%). Three isolates (4.29%) exhibited intermediate susceptibility to fosfomycin.

Of the 70 E. faecalis isolates screened, 61.43% isolates were resistant to high level gentamicin (HLG R phenotype) and 37.14% isolates were resistant to high level streptomycin (HLS R phenotype). Combined HLR pattern (HLG R HLS R phenotype) was observed among 23 (32.9%) isolates (Table 2). MIC of gentamicin and streptomycin was found to be ≥512µg/mL (HLGR isolates) and ≥2000µg/mL (HLSR isolates) respectively.
Table 1: Antibiotic Susceptibility Profile of E. Faecalis

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Resistant n (%)</th>
<th>Intermediate Susceptibility n (%)</th>
<th>Susceptible n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Level Gentamicin (HLG)</td>
<td>43 (61.43%)</td>
<td>-</td>
<td>27 (38.57%)</td>
</tr>
<tr>
<td>High Level Streptomycin (HLS)</td>
<td>26 (37.14%)</td>
<td>-</td>
<td>44 (62.86%)</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>0 (0%)</td>
<td>70 (100%)</td>
<td></td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>1 (1.43%)</td>
<td>69 (98.57%)</td>
<td></td>
</tr>
<tr>
<td>Linezolid</td>
<td>6 (8.57%)</td>
<td>48 (68.57%)</td>
<td></td>
</tr>
<tr>
<td>Fosfomycin</td>
<td>0 (0%)</td>
<td>67 (95.71%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Hlar Phenotypic Profile of E. Faecalis

<table>
<thead>
<tr>
<th>HLG&lt;sup&gt;R&lt;/sup&gt; HLS&lt;sup&gt;R&lt;/sup&gt; phenotype</th>
<th>n = 23 (32.9%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLG&lt;sup&gt;R&lt;/sup&gt; HLS&lt;sup&gt;S&lt;/sup&gt; phenotype</td>
<td>n = 20 (28.6%)</td>
</tr>
<tr>
<td>HLG&lt;sup&gt;S&lt;/sup&gt; HLS&lt;sup&gt;R&lt;/sup&gt; phenotype</td>
<td>n = 3 (4.2%)</td>
</tr>
<tr>
<td>HLG&lt;sup&gt;S&lt;/sup&gt; HLS&lt;sup&gt;S&lt;/sup&gt; phenotype</td>
<td>n = 24 (34.3%)</td>
</tr>
</tbody>
</table>

Discussion

Fosfomycin is reported to be a potent bactericidal drug as it interferes with cell wall synthesis by inhibiting UDP-N-acetylglucosamine enolpyruvyl transferase (MurA), an enzyme that catalyses the formation of N-acetyl muramic acid. This unique mode of action of fosfomycin (affecting the peptidoglycan synthesis) confers lesser cross resistance with other antibiotics and provides a broad spectrum of activity against the major genera of Gram positive (Staphylococcus spp., Enterococcus spp.) and Gram negative (Enterobacteria) bacterial pathogens including multidrug-resistant strains<sup>[8,9,10]</sup>.

Oral fosfomycin had previously been used in the treatment of uncomplicated UTI. Nevertheless, Fosfomycin is not being routinely used in clinical practice. Fosfomycin has an array of advantages viz., active against both Gram positive and Gram negative bacterial<sup>[6]</sup>, effective against <i>E. faecalis</i> and <i>E. faecium</i> irrespective of their resistance to vancomycin<sup>[11]</sup>, enhances the synergistic effect to other antibiotics such as β-lactams and aminoglycosides<sup>[12]</sup>, good distribution in tissues, does not undergo any metabolic changes when excreted in urine (an advantage for the outpatient)<sup>[13]</sup>, reduces bacterial adherence to the uroepithelial cells<sup>[11]</sup>. Owing to the above merits, fosfomycin has currently regained the attention of clinicians in the treatment uncomplicated urinary tract infections.

Previous reports have documented increased vancomycin resistance rates of 1–24% in our country<sup>[14,15,16,17,18]</sup>. In contrary, other reports, have documented complete absence of vancomycin resistant <i>E. faecalis</i><sup>[19,20,21]</sup>. In line with these studies, we report a complete absence of VRE isolates. This could plausibly be attributed to the restricted use of vancomycin in our setting.

Owing to their good pharmacokinetics, aminoglycosides are the frequently prescribed antibiotics in clinical practice. Treatment of serious enterococcal infections necessitates the synergistic combinations of a cell wall active agent, such as a β-lactam (ampicillin) or glycopeptide (vancomycin), plus an aminoglycoside (gentamicin)<sup>[22]</sup>. However, the emergence of HLR refutes the utility of the above said synergistic combination. In our study, High level aminoglycoside resistance observed among 65.7% of the isolates (HLG<sup>R</sup>HLS<sup>R</sup> (32.9%), HLG<sup>R</sup>HLS<sup>S</sup> (28.6%) and HLG<sup>S</sup>HLS<sup>R</sup> (4.2%)) negates this synergistic bactericidal effect. Our results are corroborate with the previous Indian reports that document an increased dissemination of aminoglycoside resistance genes in our setting<sup>[23,24,25,26]</sup>.

This study gains significance as it evaluated the in vitro efficacy of an older, broad spectrum antibiotic, fosfomycin that had been previously recommended for the management of uncomplicated urinary tract infections including those caused by multidrug resistant isolates. Fosfomycin susceptibility was observed among 95.71% (n=67) of the study isolates. This is in line with the reports of increased fosfomycin susceptibility from the studies documented by other authors<sup>[27,28,29]</sup>. It is noteworthy that in our study, 91.3% of our HLR isolates (93% HLG<sup>R</sup>, 92.3% HLS<sup>R</sup>), teicoplanin resistant isolate and all the linezolid resistant (100%) isolates were susceptible to fosfomycin. Based on the results of our study, it could be speculated that fosfomycin can be considered in the treatment uncomplicated urinary tract infections.
infections caused by high level aminoglycoside/linezolid resistant/glycopeptide resistant *E. faecalis*.

**Acknowledgements:** We would like to thank the Department of Science & Technology, India for the instrumentation facility provided through Fund for Improvement of Science & Technology (FIST)(SR/FST/College -2017/23).

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/ TN/2015)

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Progression of Nephropathy in Age Related Diabetes

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Abstract

Diabetes and aging are associated with reduced vascular endothelial function, 20 controls and 20 subjects with type 2 diabetes age <40 and age > 40 participated, a series of experiments were conducted to examine the interrelationship between age, Type 2 Diabetes Mellitus and endothelial renal function. This complication is first manifested as an increase in UAE [microalbuminuria] which progresses to over albuminuria and then to renal failure. In subjects with diabetes age < 40 were more prone to nephropathy which progress to End Stage Renal Disease [ESRD]

Keywords: Diabetes Mellitus, Aging, Type 2 Diabetes Mellitus, ESRP, Nephropathy.

Introduction

Diabetes Mellitus is a group of metabolic diseases characterized by high blood sugar [glucose] levels (WHO, 2006), which results from defects in insulin secretion or action or both. Type – 1 or insulin dependent diabetes mellitus (IDDM or juvenile – onset diabetes). Type – 2 or non – insulin dependent diabetes mellitus (NIDDM or adult onset diabetes). IDDM can occur at any age, but it usually starts in people younger than 30. NIDDM accounts for 90 % of all cases.

Acute complications of diabetes includes diabetic ketoacidosis, non ketotic hyper osmolar coma, hypoglycemia, and amputation chronic complications includes micro vascular disease like diabetic retinopathy, diabetic neuropathy, diabetic nephropathy and macro vascular diseases like atherosclerosis, diabetic myonecrosis etc. polyuria, polydipsia, polyphagia are clinical features of diabetes mellitus1,2

Diabetic Nephropathy: Diabetic nephropathy [nephropatia diabetic] also known as klimmelstiel – wilson syndrome and intercapillary glomerulonephritis is a progressive kidney disease caused by angiopathy of capillaries in the kidney glomeruli(Parving HH et al).

Diabetic nephropathy is the chief cause of morbidity and premature mortality in patients with both IDDM and NIDDM. This complication is first manifested as an increase in UAE [microalbuminuria] which progresses to over albuminuria and then to renal failure. At this stage the kidney may start allowing more albumins into normal urine and this can be detected by sensitive tests for albumin. This stage is called “microalbuminuria”.3,4

Albuminuria:

Normoalbuminuria: Normoalbuminuria was defined as a ratio of albumin (measured in micrograms) of less than 17 and for female patients as a ratio of less than 25.

Microalbuminuria: Microalbuminuria was defined as a ratio of albumin to creatinine in the intermediate range - 17 to 299 for male patients and 25 to 299 for female patients. elevated albuminuria is an early predicator of progressive renal function loss in type 1 and type 2 diabetes(Gambara et al. and Fioretto et al).
The scope of the study is to diagnose albuminuria at an early stage in diabetic patients before the condition become worse, which progresses to ESRD (Chalmers J, et al, 2008)\textsuperscript{4,5,6}

**Normal Kidney**

**Diabetic Nephropathy kidney**

**ESTIMATION OF GLUCOSE by Glucose oxidase method**

**Reagents**

1. Enzyme reagent
2. Glucose standard 100 mg/dl

**Procedure:** Add 1 ml of reagent to the test tubes labeled blank, standard and test, then 10 µl of glucose standard was added to the standard test tube, 10 µl of sample was added -only to test- Mix well all the tubes and measure the absorbance of standard and test against the reagent blank at 505 nm (490 - 530 nm). Glucose levels are expressed in mg/dl.

**Estimation of Glycosylated Haemoglobin**

**Kit Contents**

1) Profiled resin tube – 10 x 2 ml
2) Lysing reagent – 5 ml
3) Resin separators – 10 ml

Venous blood mixed with lysing reagent for the preparation of hemolysate. Elimination of the labile schiffs base is achieved during hemolysis. The hemolysate is then mixed with a weakly binding cation exchange resin. The non-glycosylated hemoglobin binds with resin leaving glycosylated hemoglobin free in the supernatant. The percentage is determined by measuring the absorbance of the glycosylated hemoglobin fraction and the total hemoglobin at 415 nm.

**Estimation of Urea by Urease Method:**

**Reagent:**

1. Working reagent 1 (W1) dissolve the enzyme reagent 1 in deionised water
2. Working reagent 2 (W2) hypochlorite and salicylate

**Procedure:** Add 1 ml of reagent to the test tubes labeled blank, standard and test, then 10 µl of standard urea was added to the standard test tube, 10 µl of serum sample was added -only to test- Mix well all the tubes and add 1ml of chromogen to the test tubes labeled blank, standard and test. Mix well and incubate at 37 °C for 5 minutes. Measure the absorbance of standard and the sample against the reagent blank between 580 - 630 nm within 60 minutes. Serum urea levels are expressed in mg/dl.

**Estimation of Creatinine by Jaffe’s Method:**

**Reagents:**

1. Alkaline buffer
2. Picric acid reagent
3. Acid reagent
4. Creatinine standard 2 mg/dl
5. Working reagent: Mix alkaline buffer (1) and picric acid reagents (2) in 1:1 ratio (Equal volumes)

**Procedure:** Add 2ml of working reagent in test tube labeled as a blank (B), Standard(S) and test (T). The test includes both urine and serum sample. Then 0.1 ml of standard creatinine was added to the standard test tube, 0.1 ml of dilute urine and 0.1 ml of serum is taken in the test. Then add 0.1 ml of acid reagent in each blank, standard and test tubes respectively. Mix well and incubate at 37°C for 5 minutes, and read absorbance on
spectrophotometer at 520nm. Serum creatinine levels are expressed in mg/dl. Urine creatinine levels are expressed in gms/day.

**Estimation of Albumin**

**Kit Contents:**
1. Reagent A: Borate buffer 0.1 mol/L, sodium azide 0.95g/L, pH 10.0
2. Reagent B: Suspension of latex particles coated with anti human albumin antibodies, sodium azide 0.95 g/L
3. Albumin standard: Human albumin
4. Working reagent: Mix 1ml of Reagent B, and 9ml of Reagent A

**Procedure:**
1. Bring the working reagent and standard solutions to room temperature.
2. Take two test tubes T1 and T2 and add 1.0ml of working reagent to both tubes.
3. Add 7.0 µl of standard in T1 and 7.0 µl of sample in T2.
4. Mix well, insert the cuvette in automated analyzer and start the stopwatch.
5. Record the absorbance at 540 nm before 10 seconds ($A_1$) and after 2 minutes ($A_2$)

Urinary Albumin concentration is expressed in mg/L

**Results**


Values are expressed as Mean ± Standard deviation (N=20) except for UAE.

**Expressed in mean**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Normal</th>
<th>Diabetic patients&lt;40</th>
<th>Diabetic patients &gt; 40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
</tr>
<tr>
<td>1.</td>
<td>FBS (mg/dl)</td>
<td>90.2±9.8</td>
<td>131.2±36.2***</td>
<td>185.2±37.6***</td>
</tr>
<tr>
<td>2.</td>
<td>PPBS (mg/dl)</td>
<td>122.6±7.2</td>
<td>242.6±88.4***</td>
<td>287.7±106.2</td>
</tr>
<tr>
<td>3.</td>
<td>HbA1c (%)</td>
<td>6.2±1.0</td>
<td>8.6±1.9***</td>
<td>10.2±0.8***</td>
</tr>
<tr>
<td>4.</td>
<td>S.CR (mg/dl)</td>
<td>0.8±0.2</td>
<td>0.86±0.17 NS</td>
<td>0.94±0.16</td>
</tr>
<tr>
<td>5.</td>
<td>S.UR (mg/dl)</td>
<td>19.5±6.7</td>
<td>21.8±6.5 NS</td>
<td>22±7.8 NS</td>
</tr>
<tr>
<td>6.</td>
<td>U.ALB (g/l)</td>
<td>5.7±3.2</td>
<td>10.0±4.4**</td>
<td>18.4±9.6***</td>
</tr>
<tr>
<td>7.</td>
<td>U.CR (g/24h)</td>
<td>1.2±1.3</td>
<td>9.0±17.3NS</td>
<td>24.8±36.3*</td>
</tr>
<tr>
<td>8.</td>
<td>UAE (mg/24h)</td>
<td>12</td>
<td>28</td>
<td>68</td>
</tr>
</tbody>
</table>

Statistical analysis done by students –t- Test, Comparison was made between Group 1 and Group 2, *p<0.05 **p<0.01 ***p<0.001 NS=Non Significant.

**Discussion**

The results on various parameters are useful to diagnose diabetes mellitus and to assess the relation with early stage of nephropathy in the diabetic patient. Diabetic nephropathy has been in the diabetic patient, especially of type 2 is the most common cause of ESRD.

Table 1 shows the levels of glucose (FBS & PPBS), HbA1c, S.CR, S.UR, U.ALB, U.CR, UAE of the control and experimental group of patients.\(^7\)\(^8\)

There was significant difference (p<0.001) in the levels of glucose between 3 groups, which shows the test groups are diabetic. Also the level was more increased in-group III who belong to age > 40, than group II of age < 40.

These result shows that group III patients are more hyperglycemic than group II. Studies have shown that hyperglycemia and associated metabolic abnormalities were sufficient to induce diabetes related kidney disease.
HbA1c levels are higher in diabetic patients who develop micro and macroalbumin evidence both in type 1 and type 2 diabetes, that poor blood glucose control contributes to the development of albuminuria (WHO 2011). Intensive diabetes therapy reduces the risk of transition from normo to microalbuminuria by approximately 35% but does not abolish it$^9,10,11$.

Table1 also shows the level of urine albumin. The level is found to be significantly (p<0.01) increased in group II and the increase in highly significant (p<0.001) in group III when compared to Group I.

Table1 also shows the comparison of urine albumin between group II and III, and which shows a significant (p<0.01) increase. From this it is clear that Microalbuminuria is seen in diabetic patients irrespective of age, but it is very high in patients above 40 years. So this elevated level of urinary albumin clearly indicates the incidence of nephropathy.$^{13}$

The Albumin: creatinine ratio is important to assess the Microalbuminuria exactly. Also UAE(Urinary Albumin Excretion) is increased in group III when compared to Group II and Group I. This suggests that individual with higher levels of plasma glucose are at risk of Microalbuminuria. Microalbuminuria is most likely caused by the deleterious effects of hyperglycemia on cell function and extra cellular structures such as the basement membrane and mesangial matrix.$^{14,15}$

**Conclusion**

The various observation of this study leads to the conclusion that there is a strong evidence of microalbuminuria with diabetic nephropathy. Also these observations show that diabetic patients above 40 years are highly susceptible to diabetic nephropathy. Hence all diabetic especially more than 40 years have to undergo regular screening of renal function test in order to prevent the complication of nephropathy and the progression to ESRD (Chalmers J, et al, 2008).

**Acknowledgement:** Authors wish to thank DST-FIST (Ref no. SR/FST/College-23/2017) Government of India, New Delhi, for utilizing the funded research equipment facilities of Sree Balaji Dental College and Hospital, Pallikaranai, Chennai, Tamil Nadu, India.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/ TN/2015).

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**References**

depression or depressive symptoms is associated with glycemic control in both cross-sectional and longitudinal analyses. Diabet Care. 2010;33(1):23-8


14. Use of Glycated Haemoglobin (HbA1c) in the Diagnosis of Diabetes Mellitus; World Health Organization 2011

Immunomodulatory and Mast Cell Stabilizing Potential of Ethanol Extract of Eleusine coracana L.

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Abstract

Eleusine coracana (seed) (finger millet bran) is rich in dietary fibre (free of gluten) and micronutrients and has been extensively studied for its anti-diabetic, anti-tumorogenic, anti-diarrheal, anti-ulcerative, anti-oxidant and anti-microbial potential. However, the immuno-modulatory potential and mast cell membrane stabilizing ability of E. coracana L (Ragi seeds) needs to be evaluated. Hence, this study was designed to evaluate the ability of ethanol extract of E. coracana L to potentiate immunomodulation and inhibit mast cell degranulation of human macrophages and mice peritoneal mast cells respectively. Ethanol extraction of E. coracana L (Ragi seeds) was performed by cold percolation method. Assessment of In vitro immunomodulatory activity was carried out using human PMN layer, Candida albicans and morphological criteria was adopted to calculate the phagocytic index. In vitro evaluation of inhibition of mast cell degranulation was determined using isolated mice peritoneal mast cells. In vitro evaluation of phagocytosis revealed that ethanol extract of E. corocana L (seed, ethanol extract) (25 mg/mL) was found to inhibit polysorbate 80 induced mast cell degranulation.

Keywords: Eleusine coracana, Macrophages, Ethanol.

Introduction

Eleusine coracana L. known as finger millet, ragi and manduais one of the ancient millet crop that belongs to the family Poaceae (grass). Finger millet has the advantage of being cultivable in diverse environments, semi-arid, arid, and rainfall limited hill agro-ecosystems[1]. Being a hardy crop it is drought resistant, pest and disease resistant with a short growing season and is being cultivated in several regions of India. The remarkable property of these grains that can resist storage pest for long years, makes it an indispensable crop for famine-prone areas[2]. The nutritional value of finger millet is remarkable that, it is a rich source of carbohydrate and prolamins including a high level of glutamic acid, proline, valine, isoleucine, leucine and phenylalanine and low levels of lysine, arginine and glycine. Also, finger millets are rich in essential amino acids (methionine and cystine), calcium (0.38%), dietary fibre (18%), phytates (0.48%), protein (6%–13%), minerals (2.5%–3.5%), tannins (0.61%), and phenolics (0.3%–3%)[1].

Milled finger millet is rich in dietary fibre (free of gluten) and micronutrients. Finger millet’s fat consist of oleic acid, linoleic acid, palmitic acid and traces of linolenic acid. Layers of Seed coat of the finger millets contain tannins and polyphenols, both free and bound forms[3,4]. Milled finger millet being a gluten free dietary fibre is regarded to be ideal for patients suffering from celiac disease[5]. Previous studies have documented the anti-diabetic, anti-tumorogenic, anti-diarrheal anti-ulcerative, anti-inflammatory, anti-oxidant and anti-microbial potential of finger millet[6,7,8,9,10]. However, the immunomodulatory and mast cell membrane stabilizing...
ability of *Eleusinecoracana*is yet to be explored. Hence, this study was designed to evaluate the ability of ethanol extract of *Eleusinecoracana* L. to potentiate immunomodulation and inhibit mast cell degranulation of human macrophages and mice peritoneal mast cells respectively.

**Materials and Method**

**Ethanol extraction of *E. coracana* L (Ragi seeds):**
Finger millet (*Eleusinecoracana* L.) was procured from the local market, washed well and was shade dried. Ethanol being a polar solvent could bring into solution all the metabolites present and hence was used for extraction. *E. coracana* L (seed) (10 g) was soaked in 50 ml of ethanol and was left a room temperature for 24 h. The extract was filtered through Whatman No. 1 filter paper. Solvent was evaporated to dryness under vacuum. Different concentrations (1000 µg/mL, 500 µg/mL, 250 µg/mL, 125 µg/mL and 62.5 µg/mL) of the dried extract was prepared in 10% dimethyl sulfoxide (DMSO).

**Assessment of in vitro immunomodulatory activity:** *Candida albicans* was confirmed using germ tube test and was inoculated in Saboraud’s Dextrose Broth. Overnight culture was centrifuged at 2000 rpm for 15 min. The cell pellet was washed four times with sterile Hank’s balanced salt solution (HBSS). The final cell button was suspended in sterile HBSS and human serum in a proportion of 4:1 and the cell density was adjusted to 1.5 ×10^8 cfu/ml using MacFarlands standard.

**Preparation of PMN layer:** Human capillary blood (0.2 ml) was collected by finger prick method and was spread to 1.5×1.5 cm on a clean grease free glass slide. The slide was incubated at 37°C for 25 min. The blood clot was gently removed using sterile normal saline, taking care to retain the adherent polymorphonuclear neutrophils (PMNs) intact on the glass slide.

**Determination of phagocyte index (PI):** Phagocyte index (PI) was calculated as per Brune et al., 1973. Briefly, the PMN layer on the slides was flooded with the ethanol extract (0.1 ml) of *E. coracana* (test) and the slides were incubated at 37°C for 15 min. After incubation the PMN layer was covered with *C. albicans* cell suspension (100 µl) and the slides were further incubated at 37°C for 60 min. The PMN layer was washed twice with sterile normal saline and fixed with methanol for 5 min. The PMN layer was stained with diluted (1:10) Giemsa for 25 min. The excess stain was removed using sterile HBSS and air dried. The slides were observed under the oil immersion (100 X) objective. Sterile normal saline was used as control.

Morphological criteria was adopted to determine the phagocyte index (PI) i.e. the mean number of *C. albicans* cells phagocytosed by PMNs on the slide for 100 granulocytes. Immuno-stimulation (%) was calculated by using the formula.,

\[ \text{Stimulation} \% = \frac{\text{PI (test)} - \text{PI (control)}}{\text{PI (control)}} \times 100 \]

**In vitro evaluation of inhibition of mast cell degranulation:**

**Isolation of mice peritoneal mast cells:** Ethanol extract of *E. coracana* L (Seed) (0.2 ml of 25 mg/ml) was injected intraperitoneally into Swiss albino mice (n=4) (25-28 g) for six days prior to the isolation of peritoneal mast cells. On the 7th day, 10 mL of Tyrode solution (containing 5 units of heparin/mL) was injected intraperitoneally in mice. After a gentle massage for about 30-45 s, the mast cell rich peritoneal fluid was collected over ice. The peritoneal fluid was centrifuged at 4°C at 2000 rpm for 5 min. and the cell pellet was washed twice with chilled Tyrode solution. The pellet was finally resuspended in 1 ml tyrode solution. These isolated peritoneal mast cells were used to study polysorbate 80 induced mast cell degranulation in vitro.

Mast cell membrane stabilizing ability of *E. coracana* L was assessed as per Kim *et al.*, (1997). Briefly, 0.1 ml of ethanol extract of *E. coracana* L (25 mg/ml) was added to 0.1 ml peritoneal mast cells suspension incubated at 37°C for 15 min. Then 0.1 ml of the degranulating agent (polysorbate 80) was added and further incubated for 10 min. The cells were stained with neutral red and % protection of degranulation of mast cells in control and treated groups were calculated by counting the mast cells under high power of light microscope.

**Results**

*In vitro* evaluation of phagocytosis revealed that ethanol extract of *E. corocana* was found to be cytotoxic at all the concentrations tested (1000 µg/mL to 62.5 µg/mL) and the macrophages were found to highly vacuolated compared to the control (Figure 1, 2). *In vitro* study showed that *E. corocana* (seed extract) (25 mg/mL) was found to inhibit polysorbate 80 induced mast cell degranulation when compared to the control. (Table 1) (Figure 3,4).
Table 1: Effect of E. corocana (seed, ethanol extract) on polysorbate 80 induced degranulation of isolated peritoneal mast cells

<table>
<thead>
<tr>
<th>Mice Group</th>
<th>In Vitro Treatment</th>
<th>No of Mast Cells</th>
<th>% Inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>DMSO</td>
<td>8 ± 2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>E. corocana (seed extract)</td>
<td>12 ± 2</td>
<td>4.35%</td>
</tr>
<tr>
<td>Test</td>
<td>DMSO</td>
<td>9 ± 3</td>
<td>1.09%</td>
</tr>
<tr>
<td></td>
<td>E. corocana (seed extract)</td>
<td>27 ± 4</td>
<td>20.65%</td>
</tr>
</tbody>
</table>

Figure 1: In vitro phagocytosis- Saline (control).

Figure 2: In vitro phagocytosis- Vacuolation in cells exposed to E. corocana L (Seed ethanol extract- Test)

Figure 3: Inhibition of polysorbate 80 induced degranulation of isolated peritoneal mast cells by E. corocana L (Seed,ethanol extract) (test).

Figure 4: In vitro polysorbate 80 induced degranulation of isolated peritoneal mast cells – saline (control).

Discussion

E. corocana L has been used as staple food and is known to possess an array of health benefits such as, hepatoprotective, blood glucose lowering, cholesterol lowering, wound healing, anti-tumorogenic, anti-diarrheal, anti-inflammatory, anti-oxidant, anti-ulcerative and anti-microbial activity[10,14]. Also, previous studies have demonstrated that regular consumption of whole grain cereals and their products offer protection against the risk of cardiovascular diseases, type II diabetes, gastrointestinal cancers and a range of other disorders[15]. However, the immunomodulatory potential of finger millet needed investigation. Immunomodulatory agents of plant origin are documented to increase the host immune response against pathogens by stimulating the non-specific immune system. The results of our study on In vitro evaluation of phagocytosis revealed that ethanol extract of E. corocana instead of potentiating phagocytosis of C. albicans, E. corocana L (seed extract) was found to be cytotoxic to the human macrophages as evident by the excessive vacuolations compared to the control.

Despite the availability of various mast cell stabilizers including gold standard mast cell stabilizer, disodium cromoglycate, used in the preventative
treatment of allergic conditions like bronchial asthma, allergic conjunctivitis and vernal keratoconjunctivitis, there still remains an urgent need to design substances of natural origin that are cost-effective and require less frequent dosing schedules. Mast Cell stabilizers are known to inhibit the release of allergic mediators especially histamine from mast cells in order to prevent allergic reactions. Fine & Walsh, 2013 have elaborated an array of naturally occurring mast cell stabilizers that belong to the family of Flavonoids, coumarins, phenols, terpenoids and amino acids. In this context, we explored the mast cell membrane stabilizing potential of ethanolic extract of *E. corocana* (seed). In our study, ethanol extract of *E. corocana L* (seed extract) was found to stabilize mast cell membrane, thereby inhibit the release of inflammatory mediators. Inhibition of polysorbate 80 induced degranulation of isolated peritoneal mast cells (*in vitro*) signifies the anti-inflammatory potential of *E. corocana L* (seed extract).

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Source of Funding: Nil

Conflict of Interest: Nil

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Defense Mechanism Affected by Oxidative Stress in Chronic Smokers

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Abstract

Today millions of people die due to cigarette smoking in the world. Smoking is the most common method of consuming tobacco. Tobacco smoking is the practice of burning tobacco & inhaling the smoke. Cigarette smoking is one major consequence to develop oxidative stress which will damage the lung lead to death. Cigarette contains nicotine an addictive stimulant that causes psychological and physical dependency. The aim of the study is to evaluate the oxidative stress by novel non-enzymatic antioxidant between young chronic smokers and non-smokers in the fasting state.

Keyword: Alpha tocopherol, PUFA, Vitamin C, betacarotene, ROS, Smokers and Non-Smokers.

Introduction

Smoking is the most common method of consuming tobacco. Tobacco smoking is the practice of burning tobacco & inhaling the smoke. Tobacco is a product processed from the fresh leaves of plants in the genus Nicotiana. The genus contain a number of species such as Nicotiana tabacum & Nicotiana rustica containing higher concentration of nicotine. These leaves are harvested & cured to allow for slow oxidation & degradation of carotenoids in tobacco leaf. Cigarette smoking is addictive & harmful (Okuyemi KS et al. 2007). A single cigarette contains 4000 toxic chemicals in which more than 60 chemicals are carcinogens. Cigarette contains nicotine an addictive stimulant that causes psychological and physical dependency.

Materials and Method

Fifty healthy male non-smokers in the age group of 20-35 years were placed in the group I. Fifty male smokers in the age group of 20-35 years were placed in the age group II. Blood samples were collected from smoking volunteers were smoke since past 15 years. Blood samples were collected from each of the subject for 90 days and analyzed for the following parameters: alpha tocopherol (Baker and Frank et al. 1980), vitamin C (Kyaw 1977), Beta carotene (Neeld and Pearson 1942)

Results

The non-enzymatic antioxidant Tocopherol (vitamin E) level was higher in non-smokers (2.1 ± 0.81 in blood) than smokers (0.91 ± 0.12 in blood). The Ascorbate (Vitamin C) level was higher in non-smokers (1.22 ± 0.20 in blood) than smokers (0.97 ± 0.19 in blood). The Beta Carotene showed a similar trend, where the levels are increased in non-smokers than smokers (3.90 ± 2.17 in group I blood and 2.52 ± 0.9 Group II blood). The significant decrement in the level of alpha tocopherol and Ascorbic acid by 56.47% was recorded in smokers compared to that of non-smokers.
Beta-carotene (p<0.01) changes were not statistically significant when compared with the corresponding value in the non-smokers and smokers.

Table I: Levels of Non-enzymatic Antioxidants in non-smokers and smokers.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Non-smokers</th>
<th>Smokers</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>α-tocopherol (mg/dl)</td>
<td>2.1 ± 0.81 (n = 50)</td>
<td>0.91 ±0.12 (n = 50)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>1.22 ± 0.20 (n = 50)</td>
<td>0.97 ±0.19 (n = 50)</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Beta Carotene (μg/dl)</td>
<td>3.90 ±2.17 (n = 50)</td>
<td>2.52± 0.9 (n = 50)</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Discussion

Natural antioxidants, vitamin E are preferentially oxidized before the oxidation of polyunsaturated fatty acid [Hayes JD, et al.(1999)] Free radicals are atoms or groups of atoms with an odd (unpaired) number of electrons and can be formed when oxygen interacts with certain molecules. Antioxidants such as SOD, CAT, VIT E, β – CAROTENE are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged.  

Vitamins also directly scavenge ROS & up regulate the activities of antioxidant enzymes. Among them, vitamin E is recognized as one of the most important antioxidants. Vitamin E is the term for a group of tocopherols and tocotrienols, of which α-tocopherol has the highest biological activity. Due to the potent antioxidant properties of tocopherols, the impact of α-tocopherol in the prevention of chronic diseases believed to be associated with oxidative stress has often been studied, and beneficial effects have been demonstrated [Tappel, A. L. (1962)]  

Vitamin E as a fat-soluble antioxidant, it stops the production of reactive oxygen species formed when fat undergoes oxidation. [Herrera; Barbas, C (2001), Rimbach G (2001) et.al] As it is fat-soluble, it is incorporated into cell membranes, which protects cells from preoxidation of PUFA in membrane phospholipid from oxidative damage [Topinka, Jet. al (1989)]. Vitamin E interacts directly with lipid peroxide in plasma Lipoproteins and cell membranes neutralizethem.  

Vitamin E is oxidized by the O2 generating system and reacts with OH in [Fridovich J et.al (1976)]. Vitamin E functions as a chain breaking agent in the lipid peroxidation process. It does not act as a direct antioxidant but as a provider of antioxidant activity due to its ability to donate a hydrogen atom to a free radical.
antioxidant. As an antioxidant, vitamin E acts as a peroxy radical scavenger, preventing the propagation of free radicals in tissues, by reacting with them to form atocopheryl radical, which will then be reduced by a hydrogen donor (such as Vitamin C) and thus return to its reduced state. [Stocker, R. (2000)].

The plasma \( \beta \)-carotene was not significantly altered in the smokers. There is the possibility that increasing free radicals in cigarette smoke may considerably decrease the bioavailability of vitamin C and \( \beta \)-carotene as antioxidant nutrients with increasing years of smoking. The reduced plasma vitamin C concentration in smokers in the present study suggests that these individuals may be at the risk of developing chronic obstructive Pulmonary disease. Plasma \( \beta \)-carotene is especially noted among the class of nutrients that is regarded as potential chemo preventive agents due to its antioxidant properties. [Epstein, (2003) Knekt et al. (1994)] had earlier reported that serum concentration of Vitamin C and \( \beta \)-carotene appears to play some important roles in the prevention of Pulmonary damage initiated by oxidants.

The cellular antioxidant defense enzymes SOD & CAT were significantly reduced in smokers, this might have let decreased antioxidant defense and increased oxidative stress. [Julius et al. (2014)]

The decrease levels of non-enzymatic antioxidant vitamin E, Vitamin C in the plasma might be due to the increased utilization to trap the free radicals that were generated during nicotine induced oxidative stress.

**Conclusion**

The study results show that smoking decrease level of vitamin E, vitamin C & alteration in \( \beta \)-carotene is due to increased level of free radicals indicate that the oxidative stress induced in human by smoking.

**Acknowledgement:** Authors wish to thank DST-FIST (Ref no. SR/FST/College-23/2017) Government of India, New Delhi, for utilizing the funded research equipment facilities of Sree Balaji Dental College and Hospital, Pallikaranai, Chennai, Tamil Nadu, India.

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**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**


Localized Toxicity in Patients with Fixed Orthodontic Appliance: A Case Control Study

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Abstract

Fixed orthodontic appliances made of metal alloys are routinely used in dental practise to correct malocclusion. Oral environment favours the biodegradation of metal alloys. The discharged metal ions accumulate cumulatively on the adjacent tissues and results in toxic effects on cellular metabolism and DNA stability. The study was designed to evaluate localized genetic and cytokinetic toxicity due to fixed orthodontic appliance by measuring micronuclei frequency and other nuclear abnormalities in the buccal mucosal cells. Subjects with orthodontic appliance were selected as exposure cohort (n=20) and subjects without orthodontic appliance were selected as comparative cohort (n=20). Buccal smears were collected and DNA specific feulgen stain was used. Micronuclei, nuclear bud and binucleate cells frequency were recorded and compared between the study groups. We found a significant increase in the frequency of cells with micronuclei (p<0.001) and binucleate cells(p=0.002) in the exposure cohort compared to controls. The increase in the indicators of genotoxicity and cytokinetic toxicity in the exposed cohort compared to controls could be attributed to the exposure to the metal ions released from long term orthodontic appliance treatment. Increase in binucleate cells in subjects with fixed orthodontic appliance was demonstrated for the first time in our study. The cellular changes due to toxicity could be the predisposing factor for the occurrence of immune mediated oral mucosal lesions in orthodontic patients.

Keywords: Micronuclei, nuclear bud, binucleate cells, metal ions, fixed orthodontic appliances.

Introduction

Fixed orthodontic appliances are routinely used in dental practise to correct malocclusion. Fixed orthodontic appliance consists of bands, brackets and wires made of metal alloys containing nickel, chromium, cobalt, iron and titanium. The treatment requires the patient to wear this appliance for a period of two to three years. The physical and chemical characteristics of oral environment are favourable for the biodegradation of metal alloys[1,2]. Hafiz et al have stated that even...
though many invitro studies on the amount of metal ions discharged from orthodontic appliance have found the levels below the recommended dietary levels.

The discharged ions like Ni were reported to be a strong immunologic sensitizer. These metal ions are non-biodegradable hence, their sustained release can result in cumulative accumulation on the adjacent tissues. This results in toxic effects on cellular metabolism and DNA stability [3,4,5]. The toxicity can be evaluated by well established assays like buccal micro nucleus cytochrome assay (BMCyt assay). This assay measures DNA damage through end points like micronuclei (Mn), nuclear bud (NuBd) and cytokinetic defects by binucleate cell formation (BiNu) from exfoliated buccal mucosal cells. Buccal mucosa is an easily assessable site for collecting cells in a non-invasive manner[6].

The previous studies on genotoxicity in patients with fixed orthodontic appliance using buccal mucosal micronuclei have used non DNA specific stains[7]. This can increase the false positive results affecting its validity.[8] To our knowledge, no studies have evaluated parameters of cellular toxicity like buccal mucosal NuBd and BiNu in patients with fixed orthodontic appliance.

Hence, we designed this case control study, where markers of DNA and cytokinetic damage like Mn, NuBd and BiNu frequency are evaluated using a DNA specific stain (fuelgen stain) from the buccal mucosal cells of a study cohort of subjects using fixed orthodontic appliance and compared with a non exposed cohort.

**Materials and Method**

**Subject Selection:** This case control study was designed to evaluate the toxicity in subjects undergoing fixed orthodontic treatment. Study and comparative cohort were randomly selected form subjects reporting to the department of orthodontics in a dental college.

Subjects wearing fixed orthodontic appliance for period of six months to three years were selected as exposed cohort. Subjects with no history of orthodontic treatment were selected as comparative cohort. Both exposed and comparative cohorts were selected within an age range of 16 to 25 years. Exposed and comparative cohorts were matched for age and sex. Subjects with metallic restorations, alcohol or tobacco related habits, history of any systemic illness or subjects taken oral radiographs since 3 months were excluded from the study.

Sample size was calculated for 80% power and 5% α error using mean difference and standard deviation referred from literature.[7] Sample size of n=20 each for study and comparative cohorts were calculated using nMaster ™ sample size calculation software. Institutional review board approval was obtained and informed consent was taken from the study subjects.

**Specimen collection and staining technique:** Buccal cells were collected by rubbing the buccal mucosa with hard bristled cyto brush. The cells are directly spread on a clean glass slide and fixed in methanol acetic acid (3:1) for 20 minutes[6,7]. The smears were stained by Fuelgen technique with slight modifications of the existing protocol[8]. Smear was denatured by exposing to IN HCl at 60°C for 8 minutes following which the smear was flooded with Schiff’s reagent for 20 minutes and counter stained with 1%Light green for 10 seconds. The slide was washed in deionised water and blotted gently to dry. Slide was mounted and observed[9].

**Scoring technique:** A minimum of 500 cells were counted under 400x magnification. The Mn, NuBd and BiNu recordings were standardized using the published photomicrographs[6]. The evaluators simultaneously recorded the frequencies of Mn, NuBd and BiNu using multiheaded microscope in order to reduce the inter observer variability.

**Scoring criteria[6]**

**Micro nuclei:**

1. The diameter of Mn should be 1/3rd or 1/6th of the size of the main nucleus.
2. Mn should be separated from the main nucleus with clear nuclear boundaries.
3. Mn should have similar staining like the main nucleus.
4. Mn should be on the same plane of focus as main nucleus.

**Nuclear Bud:** Nuclei with an apparent sharp constriction at one end.

**Binucleate Cell:** Cell with two main nuclei.

**Statistical Analysis:** The data was entered in SPSS software v.18. Mean with standard deviation was calculated. Comparison between the groups was be done by paired t test. p value less than 0.05 was considered as statistically significant.
Results

Demographics: The average age of subjects in exposed and comparative cohorts were 21.18±1.25. Exposed and comparative cohorts were comprised of 70% females and 30 % males.

Comparison of Nuclear abnormalities between exposed and controls: Nuclear abnormalities like Mn, NuBd and BiNu were observed and recorded in both exposed and non exposed cohorts. There was a statistically significant increase in the micronuclei (p<0.001) and binucleate cell (p=0.002) frequency in exposed cohort compared to nonexposed cohort. But there was no statistically significant difference in nuclear bud frequency between exposed and comparative cohort. (p=0.541). There was a statistically significant increase in the overall nuclear abnormality frequency in study cohort compared to comparative cohort. (p<0.001) (Table 1).

Table 1: Comparison of Nuclear Abnormalities between Exposed (Cases) Cohorts and Controls

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Category</th>
<th>Mean ±SD</th>
<th>t (df)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Micronuclei (Mn)</td>
<td>Exposed (case) (n=20)</td>
<td>3.5±0.89</td>
<td>8.45 (19)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controls (n=20)</td>
<td>1.3±0.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nuclear bud (NuBd)</td>
<td>Exposed (case) (n=20)</td>
<td>0.9±0.96</td>
<td>0.623 (19)</td>
<td>0.541</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controls (n=20)</td>
<td>0.7±0.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bi nucleate cells (BiNu)</td>
<td>Exposed (case) (n=20)</td>
<td>3.15±2.47</td>
<td>3.53 (19)</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controls (n=20)</td>
<td>1.15±1.136</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Total nuclear abnormalities (Mn+NuBd+BiNu)</td>
<td>Exposed (case) (n=20)</td>
<td>7.55±2.87</td>
<td>6.525 (19)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controls (n=20)</td>
<td>3.19±1.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p value ≤0.05 is considered as statistically significant

Figure 1: Normal Epithelial Cell (40X Magnification)  
Figure 2: Epithelial Cell With Micronuclei (Red Arrow Indicates Micronuclei)(40X Magnification)
Discussion

Orthodontic appliance used in dentistry is made of alloys containing nickel, chromium, cobalt, iron and titanium\cite{10}. Various studies have found that oral environment provides ideal condition for the degradation of these alloys and release of metal ions. Saliva acting as an electrolyte, fluctuation in pH, temperature, enzymatic activity, and the foods introduced to the oral cavity all contributes to metal corrosion\cite{11}. The metals ions released from the orthodontic appliance are reported to be taken up by the tissues which are in direct contact with them. There will be a cumulative effect on these cells due to sustained metal release\cite{12}. Mekulewicz et al and Langes et al have reported that significant sustained release of Ni and Cr ions occur from orthodontic appliance in the oral environment. Ni ions are reported to act as an allergen and mutagenic agent. They were found to suppress the promoter sites of the genes by hypermethylation\cite{10,13}. Even though acute exposures may not produce biological effects, the sustained release of metal ions from long term orthodontic appliance use has been reported to result in its cumulative accumulation in adjacent tissues. This resulted in chronic toxic effects on cellular metabolism and DNA stability\cite{3,4,5}. Hafez et al has reported that a significant increase in the Ni and Cr content in the buccal mucosal cells would be formed by a six month period of orthodontic appliance use\cite{12}. So in order to understand the long term toxic effects of orthodontic appliance use we selected cases with a minimum of 6 months of orthodontic appliance treatment.

The genotoxicity of chronic metal ion exposures on adjacent cells were evaluated in many studies. They have used surrogate markers for genotoxicity like micronuclei or comet assay on the buccal mucosal cells\cite{1,2,7}. Westphalen GH et al found that micronuclei assay was more reliable in recording the genotoxic events due to fixed orthodontic appliance\cite{1}.

Micronuclei (Mn) assay is based on the frequency of chromosomal fragments or whole chromosomes which are not included in the main daughter nuclei during cell division. This arises due to DNA breakage leading to chromosomes or chromatin lagging during anaphase\cite{1}. The frequency of micronuclei is being established as reliable marker for genetic damage due to low doses of mutagen exposure\cite{13}. Other nuclear features which indicate genetic and cellular damages are nuclear buds and binucleate cells. Binucleate cells occur due to defects in the cytokinesis\cite{6}.

Age and sex of the subjects are reported to be confounding factors that can influence the Mn frequency\cite{6}. Ferreira et al has reported an increase in the frequency of Mn as age advances\cite{16}. In order to avoid this confounding effect, we selected age and sex matched controls.

In our study we found a significant increase in the Mn frequency in cases compared to controls (p<0.0001) (Fig 2, Table 1). This increase in Mn frequency was similar to previous studies done by Westphalen et al and Natarajan et al\cite{1,7}. But the mean Mn frequency was much lower in our study (3.5±0.89) compared to these previous studies (259±233)\cite{7}. These previous studies have used non DNA specific stains like Geimsa and PAP in order to evaluate Mn frequency. However,
it has been established that the use of non-DNA specific stains increase false positive results because non nuclear material like keratin bodies in degrading cells can resemble like micronuclei[8].

Nuclear bud (NuBd) is reported to be another indicator of genetic damage. They are nuclei with a sharp constriction at one end suggestive of a budding process. It is an indication of elimination of amplified nuclear material[6]. In our study we found Nu Bd formation in both cases and controls. Also, there was no significant difference in its frequency between cases and controls (Fig 3, Table 1).

In our study we recorded binucleate (Bi Nu) epithelial cells in both cases and controls (Fig 4). We found a statistically significant increase in the mean frequency of Bi Nu cells in cases compared to controls (p=0.002) (Fig 4, Table 1). Philips et al has reported that Bi Nu cells are indicative of failed cytokinesis following last nuclear division. This was found to be a checkpoint mechanism for aneuploid cells[6]. Bi Nu frequencies were found to be higher in patients with higher rates of aneuploidy[16]. To our knowledge this is the first time, Bi Nu cell frequencies were recorded in buccal mucosal cells of subjects using orthodontic appliance.

We also evaluated total nuclear abnormality (Mn+NuBd+Bi Nu) frequencies between cases and controls. We found a significant increase in nuclear abnormalities in cases compared to controls (p<0.0001) (Table 1, Graph 4). Mn,Nu Bd and Bi Nu are all established nuclear alterations indicative of genotoxicity[6]. Hence this increase in nuclear and cytotoxicity abnormality frequency in cases is an indication of toxicity on oral epithelial cells in patients using metal orthodontic appliance. Genelhu et al has reported that patients wearing orthodontic appliance, exhibited immunologically mediated mucosal reactions like labial desquamation, angular chelitis and erythema multiforme[17]. These immunologically mediated reactions are probably caused due to the cellular injuries caused by the exposure to environmental agents like metal ions. These cellular injuries expose hidden cellular materials (epitopes) to antigen presenting cells triggering immunologically mediated mucosal reactions[18].

Our study has demonstrated that subjects with fixed orthodontic appliance have increased incidence of localized genotoxicity as indicated by an increase in Mn frequency. Cellular markers of cytotoxicity like Bi Nu cell frequency was also found to be raised in our cases compared to controls. Bi Nu cells occur due the aneuploidy state of the affected cell. These cellular toxic events predispose orthodontic patients, for possible occurrence of immune mediated oral mucosal lesions. Other cellular markers of cytotoxicity like Bi Nu cell frequency was also found to be raised in cases compared to controls. Bi Nu cells occur due the aneuploidy state of the affected cell. These results will help in sensitizing the clinicians regarding the possible biological effects of long term fixed orthodontic therapy and the need for regular patient follow up/monitoring. Further research should be focused in developing better biocompatible dental materials.

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References


Porphyromonas Gingivalis fimA Genotype in Chronic Periodontitis

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Abstract

**Background:** Periodontitisis an inflammation of the periodontium with varied etiology leading to loss of periodontal supporting tissues of the teeth including the periodontal ligament and alveolar bone. Periodontitis progresses as a result of the direct effects of bacterial virulence factors on host tissues, as well as self-damaging host responses to the colonizing bacteria.

**Method:** PCR was performed on the sub gingival plaque samples positive for *P. gingivalis* from chronic periodontitis patients (n=103) and healthy subjects (n=22) Chi-square test was performed to calculate the statistical significance.

**Result:** *P. gingivalis* type II fimA genotype was positive in 50.5% and 13.60% among patients with chronic periodontitis and health respectively. Positivity for *P. gingivalis* type II fimA genotype. Statistical significance was observed for the prevalence of *P. gingivalis* type II fimA genotype (p=0.03) in chronic periodontitis group.

**Conclusion:** The significant presence of *P. gingivalis* type II fimA genotype in chronic periodontitis compared to health suggests their role in the etiology of chronic periodontitis.

**Keywords:** Periodontitis, Inflammation, Plaque.

Introduction

Periodontitis is an important global public health problem which involves mostly the adult population over 35-40 years of age. “Periodontitis” refers to an inflammation of the periodontium with multi-factorial etiology leading to loss of periodontal supporting tissues of the teeth including the periodontal ligament and alveolar bone. The disease is initiated due to colonization by a group of gram-negative anaerobes in the form of a subgingival biofilm. Periodontitis progresses as a result of the direct effects of bacterial virulence factors on host tissues, as well as self-damaging host responses to the colonizing bacteria. This disease results from complex interactions between the host and a predominantly anaerobic microflora. In periodontal diseases, the junctional epithelium at the base of the gingival crevice migrates down the root of the tooth to form a periodontal pocket. This is partly as a result of direct action by the microorganisms themselves. The main types of periodontal disease are gingival disease, chronic periodontitis, necrotizing form of periodontal disease and aggressive periodontitis. Chronic periodontitis (ChP) is defined as an infectious disease inducing an inflammatory reaction and subsequent loss of supporting tissue and alveolar bone of the teeth if no periodontal treatment is provided. It results in periodontal pocket formation and/or gingival recession. It is estimated that more than 500 bacterial species can be identified within...
the plaque biofilm of the gingival pocket. Possibly, 10 – 30 species may play a more critical role in the pathogenesis of periodontal disease. The red complex, which comprises Porphyromonas gingivalis, Treponema denticola, and Tannerella forsythia are known as the putative periodontal pathogens in chronic periodontitis. $P. gingivalis$ is a gram-negative, anaerobic, non-motile, asaccharolytic and black pigmented rod that forms greenish-black colonies on blood agar plates is documented as putative periodontal pathogen. Chronic periodontitis patients predominantly harbor $P. gingivalis$ type II fimA in various geographic regions. Hence, the study was opted to verify in South Indian population.

**Method**

Subgingival plaque samples positive for $P. gingivalis$ from chronic periodontitis patients (n=103) and healthy subjects (n=22) were used for the study. To detect type II fimA gene of $P. gingivalis$, polymerase chain reaction was performed in a volume of 50 μl containing 5 μl of the template, 5 μl of 10X PCR buffer and 1 U Taq polymerase, 0.25 mM of each dNTP, 2.5 mM MgCl$_2$, and 0.8µM primer. The primers for amplification of type II fimA gene of $P. gingivalis$ was: forward 5’-ACAACTATACTTATGACAATGG-3’, reverse 5’-AACCCCGCTCCCTGTATTCCGA-3’.[12] Chi-square test was performed to calculate the statistical significance.

**Results**

$P. gingivalis$ type II fimA genotype was positive in 50.5% of $P. gingivalis$ positive subgingival plaque samples of patients with chronic periodontitis. While, healthy samples showed 13.60% positivity for $P. gingivalis$ type II fimA genotype. Statistical significance was observed for the prevalence of $P. gingivalis$ type II fimA genotype (p=0.03) in chronic periodontitis group.

**Discussion:**

$P. gingivalis$ fimbriae are adhesive filamentous appendages that have been demonstrated to be essential for virulence in rodent models of periodontitis. Insertional inactivation of the fimA gene, with concomitant loss of fimbrial production, results in a phenotype significantly less able to cause periodontal bone loss in the gnotobiotic rat model.[13] Many studies suggest a strong association between the expression of fimbriae and periodontal tissue destruction in humans. Fimbriae have been classified into six genotypes: type I- V and type Ib based on the nucleotide sequence of the fimA gene. These fimbriae are thought to play an important role in adhesion and invasion of bacteria into the host cells (Amano, 2003). Several epidemiological investigations have reported the distribution of fimA genotypes in subjects of different race and with different periodontal conditions. A majority of Japanese periodontitis patients were found to carry fimA genotype II.[12,14,16] Moderately high prevalence of type II fimA genotype was observed among Chronic Periodontitis patients (50.5%) compared to Guo et al., 2005.[17] The prevalence of $P. gingivalis$ type II fimA + genotype was consistent with other reports.[12,14,18]

**Conclusion**

The results obtained in the present study demonstrate that $P. gingivalis$ strains that possess the type II fimA gene are most predominantly present in the oral flora of the chronic periodontitis patients and that the type II fimA organisms might be involved in the etiology of chronic periodontitis.

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Bacterial Etiology of Neonatal Sepsis: A Mini Review

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Abstract

Neonatal sepsis can be generally classified as early onset or late onset. Early-onset sepsis is observed during first week after birth. Late onset sepsis is seen between seven days of life to three months of age. Early-onset neonatal sepsis is linked with acquiring of microorganisms from the mother. Infection can occur through bloodstream, vertical transmission from infected mother or by infection during parturition. The bacterial etiology in neonatal sepsis is on increase currently following the raise in antibiotic resistance among the bacterial community. This brief review highlights the bacterial species implicated in neonatal sepsis.

Keywords: Microorganisms, Infection, Sepsis.

Introduction

Septicemia is a life-threatening complication that is caused when bacteria from a different habitat enter the blood stream and spread all over the body. Septicemia affects two extremes of age, those with prolonged illness and those who have undergone surgery recently. The cause of sepsis in hospitals consists of severe community-acquired and nosocomial pneumonias, pyelonephritis, intravenous line infections, viral hepatitis, septic pulmonary emboli, antibiotic-associated diarrhea/colicitis, infected decubitus ulcers, and intra-abdominal or pelvic infection due to perforation, trauma, or surgery.

Discussion

Sepsis is one of the major causes of death among new-born children globally, mostly in developing and undeveloped countries[1]. Approximately three million new-born deaths occur every year, and 36% of these are due to neonatal septicaemia[2]. Neonatal septicemia can be classified as early onset (EOS) if septicemia manifests within three days of life or late onset (LOS) if it manifests after three days of life[3] New-born children obtain bacteria present on the skin surface, blood or vagina of the mother before birth or during delivery. This is commonly observed in EOS. Hospital acquired and environmental microbes adds further risk following delivery. This is seen in LOS.[4, 5] This short review discusses the bacterial species frequently encountered in neonatal septicaemia in varied geographical area.

In hospital southwest Iran, coagulase negative Staphylococcus, followed by Staphylococcus aureus and Escherichia coli was most commonly encountered[6]. In Northwest Ethiopia S. aureus followed by coagulase negative Staphylococcus and Klebsiella pneumoniae was reported[7]. S. aureus and Streptococcus pneumoniae were most prevalent in Africa, while Klebsiella was highly prevalent in South-East Asia. A notably higher prevalence of Group B Streptococcus was present in neonates aged 7 days or less in South-East Asia[8]. In a study in Nepal, coagulase-negative Staphylococcus followed by S. aureus, Acinetobacter species and K. pneumoniae[9]. In Haiti, the percentage of bacterial species cultured in descending order is Streptococcus
agalactiae, K. pneumoniae, Pseudomonas aeroginusa, Enterobacter aerogenes, S. aureus and Proteus mirabilis.

[S] aureus (52%), 30.7% of which were methicillin-resistant S. aureus (MRSA), K. pneumoniae (12%), E. aerogenes (8%), Enterococcus spp. (8%), E. coli (4%), and other Gram-negatives (12%) were the bacterial species isolated from neonatal sepsis in Nigeria. E. coli and Klebsiella were the most common bacterial species causing neonatal septicemia in a tertiary care hospital in Bangladesh. Suitable prenatal care and health education should be promoted in the obstetrics and gynecology settings to prevent neonatal sepsis.

Conclusion

Neonatal septicemia can be classified as early onset (EOS) if septicemia manifests within three days of life or late onset (LOS) if it manifests after three days of life. This short review discusses the bacterial species frequently encountered in neonatal septicemia in varied geographical area.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

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References

Antibiotic Resistance-as a Threat to the Future and its Role in Dentistry

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Abstract

The prescription of antibiotics is reaching its peak day by day in all specialities. This is causing antibiotic resistance in many bacteria along with evolution of newer multiple drug resistant strains of bacteria. If this situation continues then we would tend to ‘lose battle against the bugs’. Dentistry is a speciality commonly prescribing antibiotics all over the world. Lack of proper knowledge and lethargic attitude of many dentists contribute largely to the increasing antibiotic resistance among patients.

Keywords: Antibiotics, Bacterial resistance, dentistry.

Introduction

In the 18th and early 19th century, the primary cause of death was infectious diseases. Later, after the discovery of the first antimicrobial drug - Penicillin by Alexander Fleming, in 1928, and with further discovery of other potential antimicrobials, death rate drastically declined. But recently, the concept of microbial resistance has been rising and exploding among the population. In this alarming rate, we would be facing history again with increase in mortality rate due to antimicrobial resistance.

Nowadays antibiotics are being judiciously prescribed therapeutically as well as prophylactically by all medical and dental practitioners.

Antibiotic Resistance: Bacteria are said to be resistant to an antibiotic if the maximum dose taken tolerable by the host, does not affect the organism.

Bacteria develop antibiotic resistance in two forms—Genotypically or phenotypically.

Genotypic resistance is when a bacteria genetically carries certain elements responsible for resistance. While, phenotypic resistance is when a bacteria can outgrow and survive in the presence of antibiotic drug concentrations, either clinically or in laboratory.

Antibiotic resistance is further classified into natural or acquired.

Natural resistance occurs when bacterium does not possess certain structures which are target molecules for some antibiotics. Eg: cell wall is absent in bacterium like Mycoplasma and hence exhibit a natural resistance to Betalactam antibiotics.

Acquired resistance can be developed through two mechanisms. 1) through mutation of bacterial genome responsible for resistance 2) through horizontal gene transfer which is the most common type, where a part of genetic material (responsible for resistance in this case) from one organism gets transferred to another

Factors Leading to Antibiotic Resistance:

Empirical Antibiotic Therapy: Usually antibiotics should be prescribed only after identifying the causative microorganism and establishing its susceptibility to it. But in exceptional cases, when the patient is critical and a delay in therapy would cause serious complications, empirical therapy is indicated. But in most of the health care centers empirical therapy with broad spectrum
antibiotics are started for all patients admitted with an infectious etiology, even before the culture results are out. 

- **Multidrug therapy/Combination therapy:** Unnecessary use of multiple drugs or combination antibiotics also contributes to development of resistance and newer strains of bacteria. Practitioners being over precautious about the therapy being inadequate or fear of facing medical or legal issues are the major causes for multidrug therapy in many cases.

- **Lack of knowledge among doctors regarding updated guidelines for antimicrobial prophylaxis and therapy**
- **Patients missing doses or not following the prescribed regimen**
- **Inappropriate prescription of antibiotics, due to pressure from patients**

**Resistance Mechanisms:** There are various mechanisms by which bacteria exhibits their resistance to antibiotics.

1. **Chemical alterations of the antibiotic:** Production of enzymes by the bacteria which chemically alter the structure of the antibiotic. Eg: Aminoglycoside modifying enzymes (AMEs) produced by certain species which which covalently modifies the amino group of the antibiotic

2. **Destruction of the antibiotic molecule:** A classic example is production of Beta lactamase enzymes by the bacteria which destroys the beta lactam ring of the antibiotics rendering it inactive. To overcome this newer beta lactam antibiotics which are

3. **Decrease in permeability of the antibiotic molecule:** Antibiotics enter the bacteria through the outer and the cytoplasmic membrane. Bacteria develops certain mechanisms to reduce the penetration of the antibiotic and prevent them from reaching into the cell. Eg: Beta lactams, tetracyclines, fluoroquinolones

4. **Efflux Pumps:** Bacterial cell possess certain pumps which are capable of pumping the antibiotic out of the cytoplasm. Eg: E. coli pumps out concentrated tetracyclines out of them.

5. **Target protection:** The bacterial chromosomes mediate certain determinants which protects the antibiotic target site in the bacterial cell, thereby preventing the action of antibiotics.

6. **Modification of target site:** Target site in the bacterial cell wall is modified by genetic mutation, enzymatic alterations of the binding site or by replacement of the target

7. **Resistance due to global cell adaptation:** Through years of evolutional development, bacteria have faced lots of environmental stress and pressures. In order to cope up with this, bacteria have developed certain sophisticated mechanisms to survive in this hostile environment

**Common Antibiotics Used in Dentistry and their Resistance Mechanisms:** Oral cavity consists of a diverse ecosystem comprising of many bacterial species including Streptococci, Staphylococci, Neisseria, Enterococcus, Lactobacillus, Hemophilus, Actinomycetes, etc. Most of the oral infections are known to be associated with Gram positive aerobic cocci, Alpha hemolytic streptococci, Peptostreptococci and Gram negative anaerobes.

Chlorhexidine and triclosan known to be potent prophylactic agents in dentistry and often prescribed to the patients for long term use are also known to exhibit resistance. Hence unnecessary use of long term antibacterial prophylactic agents should be minimized. Rather, patients should be encouraged to use mechanical prophylactic agents and professional cleaning should be insisted.

**Role of Dentists in Reducing Antimicrobial Resistance:** Dental practitioners prescribe antibiotics either prophylactically or therapeutically. Dentists can optimally control the prescription of antibiotics to avoid resistance by following certain principles.

- By strictly following infection and sterilization protocols to prevent the growth and multiplication of resistant strains
- By educating the patients regarding antibiotic abuse and its harmful effect, and importance of following the prescribed regimen
- By updating knowledge about the recently established guidelines for antibiotic prophylaxis and therapy.

According to the American heart association, antibiotic prophylaxis before a dental procedure is only indicated for the following heart conditions.
I. Prosthetic cardiac valves, including trans catheter-implanted prostheses and homo grafts.

II. Prosthetic material used for cardiac valve repair, such as annuloplasty rings and chords.

III. Previous Infective Endocarditis.

IV. Unrepaired or repaired cyanotic congenital heart disease, with residual shunts or valvular regurgitation at the site of or adjacent to the site of a prosthetic patch or prosthetic device.

V. Cardiac transplant with valve regurgitation due to a structurally abnormal valve.

Any other heart conditions other than these are considered as low risk category for infective endocarditis and does not require antibiotic prophylaxis before the dental treatment.

The AHA also offers a wallet card for patients containing the indications for antibiotic prophylaxis and the recommended dosage.

The American Academy of Orthopaedic Surgeons and the American Dental Association has updated their guidelines in 2007 mentioning that antibiotic prophylaxis is not necessary for patients with prosthetic joints.

### Conclusion

The responsibility of preventing bacterial resistance against antibiotics, lies greatly on the shoulder of medical and dental health care professionals. Hence, Practitioners must keep themselves updated about the recent protocols and guidelines on antibiotic prescriptions and strictly adhere to it. Patient education on avoiding OTC drugs without a prescription should also be insisted. Following these guidelines would help us to prevent a large medical catastrophe from happening and ensure the safe use of antibiotics.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Obesity: A Killer Living with Us

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Abstract

Obesity is a common and often neglected health problem with high economic and health consequences. Obesity, which is now considered as a disease can be easily prevented which otherwise can impact the lives of people of all age groups. Obesity is associated with increased risk of illness, disability, and death. Last decade has witnessed a striking increase in obesity prevalence. It is an easily preventable and treatable health problem which is increasing at an alarming rate in the society now and currently an important health issue. Early intervention of this often-neglected problem will lead to healthy adults and decreased economic burden in health care industry.

Keywords: Obesity, BMI, Diet, Weight loss.

Introduction

Obesity is defined as an abnormal accumulation of body fat, that is 20% higher than what is considered as a healthy weight for a given height. The medical branch specializing in the control and treatment of obesity and allied diseases is known as Bariatrics. Obesity is the most pervading, chronic illness requiring newer approach for medical management and prevention. (Wright, S.M. & Aronne, L.J 2012). As a leading cause of mortality, morbidity, disability, healthcare utilization and healthcare costs, the high prevalence of obesity has strained the healthcare system.

A diagnostic tool for screening for obesity is Body Mass Index. Body Mass Index (BMI) “is a person’s weight in kilograms divided by the square of height in meters”. A person is called obese if the Body Mass Index is more than or equal to 30.

Classification of overweight and obesity in adults according to BMI. (Ruth S.M Chan and Jean Woo, 2010)

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI</th>
<th>Risk of co-morbidities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>Low</td>
</tr>
<tr>
<td>Normal range</td>
<td>18.5–24.9</td>
<td>Average</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0–29.9</td>
<td>Increased</td>
</tr>
<tr>
<td>Obese class I</td>
<td>30.0–34.9</td>
<td>Moderate</td>
</tr>
<tr>
<td>Obese class II</td>
<td>35.0–39.9</td>
<td>Severe</td>
</tr>
<tr>
<td>Obese class III</td>
<td>≥40</td>
<td>Very severe</td>
</tr>
</tbody>
</table>

Rationale: Obesity is a common often neglected health problem with high economic and health consequences. Obesity, which is now considered a disease entity is easily preventable health condition which can impact the lives of people of all age groups. Its a health condition by controlling which, a plethora of many other illness associated with it can be prevented. It is an easily preventable and treatable health problem which is increasing at an alarming rate in the society now and currently an important health issue.

Epidemiology of Obesity: Obesity is associated with increased risk of illness, disability, and death. Last decade has witnessed a striking increase in obesity prevalence. This increase is prevalent across males and females, all age groups, and every race. Since 1980 there is a double fold increase in obesity prevalence worldwide. There is an increase in mortality rate because of obesity in many countries today. In recent times childhood obesity is becoming increasing prevalent. (Muhamad Hanafiah Juni, 2015)

According to a research published in Lancet, after the United States and China, India ranks third in the list of top ten countries with the largest number of overweight people. In India, there is an upsurge in the prevalence of obesity among middle-income people. This increase is attributed to the higher percentage of refined sugar, trans fat and other artificial agents in the processed food which has been consumed largely. (Neetu Chandra Sharma 2014)
Prevalence of overweight in the four regions of India (Pradeepa R et al 2015)

Causes of Obesity: The weight of a person depends on the balance between the calorie consumed and the energy spent. Overweight is the result of more calorie intake than that is metabolised, as the body stores the extra energy as fat. The person will lose weight if the calorie consumed is less than that metabolised by the body. The two main reasons for overweight are overeating and physical inactivity. Other factors that influence body weight are genetics, environment, metabolism, culture and behaviour.

Genetics: There is a higher risk of the person becoming obese if either or both of the parents are overweight. Genes play an important role in obesity as it affects hormones responsible for fat regulation. Genetic leptin deficiency is one of the causes of obesity. Fat cells and placenta produce leptin and it signals the brain to stop eating if the fat stores are high in the body.

Overeating: Overeating of fatty foods with high energy density lead to weight gain. Food high in simple carbohydrates escalates the blood glucose levels, which stimulates insulin release from the pancreas, and fat tissue growth and leads to overweight. Compared to complex, simple carbohydrates are absorbed rapidly thus, in turn, releasing more insulin, which contributes to obesity.

Physical inactivity: Active people burn more calories than persons who are sedentary. According to The National Health and Nutrition Examination Survey (NHANES), physical inactivity is a high-risk factor for obesity.

Medications: Diabetic medications, antidepressants, anti-epileptic medicines, steroids and certain hormones used in contraception leads to weight gain. Obesity is also associated with some antihypertensives and antihistamines. The mechanism of weight gain differs for each medication.

Psychological factors: One of the contributing risk factor for weight gain is psychological factors such as stress, lack of interest in life and temperament. Binge
eating is an important reason for seeking treatment in thirty percent of obese people.

**Systemic illness:** Many systemic diseases like thyroid problems, polycystic ovary syndrome, Cushing’s syndrome and insulin resistance, causes obesity. (Jerry R. Balentine 2015).

**Other factors associated with obesity:**

**Ethnicity:** The age and rapidity at which obesity starts are influenced by ethnicity. Compared to Asians and Caucasians the Hispanic and African-American women become overweight at a younger age. White non-Hispanic men are less obese compared to Hispanic and Non-Hispanic black men.

**Childhood weight:** Adult obesity is influenced by the weight of the individual during their childhood and adolescent years. Teenage obesity is a predictor of adult obesity.

**Hormones:** Women gain weight during menopause or pregnancy or while using oral contraceptives. (Africa Federation - Health Bulletin 2015)

**Consequences of Obesity:** Obesity leads to numerous negative consequences. Overweight leads to numerous health conditions compromising the lifespan because of heart disease, diabetes mellitus, certain cancers, and osteoarthritis. Expenditure in managing obesity and its related conditions have increased exponentially over the years. (Cawley J, Meyerhoefer C, 2012).

**Economic effects:** There is an increased economic burden on the healthcare industry because of obesity and its related illness. Obesity and its related conditions are economically associated with direct or indirect costs. Preventive, investigative, and management services of obesity are related to direct costs. The mortality and morbidity associated with it come under the indirect costs. (Colditz GA, 1992)

**Health Effects:** Obesity leads to numerous health consequences. Some of the health effects of obesity includes:

**High blood pressure:** Excess fat accumulated in the body requires nutrients and oxygen this, in turn, requires blood circulation in the fat tissue. The heart’s workload is increased as it needs to pump more blood through the extra blood vessels and puts extra pressure on the walls of the artery leading to high blood pressure.

**Diabetes:** Lifestyle associated type 2 diabetes is caused mainly because of obesity. The prevalence of type 2 diabetes is increasing in children in recent years. Moderate obesity also increases diabetic risk dramatically.

**Heart disease:** Obese individuals are ten times at a higher risk of developing atherosclerosis than thin persons. Fat deposited in the heart vessels leads to the development of coronary artery disease. Reduction in the blood flow because of narrowing of the heart vessels leads to heart attack.

**Joint problems:** Overweight leads to increased stress placed on the hips and knee joints causing joint problems.

**Sleep apnea and respiratory problems:** Overweight leads to heavy snoring and sleep apnea causing sleep disturbance because of difficulty in breathing. Hypertension is also a consequence of sleep apnea. The squeezing of chest wall because of overweight leads to restricted breathing and respiratory problems.

**Cancer:** Obese women are at a higher risk of uterine, breast, colon, and gallbladder cancer. Prevalence of prostate and colon cancer is higher in overweight men. (Michael T. Murray Joseph Pizzorno, 2012)

**Management of obesity:** Management of obesity includes weight reduction, maintaining the weight loss, as well as, treating and controlling the risk factors associated with it. Appropriate treatment can be chosen based on the BMI, waist circumference and the associated risk factors. Obesity is managed by three approaches, which includes non-pharmacological method like diet modification, exercise and behavioural therapy, pharmacological and surgical method. (Srinivas Nammi et al 2004)

**Non - pharmacological management:**

**A. Dietary therapy:** Primary treatment line is calorie restrictions through low calorie food which will provide 100 - 1500 kcal per day, which can result in eight percent weight loss over a period of six months. (Srinivas Nammi et al 2004)

**B. Physical activity:** Regularly exercising benefits everyone. There is reduction in the fat storage because of the increase in the expenditure of energy
during physical activity. Research has proved that regular exercise improves the cardiac health and also has positive psychological benefits. Exercising regularly for thirty minutes a day is a part of a comprehensive health care and for losing the over weight. (Wyatt HR et al 2002)

C. **Behaviour therapy:** Behavioural intervention compliments the weight loss therapy along with the other management modalities. In behaviour therapy self control on eating habits and awareness on balanced health diet is taught. It also help in the maintenance therapy after the weight loss is achieved. (Srinivas Nammi et al 2004)

**Pharmacotherapy:** In persons with the body mass index above 27 kg/m² along with the presence of other systemic risk factors or body mass index of above 30 kg/m², pharmacotherapy or drug therapy is given. This therapy is given along with diet and behavioural counselling. (National Institutes of Health 1998)

**Surgery:** When the BMI is above 40 kg/m² or its above 30 kg/m² with the associated risk factors bariatric surgery is indicated. There are serious nutritional and gastric complications associate with surgery. Its only the last treatment option when the other method of weight loss have failed. (Srinivas Nammi et al 2004)

### Weight Loss Interventions Based on Risk and BMI (kg/m²)

<table>
<thead>
<tr>
<th>Patient Classification</th>
<th>Interventions Based on Risk and BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td><strong>Level 2</strong></td>
</tr>
<tr>
<td><strong>Overweight</strong></td>
<td></td>
</tr>
<tr>
<td>BMI ≥ 25 kg/m² with obesity-associated condition(s)</td>
<td>Diet, exercise, and behavior modification</td>
</tr>
<tr>
<td><strong>Obese</strong></td>
<td></td>
</tr>
<tr>
<td>BMI ≥ 30 kg/m², or BMI ≥ 27 kg/m² with obesity-associated condition(s)</td>
<td>Diet, exercise, and behavior modification</td>
</tr>
<tr>
<td><strong>Obese</strong></td>
<td></td>
</tr>
<tr>
<td>BMI ≥ 40 kg/m², or BMI ≥ 35 kg/m² with obesity-associated condition(s)</td>
<td>Diet, exercise, and behavior modification</td>
</tr>
</tbody>
</table>

(Clinical Practice Guideline for Screening and Management of Overweight and Obesity 2014):

**Prevention of Obesity:** Infants: Breastfed babies for long duration are twenty to forty percent at lower risk of becoming obese.

**Children and Adolescents:** Encouraging children to have a healthy life style with balanced eating habits combined with physical activity prevents obesity.

**Preventing Obesity in Adults:** Being healthy with ideal body weight can be achieved by eating a healthy balanced diet and exercising regularly. Obesity prevention is vital because fat cells once formed can only be reduced in size and it will remain forever in the body. Prevention is better than cure. (Stanford health care)
Conclusion

Obesity is a significant health threat posing a challenge to the health care industry. It impacts the society in various ways. Obesity management and prevention will lead to a healthier society.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References


Banned Fixed Drug Combinations of NSAIDS: An Update for Dentists in India

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Abstract
Being the most common medical professionals in prescribing of Non-steroidal anti-inflammatory medications, Dentist in India are to be essentially aware of banned medications, that due to various reasons, still haven’t been withdrawn from market. Many fixed drug combinations are easily available without any scientific justification behind them. This article aims in creating an awareness among the dentist regarding banned fixed drug combinations of NSAIDS in India since September 2018.

Keywords: Banned drugs, NSAIDs, Fixed Drug Combinations.

Introduction
The field of medicine has gained enormous success with vast use of drugs. These drugs are essentially chemical ingredients that are administered to a living organism to alter its metabolic functioning. This alteration of metabolism has enabled the use of drugs as medications in obtaining favourable health conditions during an illness.1

The widely accepted form of medications as a single dosage unit has proven its therapeutic efficacy and drug safety in humans. The concept of drugs in various combinations have been tried globally with proven advantages.

Rationale for combination of drugs are based on:
• Favourable synergistic effect without any added toxicity.
• Difference in mechanism of action of drugs in combination.

• Similarity in their pharmacokinetic and pharmacodynamic properties.

Some rational drug combinations include – Trimethoprim with sulfamethoxazole and Anti-Parkinson’s drug such as levodopa and carbidopa.2

Fixed Drug Combinations: A Fixed Drug Combination or FDCs is fusion of two or more drugs or their active ingredients in a single dosage form. Though the idea of combination of drugs is seemingly brilliant, it does come with its own share of demerits.

Demerits of FDCs:
• Pharmacokinetic/Pharmacodynamic mismatch
• Increased chance of Adverse Drug Reactions (ADRs)
• Increased chance of drug interactions.
• Undesirable super added effects.

Indian drug market scenario: Indian drug market provides huge space for irrational drug combinations that have been manufactured with intention of marketing purposes only. These combinations have no scientifically proven justification and can cause significant health hazard to humans. The Drug regulatory bodies in India are governed by both State and Central Government organisations.4
**CDSCO:** In India, the Central Drugs Standard Control Organization (‘CDSCO’) is the main regulatory body currently regulating import, sale and manufacture of medical devices which have been notified as drugs by virtue of Section 3(b) (IV) of the D & C Act, 1940. Within the CDSCO, the Drug Controller General of India (DCGI) is responsible for the regulation of pharmaceuticals and medical devices. The DCGI is advised by the Drug Technical Advisory Board (DTAB).\(^4\)

**List of Banned Drugs – NSAIDS and their FDCs.**\(^5\)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Banned NSAIDs in their FDCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aceclofenac + Paracetamol + Rabeprazole.</td>
</tr>
<tr>
<td>2.</td>
<td>Nimesulide + Diclofenac.</td>
</tr>
<tr>
<td>3.</td>
<td>Nimesulide + Cetirizine + Caffeine.</td>
</tr>
<tr>
<td>4.</td>
<td>Nimesulide + Tizanidine.</td>
</tr>
<tr>
<td>5.</td>
<td>Paracetamol + Cetirizine + Caffeine.</td>
</tr>
<tr>
<td>6.</td>
<td>Diclofenac + Tramadol + Chlorzoxazone.</td>
</tr>
<tr>
<td>7.</td>
<td>Dicyclomine + Paracetamol + Domperidone.</td>
</tr>
<tr>
<td>8.</td>
<td>Diclofenac + Tramadol + Paracetamol.</td>
</tr>
<tr>
<td>11.</td>
<td>Nimesulide + Serratiopeptidase.</td>
</tr>
<tr>
<td>15.</td>
<td>Nimesulide + Paracetamol Injection.</td>
</tr>
<tr>
<td>16.</td>
<td>Tamsulosin + Diclofenac.</td>
</tr>
<tr>
<td>17.</td>
<td>Paracetamol + Phenylephrine + Chlorpheniramine + Dextromethorphan + Caffeine.</td>
</tr>
<tr>
<td>18.</td>
<td>Diclofenac + Zinc Carnosine.</td>
</tr>
<tr>
<td>19.</td>
<td>Diclofenac + Paracetamol + Chlorpheniramine Maleate + Magnesium Trisillicate.</td>
</tr>
<tr>
<td>20.</td>
<td>Paracetamol + Pseudoephedrine + Cetirizine.</td>
</tr>
<tr>
<td>22.</td>
<td>Lornoxicam + Paracetamol + Trypsin.</td>
</tr>
<tr>
<td>23.</td>
<td>Paracetamol + Mefenamic Acid + Ranitidine + Dicyclomine.</td>
</tr>
<tr>
<td>25.</td>
<td>Heparin + Diclofenac.</td>
</tr>
<tr>
<td>26.</td>
<td>Glucosamine + Methyl Sulfonyl Methane + Vitamin D3 + Manganese + Boron + Copper + Zinc.</td>
</tr>
<tr>
<td>S.No.</td>
<td>Banned NSAIDs in their FDCs</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>27.</td>
<td>Paracetamol + Tapentadol.</td>
</tr>
<tr>
<td>28.</td>
<td>Tranexamic Acid + Proanthocyanidin.</td>
</tr>
<tr>
<td>29.</td>
<td>Lornoxicam + Paracetamol + Tramadol.</td>
</tr>
<tr>
<td>30.</td>
<td>Lornoxicam + Paracetamol + Serratiopeptidase.</td>
</tr>
<tr>
<td>31.</td>
<td>Diclofenac + Paracetamol + Magnesium Trisilicate.</td>
</tr>
<tr>
<td>32.</td>
<td>Paracetamol + Domperidone + Caffeine.</td>
</tr>
<tr>
<td>33.</td>
<td>Ammonium Chloride + Sodium Citrate + Chlorpheniramine Maleate + Menthol.</td>
</tr>
<tr>
<td>34.</td>
<td>Combokit of 3 tablets of Serratiopeptidase (enteric coated 20000 units) + Diclofenac Potassium &amp; 2 tablets of Doxycycline.</td>
</tr>
<tr>
<td>35.</td>
<td>Nimesulide + Paracetamol Suspension.</td>
</tr>
<tr>
<td>36.</td>
<td>Aceclofenac + Paracetamol + Famotidine.</td>
</tr>
<tr>
<td>37.</td>
<td>Aceclofenac + Zinc Carnosine.</td>
</tr>
<tr>
<td>41.</td>
<td>Paracetamol + Caffeine + Codeine Phosphate.</td>
</tr>
<tr>
<td>42.</td>
<td>Aceclofenac (SR) + Paracetamol.</td>
</tr>
<tr>
<td>43.</td>
<td>Diclofenac + Paracetamol Injection.</td>
</tr>
</tbody>
</table>

### Conclusion

A good medical practice is highly influenced by good prescription of medications. This will lead to increased overall health maintenance of people of the nation. It is important for dental professionals to have up-to-date knowledge regarding the regulatory affairs of the country – atleast concerning with NSAIDs and Antibiotics. Dentist are among the highest medical professionals to prescribe Nonsteroidal anti-inflammatory drugs and Antibiotics to the population, in general. Good knowledge of these banned drugs shall enable the reduction of their demands in market, thus reducing their sale, even when not withdrawn by the pharma companies.

### Ethical Clearance

Not required since it is a review article.

### Source of Funding

Nil

### Conflict of Interest

Nil

### References


Management of Anaphylaxis in Dental Clinics: A Review

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Abstract

Anaphylaxis is a severe, life-threatening, generalized or systemic hypersensitivity condition with increased mortality and requires immediate management. Dentist will face this kind of risky entity most commonly while administering local anesthesia. This review is just to update and to impart knowledge regarding management of anaphylaxis to the dentists to avoid fatality.

Keywords: Anaphylaxis, dentistry, adrenaline, lignocaine.

Introduction

Anaphylaxis is a type I hypersensitivity reaction. It is a serious, life-threatening allergic reaction. If a pre-sensitized host comes in contact with the allergen the mast cells release chemical mediators initiates the anaphylactic reaction. The reaction can take place within seconds or minutes of exposure to an particular allergen in sensitized individual. The mediators released by the mast cells are histamine, serotonin, arachidonic acid derivatives, NO, cytokines, chemokines, reactive oxygen species etc. these mediators causes bronchoconstriction, vasodilation, increased vascular permeability. Severe anaphylaxis leads to shock, coma and death. Blood pressure drops suddenly and airways narrow, blocks the breathing. In dentistry as such condition develops mostly while administering local anesthesia (lignocaine). All dental practitioners should be aware of the diagnosis and management of emergencies such as anaphylaxis that may arise from the use of local anesthetic agents in their clinical set up.

Signs and Symptoms of Anaphylaxis:

- SKIN REACTIONS, such as rashes, hives, pruritis, and flushed or pale skin
- Angioedema, Anasarca
- RESPIRATORY—coughing, hay fever, constriction of airways and a swollen tongue or throat, which can cause wheezing and trouble breathing.
- CARDIOVASCULAR—weak and rapid pulse, dizziness, loss of consciousness
- GASTROINTESTINAL—Nausea, vomiting, diarrhea
- NEUROLOGICAL—anxiety, feeling of doom

Risk Factors:

Persons with preexisting:

- Cardiovascular disease.
- Substance abusers.
- Asthma and other respiratory diseases.
- Initial exposure to the allergen by injection (intravenous [IV] medication).
- Frequent exposure to the allergen, particularly if exposure is followed by a long delay and then a re-exposure.

Anaphylactic Shock: Anaphylactic shock is extremely serious life threatening condition. It can block the airways and prevent breathing. It can also stop the function of heart. Because of the decrease in blood pressure that prevents the heart from receiving enough oxygen. It also leads to potential complications such as brain damage, kidney failure, and other organ damage, cardiogenic shock, a condition that causes your heart to not pump enough blood to body, arrhythmias, heart attacks, and death.

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Emergency (Acute) Management:

Assessing the Patient:

Airway: The initial steps in anaphylaxis management involve a rapid assessment of the patient’s airway. Give high-flow oxygen using a mask with an oxygen reservoir.

Breathing: Look for bronchospasm and signs of respiratory distress. If marked stridor or respiratory arrest is present, start intubation immediately.

Circulation: Patient might look pale and clammy, increased pulse rate (tachycardia), low blood pressure. Make the patient lie down with raised legs. If the patients made to sit up or stand up there may be chance of worsening of condition.

Disability: Airway, Breathing and Circulation problems can all these alter the patient’s neurological status because of decreased brain perfusion. There may be confusion, delirium, agitation, dizziness, and loss of consciousness.

Patients Positioning: All patients should be placed in a comfortable and safe position. The following factors should be considered:

- If the patient is conscious and with Airway and Breathing problems may prefer to sit up as this will make breathing easier.
- Lying flat with or without leg elevation is helpful for patients with a low blood pressure because this position increases the circulatory flow. If the patient feels faint, do not sit or stand them up - this can cause cardiac arrest.
- Patients who are breathing and unconscious should be placed on their side (recovery position), keeping them lying flat make the tongue fall back and block the airway.
- Pregnant patients should lie on their left side to prevent caval compression.

Cardiorespiratory Arrest Following An Anaphylactic Reaction: Start cardiopulmonary resuscitation (CPR) immediately and continuing until the help arrive. Rescuers should ensure that help is on its way as early with advanced life support systems. The 2010 AHA Guidelines for CPR and ECC recommend a change in the BLS sequence of steps from A-B-C (Airway, Breathing, Chest compressions) to C-A-B (Chest compressions, Airway, Breathing) for adults, children, and infants (excluding the newly born; see Neonatal Resuscitation section).

Pharmcotheraphy:

Adrenaline (Epinephrine): Adrenaline is one of the emergency drug used for the management of an anaphylactic reaction. Adrenaline causes peripheral vasoconstriction which improves the circulation. It also inhibits the IgE mediated chemical mediators to control the inflammatory response. Adrenaline increases the force of contraction, vasoconstriction, heart rate and bronchodilation. The intramuscular (IM) route is the first and easier route for administering adrenaline to the victim. The best site for IM injection of adrenaline is the anterolateral aspect of the middle third of the thigh. The needle used for drug administering should have sufficiently long enough to ensure that the adrenaline is injected into muscle[5].

Adrenaline IM Dose – Adults

- 0.5 mg IM (= 500 micrograms = 0.5 mL of 1:1000) adrenaline

Adrenaline IM Dose – Children

- > 12 years 500 micrograms IM (0.5 mL) i.e. same as adult dose
- 300 micrograms (0.3 mL) if child is small or prepubertal
- > 6 – 12 years 300 micrograms IM (0.3 mL)
- > 6 months-6 years 150 micrograms IM (0.15 mL)
- < 6 months: 150 micrograms IM (0.15 mL)

Adrenaline IV Route: Administration of IV adrenaline only applies to those experienced in the use and titration of vasoressors in their normal clinical practice (e.g., anesthetists, emergency physicians, intensive care doctors). Patients who are given IV adrenaline must be monitored continuously with ECG and pulse oximetry and frequent non-invasive blood pressure measurements.

Ensure patient is monitored

- Adrenaline IV bolus dose – adult: Titrate IV adrenaline using 50 microgram boluses according to response.
- If repeated adrenaline doses are needed, start an IV adrenaline infusion.
The pre-filled 10 mL syringe of 1:10,000 adrenaline contains 100 micrograms/mL.

A dose of 50 micrograms is 0.5 mL, which is the smallest dose that can be given accurately.

Do not give the undiluted 1:1000 adrenaline concentration IV.

**Antihistamines:** Antihistamines are a second line of drugs used in the treatment for an anaphylactic reaction. Antihistamines (H1-antihistamine) may help counter histamine-mediated vasodilation and bronchoconstriction. But they are insufficient alone to treat anaphylaxis.

**The dose of chlorpheneramine depends on age:**
- >12 years and adults: 10 mg IM or IV slowly
- >6 – 12 years: 5 mg IM or IV slowly
- >6 months – 6 years: 2.5 mg IM or IV slowly
- <6 months: 250 micrograms/kg IM or IV slowly[^4]

*[^4]* Diphenhydramine: 50 mg or 1 mg/kg IV slowly repeated if necessary.

Ranitidine: 50 mg IV 8 hourly.

**Oxygen:** Initially, give the highest concentration of oxygen possible using a mask with an oxygen reservoir. Ensure high flow oxygen (usually greater than 10 liters per min) to prevent collapse of the respiratory system during inspiration.

**Steroids:** Corticosteroids may help to prevent or shorten protracted reactions. Inject hydrocortisone slowly intravenously or intramuscularly, taking care to avoid inducing further hypotension.

**The dose of hydrocortisone for adults and children depends on age:**
- >12 years and adults: 200 mg IM or IV slowly
- >6 – 12 years: 100 mg IM or IV slowly
- >6 months – 6 years: 50 mg IM or IV slowly
- <6 months: 25 mg IM or IV slowly

**Fluid Replacement:** Large volumes of fluid may leak from the patient’s circulation during an anaphylactic reaction. There will also be vasodilation, a low blood pressure and signs of shock. Give a rapid IV fluid administration (20 mL/kg in a child or 500-1000 mL in an adult) and monitor the response continue further doses as necessary.

**Investigations:** The specific test to help confirm a diagnosis of an anaphylactic reaction is the measurement of mast cell tryptase. Tryptase is the major protein component of mast cell secretory granules. In anaphylaxis, mast cell degranulation leads to markedly increased blood tryptase concentrations[^7].

**Follow Up:** The patient may need to stay in the hospital for 24 h to make sure no new symptoms occur. For a severe reaction, the doctor may monitor heart function or admit the patient to the intensive care unit. Ideally, all patients should be assessed by an allergy specialist and have a treatment plan based on their individual risk. An auto-injector is not usually necessary for patients who have suffered drug induced anaphylaxis.

**Dental Clinic Should Contain These Things in the Emergency Trolley:** Adrenaline 1:1000 (consider adrenaline autoinjector availability, particularly in rural locations, for initial administration).

- 1 mL syringes; 21-gauge needles
- Oxygen
- Airway equipment, including nebuliser and suction
- Defibrillator
- Manual blood pressure cuff
- IV access equipment (including large bore cannulae)
- At least 3 litres of normal saline

**Conclusion**

To manage as such emergency situation dentist should have the knowledge about the management of anaphylactic reaction to prevent this life-threatening condition.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Efficacy of Locally Delivered 1% Metformin (MF) in Treating Periodontal Intrabony Defects: A Systematic Review

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Abstract

Periodontitis is characterized by destruction of supporting structures of tooth and may also lead to loss of teeth if untreated. The aim of this review is to systematically evaluate the efficacy of 1% MF in the treatment of periodontitis. An electronic search was carried out using the keywords ‘metformin’, ‘periodontal’ and ‘periodontitis’ via the PubMed/Medline, ISI Web of Science and Google Scholar databases for relevant articles published from 1949 to February 2019.

Keywords: Metformin, Intrabony Defects, Periodontitis, Diabetes Mellitus

Introduction

Periodontitis, a multifactorial disease affects 40–90% of the global population [1]. In the study done by Eke et al., 2012 estimated that 46% of the adult population in united states of America is affected by periodontitis[2]. Periodontitis is characterized by the progressive destruction of all the supporting structures of teeth and subsequently, loss of teeth[3][4].

Lack of oral hygiene leads in the formation of dental plaque[5][6] a biofilm containing multiple microbiomes that have been implicated in periodontitis[3][7]. The gold standard approach to periodontal therapy is mechanical debridement which reduces the inflammatory process. Although mechanical therapy is the most frequent other treatments such as flap surgery, bone grafts and barrier membranes are also done after phase 1 therapy to improve the overall health[8][9]. Recently, a number of agents such as melatonin, platelet rich fibrin and metformin are also been proven to cure periodontitis[10][11][12].

Metformin is an antidiabetic agent used to treat type 2 diabetes. It is a second-generation biguanide which is orally administered anti-hyperglycemic drug[13]. There are two mechanisms of action that have been suggested for the osteogenic effect of MF: increased proliferation of osteoblasts and reduction of osteoclast activity. Studies indicate that after MF is taken up by osteoblasts, their proliferation is increased[14][15] and another study it was observed that exposure to MF led to a decrease of osteoclast and bone formation. MF down-regulates the production of receptor activator of nuclear factor kappa B ligand (RANKL) and up-regulates the production of osteoprotegerin (OPG) from osteoblasts[16]. This study is aimed to perform a systematic review based on the effect of metformin in periodontal therapy to treat chronic periodontitis.

Method

Focused Question: According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [17], a focused question was constructed based on the Participants, Interventions, Control, Outcomes (PICO) principle [18].

The focused question was: ‘Is 1% metformin (MF) effective in reducing intrabony defect and increasing bone fill in chronic periodontitis?’

Criteria for the selection of studies: The inclusion criteria: (1) original studies published in the English...
language, (2) clinical studies, (3) animal studies and (4) Intervention: topical or systemic MF to treat periodontitis.

**Exclusion criteria:** (1) historic reviews, (2) letters to the editor, (3) case series and reports and (4) clinical trials.

**Search Methodology:** An electronic search was carried out using the keywords ‘Metformin’, ‘periodontal’ and ‘periodontitis’ via the PubMed/Medline, ISI Web of Science and Google Scholar databases for relevant articles published from 1949 up to February 2019. The titles and abstracts of the articles found were read independently by two authors (k and R). The references in the potentially relevant articles were read by both the authors to find additional studies which the authors checked agreement via discussion.

**CAL,** Clinical Attachment Level; **IBD,** Intrabony Defect; **MF,** Metformin Gel; **OFD,** Open Flap Debridement; **PD,** Probing Depth; **SRP,** Scaling and Root Planing. **DDR,** Defect Depth Reduction; **GI,** Gingival Index; **PI,** Bleeding Index; **AV,** Alovera Gel, **RSV,** Rosuvastatin, Plasma Rich In Growth Factor – **PRGF,** modified sulcus bleeding index (mSBI)

**Results**

**Search Results:** Following the removal of the duplicate search results, the primary search resulted in 20 articles in total. Two articles were excluded based on title and abstract. Hence, remaining eight articles were read completely for eligibility. After exclusion of another two irrelevant studies, six studies (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak kumarkhajuria 2017., Shabnam 2019., Ida G Kurian 2017., Dileep P 2017) were included in this review.

Three studies were animal studies (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak kumarkhajuria 2017.,) and remaining three studies were human trials (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017).

**Animal Studies:** All three animal studies were in vivo prospective studies. The number of animals used as test subjects ranged from 8 to 20 (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak kumarkhajuria 2017.,) In first study, periodontitis was induced by Oral Intrapерitoneal STZ Injection (Xinyi Zhou 2019.,) test group received oral metformin (200 mg/kg/day) from 8 weeks of age for 10 weeks, control groups received a mean volume of sterile water based on that of the test group. In second study chronic periodontitis was induced by means of ligatures (Aline De Sousa 2018.,) In Experimental groups 1 twenty animals with diabetes and with periodontal disease and Metformin 50 mg/kg/day, twenty animals with diabetes and periodontal disease and Metformin 100 mg/kg/day. In third study periodontitis was induced by Pгр-LPS injections in combinations with ligatures (Deepak kumarkhajuria 2017.,) test groups (periodontitis + CMIDF-A (1.99 ± 0.09 mg metformin; total mass-4.01 ± 0.05 mg), (periodontitis + CMIDF-B (2.07 ± 0.06 mg metformin; total mass-7.56 ± 0.09 mg), and (periodontitis + chitosan film (7.61 ± 0.08 mg), control groups were healthy and untreated periodontitis. The follow-up period ranged from 11 days to 16 weeks in all the three groups.

**Human Studies:** All human studies were randomized control trials (RCTs) trials (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017). Number of patients included the studies ranged from 8 to 90 in which the number of female subjects ranged from 5 to 46, the number of male subjects ranged from 3 to 46. (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017). The age of the patients ranged from 35 to 45 years. In all studies, MF gel was used in combination with other treatment modalities and the Concentration of MF was only 1% in all the three studies (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017) In first study (Shabnam 2019) test Group 1 received flap debridement with 1% MF, Group 2 received oral flap debridement with PRGF gel and the control group received oral flap debridement only. In second study (Ida G Kurian 2017) test Group 1 received SRP + Alovera gel, Group 2 received SRP + 1% MF and the control group received SRP + PLACEBO. In third study (Dileep P 2017) test Group 1 received SRP + 1.2% RSV gel, test Group 2 received SRP + 1% MF gel and the control group received SRP + PLACEBO. The follow-up period ranged from 3 to 12 months in all the three groups.

**Assessment of Parameters:** In animal studies (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak kumarkhajuria 2017.,) In first study (Xinyi Zhou 2019.,) Micro CT, Western Blot, Immune Fluorescence analysis
were assessed. In **second study** (Aline De Sousa 2018.), Micro CT, Tomography, Histological Immune Histochemical Analysis were assessed. In **third study** (Deepak Kumarkhajuria 2017.), Micro CT, Tomography, Histological Analysis were assessed.

**Outcome of Studies:** In animal studies (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak Kumarkhajuria 2017.)

In this study done by (Xinyi Zhou 2019.) concluded that metformin treatment can robustly ameliorate periodontal infection and tissue destruction and reduce blood glucose and serum IL-1β levels in mice with diabetic periodontitis.

In human studies (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017). In this study (Shabnam 2019) showed All the groups exhibited improvements in all the clinical parameters after 6 months. Inter-group comparison of GI, CAL and PPD parameters revealed no statistically significant differences. Radiographic changes in the group of 1% metformin with PRGF revealed statistically significant differences compared with other groups; however, there were no statistically significant differences in other groups.

**Discussion**

In animal studies (Xinyi Zhou 2019., Aline De Sousa 2018., Deepak Kumarkhajuria 2017.)

In this study (Xinyi Zhou 2019.) A range of techniques were carried out in this study: microCT, western blotting and immunofluorescence were used to analyze periodontal tissues. We found that metformin treatment can robustly ameliorate periodontal infection and tissue destruction and reduce blood glucose and serum IL-1β levels in mice with diabetic periodontitis. Moreover, gingival tissue exhibited less macrophage infiltration and decreased expression of Nek7, NLRP3, caspase-1 and mammalian target of rapamycin (mTOR), which were simultaneously observed in RAW 264.7 cell models stimulated with metformin. CMIDF might play a role in limitation of periodontitis and alveolar bone loss Therefore, it can be speculated that themetformin and chitosan are compatible and can be formulated into films. Micro-CT results by demonstrating that treatment with CMIDF increased the alveolar bone formation and suppressed periodontitis induced alveolar bone destruction. Metformin invigorates bone growth and bone mineralization by initiation of osteogenesis via osteoblasts aside from restraining osteoclastic resorption.

In human studies (Shabnam 2019., Ida G Kurian 2017., Dileep P 2017). This study (Shabnam 2019) was conducted on patients with moderate chronic periodontitis with two walled intra-bony periodontal defects. The study groups consisted of open flap debridement/metformin/PRGF/metformin + PRGF. Results showed that use of MF with PRGF was effective in improving the level of the clinical parameters, though both RSV and MF possess anti-inflammatory and osteoplastic properties only RSV has an inhibiting action on osteoclastogenesis.

**Conclusion**

Metformin is an effective medicament in improving the outcomes of surgical and non-surgical periodontal therapy. Nevertheless, in 100% of the RCTs, local intra-bony administration of MF resulted in better clinical and radiographic parameters. However, owing to the lack of histological and bacterial studies and short follow-up periods of reported studies, there is risk of bias in the RCTs and long-term efficacy of metformin in the treatment of intrabony defects is not yet ascertained. Further research is required to investigate long-term efficacy of metformin for chronic periodontitis management.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Pharmacovigilance, Adverse Drug Reactions and Future Aspects of Pharmacovigilance in India: A Review Article

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Abstract

Pharmacovigilance is useful to reassure the safety of drugs and protecting the consumers from their injuries effects. A number of single drugs as well as fixed dose combinations have been banned from manufacturing, marketing and distribution in India. An important issue about the availability of banned drugs over the counter in India is that sufficient adverse drug reactions data about these drugs have not been reported. The most common categories of drugs withdrawn in the last decade were non steroidal anti inflammatory drugs (28%), antidiabetics (14.28%), antiobesity (14.28%), antihistamines (14.28%), gastroprokinetic drugs (7.14%), breast cancer and infertility drugs (7.14%), irritable bowel syndrome and constipation drugs (7.14%) and antibiotics (7.14%). Drug withdrawals from market were made mainly due to safety issues involving cardiovascular events (57.14%), liver damage (14.28%), and carcinogenic reasons. Majority of drugs have been banned since 3-5 years in other countries but are still available for sale in India. The present study says about how to manage adverse drug reactions and to prevent it in advance and provides implications for developing a system that can ensure the safety and efficacy of drugs in India. There should be a multidisciplinary approach towards drug safety that should be implemented throughout the entire duration spanning from drug discovery to usage by consumers.

Keywords: Pharmacovigilance, Adverse drug reaction, drug safety, multidisciplinary approach.

Introduction

Almost all healthcare students enter clinical practice immediately after graduation and are required to prescribe, distribute, administer, and/or monitor drugs on a day to day basis1-2. The need to perform these duties effectively and to ensure the safe use of drugs, healthcare students (especially in medicine, pharmacy, dentistry, and nursing) should know about minimum set of pharmacovigilance before they graduate and start clinical practice3. For seeing, recollecting, managing, and reporting adverse drug reactions (ADRs) are an important part of safe prescribing and are integrated into steps of the WHO- Guide to Good Prescribing. Our healthcare curricula often teach little on pharmacovigilance and ADR reporting. Many studies have expressed concern about the lack of healthcare professional competencies in pharmacovigilance. This lack of education and training in pharmacovigilance is related with the low level of knowledge, skills, and actions seen not only in physicians but also in practicing pharmacists, dentists, and nurses2. In spite of the emergency of this problem, every year millions of drug users experience ADRs ranging from minor discomfort to hospitalization, permanent disfunction, or even loss of life. ADRs are the reason for 3.0–6.5% of all hospital admissions, 0.15% of all deaths, and could have been prevented in 47– 72% of cases by excellent pharmacological and pharmacovigilance skills and knowledge. Pharmacovigilance centers have a main role in spreading knowledge of present pharmacovigilance. The data available are mostly dependent on reports after marketing, which is important for recognising previously unidentified, uncommon, or very serious ADRs.
What is pharmacovigilance?: Pharmacovigilance is defined as “the pharmacological science relating to the recognition, assessment, understanding and prevention of adverse effects, particularly long term and short term adverse effects of medicines.” Pharmacodynamic effects are the characteristic drug effects that are important to know for treating diseases. Pharmacodynamic effects are recorded in animal studies then in Phase I and Phase II studies in human beings and finally in Phase III clinical trials. Provided the dosage is enough, they occur in all individuals. During the development of drug, the pharmacodynamic effect that is of greatest clinical application is found. Phase III trials are structured to measure the selected pharmacodynamic outcome (in the examples above, efficacy against gout or analgesia). These results are used by regulatory agencies to define the clinical indications of the medication. Side effects branch from recorded pharmacological properties of the medication that is present in addition to the selected pharmacodynamic effect. Side effects may be beneficial or harmful.

Pharmacovigilance in India: According to the 2011 census, India is the second highest populated country in the world with over 1.21 billion people. The pharmaceutical industries present in India is valued at 18,000 million dollars and its growth is estimated at the rate of 12-14% per year. Pharmaceutical exports are also raising at 25% compounded annual growth rate (CAGR) every annum. On a global scale, India is being viewed as an emerging country of clinical trials, medicine discovery, research and development. Immediately reporting by healthcare professionals is the most important step for preventing or reducing ADRs. The ADR reporting rate in India is below 1% in comparison to the worldwide rate which is 5%. One of the reason for lower rate in India might be attributed to the awareness about pharmacovigilance and ADR monitoring among the Indian healthcare professionals.

National pharmacovigilance program of India: The national pharmacovigilance program (NPP) was established by the Ministry of Health and Family Welfare in New Delhi in the year 2010 as a reason to gather ADR reports throughout India. The NPP comprises of a national coordinating center that gets ADR information from individual pharmacovigilance centers about the cause, source and the personnel involved in an adverse drug event via a vigiflow software interface operated by Uppsala Monitoring Center.

Causes of failure of implementation of pharmacovigilance in India: Many newer medications is being introduced in our country, so there is a need to improve the pharmacovigilance system in order to prevent the Indian population from potential harm that may be caused by some of the new medicines. Moreover, there are numerous issues and problems that have prevented building a robust pharmacovigilance system, which are described below:

1. Pharmacovigilance systems are not well-funded and properly systematized for a highly populated country like India to provide service to patients and the public.
2. The data collected to date in the zonal centers from various peripheral centers is mostly poor and not well-analyzed. Research on ADRs is inadequate in India, so the exact incidence of specific ADRs is not known.
3. Healthcare professionals involvement and knowledge and motivation for pharmacovigilance is negligible. We need a little encouragement from the department of health to provide more training and to create more awareness for better reporting.
4. There are several consumers groups in our country who encourage patients to report any adverse reactions encountered by them, but there is no information for patients to report to ADRs directly.

Adverse Drug Reactions: Adverse drug reactions (ADRs) are harmful effects of medications that lead to large-scale morbidity and mortality in developed countries. However, there is inadequate research on ADR presence in developing countries like India. A few studies have examined the outcomes of ADRs mainly by seeing the hospital readmissions. Serious ADRs are reported in 6.7% patients on an average in our country. Involvement of healthcare and the number can be as high as 8% in rural South India. In South India ADRs are reason for 0.7-3.4% hospital admissions, 3.7% hospital readmissions and 1.3% mortality.

Adverse drug reactions (ADRs) may cause serious health problems which can lead to drug-related hospitalizations. To increase knowledge and awareness about ADRs among healthcare professionals, more education in the field of ADRs and pharmacovigilance (PV) is needed.

ADRs fall into four categories: Category A
(“Augmented”) effects which reflect augmentation of the pharmacodynamic properties of the drug (e.g. sedation with a muscle-relaxing benzodiazepine)\(^2\)

Category B (“Bizarre”) effects which are unrelated to known pharmacodynamic properties (e.g. unwanted allergic reactions), \(^2\)

Category C (“Continuous”) effects which occur in the long term (e.g. pharmacological dependency or rebound effect)\(^2\)

Category D (“Delayed”) effects which occur after discontinuation of medication (e.g. cancer, birth defects, or impaired reproductive capability). Pharmacovigilance is the study of ADRs.\(^2\)

A serious adverse event (SAE) is any unexpected medical manifestation, that at any dose: \(^3-4\)

• Which results in death
• Which threatens the life of an individual (well-defined as an event in which the subject was at risk of death at the time of the event)
  • Which requires in-patient hospitalization or causes prolonged hospitalization
• Which results in persistent or significant disability/incapacity
• Which causes a congenital anomaly/birth defect
• Which results in an important medical event (defined as a medical event(s) that may not be immediately lifethreatening or result in death or hospitalization but, based upon suitable medical & scientific judgment, may require intervention to prevent one of the serious outcomes as listed above).

Understanding the Importance of PV: We must also need knowledge about the extent of drug-induced harm at a population level, which can be visualized using drug-related hospital admissions and with historical examples of drug-induced disasters such as limb deformities following maternal use of thalidomide. These examples gave rise to the present-day regulatory framework and the way in which the safety monitoring of drugs is organized. \(^2\)

Food–drug interactions may influence drug absorption or drug metabolism; for example, grapefruit juice inhibits drugs metabolized by cytochrome P450 (CYP)-3A4\(^4\). Information about these risk factors is generally available in drug labelling, treatment guidelines and medical literature, which healthcare workers must learn to use and interpret. \(^2\)

Recognizing ADRs: It is important that healthcare workers know how to recognize symptoms of ADRs in patients. Identifying ADRs can be difficult, because sometimes they are hard to distinguish from underlying diseases or comorbidity. This comes the need for knowledge of clinical pharmacological principles of ADRs, such as types of ADRs, dose-relatedness, pharmacological actions, hypersensitivity reactions, time relationship and risk factors. Training in clinical reasoning with a focus on causality reasoning is important to differentiate a suspected ADR from other medical conditions or background incidence. \(^2-3\)

Observations of ADRs and framing individual treatment plans for managing ADRs will strongly contribute to the development of awareness of the impact of ADRs in patients and on the importance of PV at a population level.\(^2-3-4\)

Managing ADRs: Patients who experience an ADR need special and individual care. Furthermore, ADRs may negatively influence a patient’s compliance with therapy. Actions for treatment include drug discontinuation, dose adjustment or additional treatment of the symptoms. Sometimes, alternative treatment for the initial disease should be chosen. After experiencing a severe ADR, patients might fear for any drug treatment in general. Healthcare workers need the skills and knowledge to classify an ADR and the capability to respond when they come across serious or severe ADRs, which can be difficult. \(^2-3-4\)

Communication skills are also needed to better explain safety data to colleagues and patients and encourage and understand feedback from those involved in PV.\(^2\)

Healthcare workers should furthermore develop the ability to explain ADRs to patients and their families, advising about which drug to use and which drug not to use to avoid the chances of the ADR recurring. \(^2-3-4\)

At last, relevant elements of the ADR must to be recorded properly into the patient’s healthcare record. \(^2\)
Reporting ADRs: Beyond the awareness of ADRs in individual patients, PV also focuses on the improvement of public health regarding the safe use of drugs. Healthcare workers need to understand that information on ADRs before marketing phase. Healthcare professionals have an important duty to share their clinical experience in the real world with regulatory authorities. Spontaneous reporting systems continue to be an effective method of signal detection. ADR reports from Healthcare professionals and patients often trigger the detection of potential new medicines safety signals. They improve general information about ADRs. Reporting an ADR to PV centers or other relevant organizations is a skill that can be developed easily during clinical internships.2

Summary of the key aspects and content of the World Health Organization pharmacovigilance

Future aspects of pharmacovigilance in India:
An appropriately working pharmacovigilance system is essential if drugs are to be used safely. It will provide advantage for all parties including healthcare professionals, regulatory authorities, pharmaceutical companies and the consumers. It helps pharmaceutical companies to continuously monitor their drugs for risk and to devise and implement the effective risk management plans to save their medicines in difficult situations.2

Having considered the problems and challenges facing the development of a strong and healthy pharmacovigilance system for India, the following proposals might be follows:

1. Building and maintaining a strong and healthy pharmacovigilance system.
2. Making pharmacovigilance reporting compulsory and introducing pharmacovigilance inspections.
3. High-level discussions are to be conducted with various stakeholders.
4. The office of drug control general of India must to be strengthen with trained scientific and medical assessors for pharmacovigilance.
5. To create a single country-specific adverse event reporting form to be used by all.
6. To create a clinical trial and post marketing database for SAEs and ADRs for signal detection and access to all related data from various stakeholders.
7. To create a list of all new drugs/indications by maintaining a standard database for every pharmaceutical company.
8. To Educate and train medical students, dentists, pharmacists and nurses in the area of pharmacovigilance.
9. To collaborate with pharmacovigilance organizations with advancements in information technology in enhancing drug safety, there has been the emergence of new opportunities for national and international collaborations that can enhance postmarketing surveillance programs and increase drug safety.
10. To build a network of pharmacovigilance and pharmaco epidemiologists in India.

Conclusion

If all healthcare professional including physicians, dentists, nurses, pharmacists and others including the patient report all ADRs which will help regulatory authority to take action as soon as possible, and drugs which are banned worldwide will also be not available in India too. The importance of encouraging physicians, dentists, pharmacists, other health-care professionals, and patients to continue to report serious suspected adverse drug reactions, whether unknown or known, to manufacturers and their local regulatory agencies cannot be made to much. Drug development is becoming increasingly difficult. Continued attrition of potentially useful drugs because of serious untoward effects will not help. Careful premarketing screening helps in reducing the problem but may also reduce the number of potentially useful drugs available for full development and subsequent licensing. Better risk management strategies are needed to handle problems when they come, by means other than revocation of licenses.4-5

Pharmacovigilance systems are needed to safeguard public health. Unusually small prominence has been put into engendering information that can assist a healthcare professional or a patient in medication decision-making processes. The collecting and dissemination of this information is a chief goal of Pharmacovigilance. Pharmacovigilance method must be capable to designate which patients are at risk from medication use. A suitably working Pharmacovigilance system is important if medicines are to be used intelligently. It will be of great advantage for healthcare professionals, regulatory
authorities, pharmaceutical companies and consumers to monitor medicines for risk.4-5

**Ethical Clearance:** Not required since it is a review article.

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Oral Mucosal Lesions among Tobacco Users in Chennai, Tamil Nadu: A cross sectional study

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Abstract

Background: Oral cancer is eighth most common cancer worldwide. They may arise from potentially malignant disorders. The etiology of Oral cancer is multifactorial, the most common among those are the effects of tobacco usage. The tobacco is used in various forms in our country. Tobacco chewing and smoking are associated with oral mucosal lesions such as Leukoplakia, Oral submucous Fibrosis which are potentially malignant lesions. This study was aimed at identifying the prevalence of these oral mucosal lesions and to motivate the tobacco users about the various deleterious effects associated with tobacco and to help them to quit their habits.

Aim: The aim of this study is to determine the prevalence of oral mucosal lesions among the tobacco users in Chennai.

Materials and Method: The study sample was randomly selected and comprised 1483 patients attending the Department of Oral Medicine and Radiology, Sree Balaji Dental College and hospital, Chennai between January 2017 and December 2018. The ages ranged from 18 to 65 years and are tobacco users were eligible to participate in the study. The data collected was tabulated in Microsoft Excel and further analysed using SPSS Version 21.0 (IBM), software for statistical analysis.

Results: A total of 1483 patients were examined to diagnose the lesions associated with the use of tobacco. The most frequently seen lesion was Smokers Melanosis [921(62.1%)], followed by Frictional Keratosis [696(46.9%)], Periodontal Inflammation [551(37.2%)], Leukoedema [304(20.5%)], and Stomatitis Nicotina Palatini [160(10.8%)].

Conclusion: The overall prevalence of potentially malignant disorders have slight variations when compared to other studies. This may be due to difference in habits, duration and frequency of use.

Keywords: Tobacco smokers; Tobacco Chewers; Oral Lesions.

Introduction

Oral cancer is eighth most common cancer worldwide. The oral cancer may arise from potentially malignant disorders. Potentially malignant disorders are those disorders where not all lesions and conditions described under this term may transform to cancer, instead there is a morphological alteration among which
some may have an increased potential for malignant transformation. Oral cancer is multifactorial and it depends on individual response to these factors. The most common risk factor is tobacco use both smoking and chewing, separately or in conjunction with betel quid chewing and alcohol drinking.

The etiology of Oral cancer is multifactorial, the most common among those are the effects of tobacco usage. Tobacco usage has become one among the five greatest risk factors for mortality. Tobacco consumption in India is a major risk factor responsible for oral and oropharyngeal cancer. The tobacco is used in various forms in our country. It can be either smoking tobacco like cigarette, beedi, hookah, and other pipes like chillum, chutta, dhumti, cherrot and cigar or smokeless tobacco like chewing plain tobacco, khaini, zarda, kiwam, bajar/tapkheer (dry snuff), masheri/mishri, and gutka. Among all the forms the most commonly used is chutta and cigarette. Smokeless Tobacco users chew the tobacco in the mouth and spit out the juice that builds up. Nicotine and other constituents in tobacco are absorbed in the lining of oral cavity. There are many chemical constituents present in smokeless tobacco which are carcinogenic in nature, among which nitrosamine is the most prominent. The consumers are not aware of the harmful effects associated with tobacco use and it has been reported that they are consumed for some beneficial effects, such as mouth freshening, aids in digestion, killing of germs, astringency, mood enhancement, tension relief, and oral cleaning. Initially, tobacco usage leads to keratotic or hyperkeratotic changes in the oral cavity which is related to duration and site of tobacco placement. Tobacco chewing and smoking are associated with oral mucosal lesions such as Leukoplakia, Oral submucous Fibrosis which are potentially malignant lesions.

The aim of this study is to determine the prevalence of oral mucosal lesions among the tobacco users in Chennai and to motivate the tobacco users about the various deleterious effects associated with tobacco and to help them to quit their habits.

**Materials and Method**

**Study design:**

A cross sectional study: Study Population: Patients attending the Out Patient Department in Sree Balaji Dental College and Hospital. Individuals in the age group of 18 to 65 years, including both genders who are tobacco users are included in this study.

**Sample selection:** The study was carried out from January 2017 to December 2018. The study sample was randomly selected which consists of total sample size of 1483 patients who were tobacco users (Smoking and Smokeless Tobacco). The study was approved by Institutional Ethical Committee and was done as per the ethical guidelines.

**Data collection:** All the patients were informed about the study and an informed consent was obtained from the patients. A detailed case history was taken following which they were asked about their tobacco habits which include forms of tobacco, duration, frequency, site of placement, duration of contact with the mucosa. Clinical Examination of hard and soft tissues was done using mouth mirror and gauze under proper illumination. Examination was done by two examiners separately and the size, site, consistency, colour of the lesion were recorded. If the lesion is found to be premalignant/malignant, biopsy was done for confirmatory diagnosis and reports were recorded. Those patients whose results were positive were referred for further definitive treatment.

The data collected was tabulated in Microsoft Excel and further analysed using SPSS Version 21.0(IBM), software for statistical analysis.

**Results**

The study included a total sample of 1483 subjects with a mean age of 32.4 years. About 908 (61.2%) were males and 575 (38.8%) were females. About 1068 (72%) were south Indians. The majority of participants 1112 (75%) were of urban origin. Only 522 (35.2%) were educated, 1290 (87%) were of lower socioeconomic income group. In regards to the tobacco use, Smoking tobacco users were 860 (58%), Smokeless tobacco users were 460 (31%) and those who consume both smoking and smokeless tobacco users were 163 (11%). Among the smoking forms, Beedi was most common (62%), Cigarettes [249 (29%)], Chuttas [69 (8%)] and Hookah [9 (1%)]. Among the Smokeless forms, Raw tobacco was most common [235 (51%)], Pan Masala were [87 (19%)], Gutkha were [51 (11%)], Khaini and Mishri were [32 (7%)], Mawa were [32 (7%)] and other forms (Rajinigandha, Hans, Pan Parag) were [32 (7%)].
Table 1. Soft tissue lesions prevalent in the oral cavity

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Pseudomembranous Candidiasis</td>
<td>12(0.8%)</td>
</tr>
<tr>
<td>Angular Chelitis</td>
<td>64(4.3%)</td>
</tr>
<tr>
<td>Hypertrophy of Papilla of tongue</td>
<td>129(8.7%)</td>
</tr>
<tr>
<td>Bald Tongue</td>
<td>16(1.1%)</td>
</tr>
<tr>
<td>Fissured Tongue</td>
<td>122(8.2%)</td>
</tr>
<tr>
<td>Median Rhomboid Glossitis</td>
<td>21(1.4%)</td>
</tr>
<tr>
<td>Frictional Keratosis</td>
<td>696(46.9%)</td>
</tr>
<tr>
<td>Tobacco pouch Keratosis</td>
<td>52(3.51%)</td>
</tr>
<tr>
<td>Periodontal Inflammation</td>
<td>551(37.2%)</td>
</tr>
<tr>
<td>Leukoedema</td>
<td>304(20.5%)</td>
</tr>
<tr>
<td>Smokers Melanosis</td>
<td>921(62.1%)</td>
</tr>
<tr>
<td>Stomatitis NicotinaPalatini</td>
<td>160(10.8%)</td>
</tr>
<tr>
<td>Traumatic Ulcer</td>
<td>95(6.4%)</td>
</tr>
<tr>
<td>Parulis</td>
<td>30(2.05%)</td>
</tr>
<tr>
<td>None of the oral lesion</td>
<td>90(6.1%)</td>
</tr>
</tbody>
</table>

Table 2. Potentially malignant lesion and Malignant lesions prevalent in the oral cavity

<table>
<thead>
<tr>
<th>Potentially Malignant Lesion and Malignant lesion</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people without Potential Malignant Lesion and Malignant lesion</td>
<td>1325</td>
<td>89.4%</td>
</tr>
<tr>
<td>Leukoplaikja</td>
<td>81</td>
<td>5.5%</td>
</tr>
<tr>
<td>Erythroplakia</td>
<td>17</td>
<td>1.17%</td>
</tr>
<tr>
<td>OSMF(Oral Submucous Fibrosis)</td>
<td>35</td>
<td>2.34%</td>
</tr>
<tr>
<td>Lichenoid Reaction</td>
<td>13</td>
<td>0.87%</td>
</tr>
<tr>
<td>Oral Squamous Cell Carcinoma</td>
<td>12</td>
<td>0.87%</td>
</tr>
</tbody>
</table>

Table 1 shows the findings of soft tissue lesions found after intraoral examination. It is found that majority of the study group had at least one soft tissue lesion and few had more than one soft tissue lesion and few didn’t have any oral lesion. About more than half the study group were present with Smokers Melanosis [921 (62.1%)] (Figure 1) followed by Frictional Keratosis [696 (46.9%)], Periodontal Inflammation [551 (37.2%)], Leukoedema [304 (20.5%)] and Stomatitis NicotinaPalatini [160 (10.8%)] (Figure 2).
Figure 6 shows Oral Squamous Cell Carcinoma of buccal mucosa and floor of the mouth

Table 2 shows prevalence of Potentially malignant lesion and Malignant lesions among which [1325 (89.4%)] patients showed no signs of Potential pre malignant lesion and Malignant lesions,81(6.15%) showed Leukoplakia,35(2.34%) showed OSMF(Oral Submucous Fibrosis) (Figure4),17(1.17%) showed Erythroplakia(Figure5),12(0.87%) showed Oral Squamous Cell Carcinoma (Figure6).

Discussion

Various case–control studies and two cohort studies were conducted among tobacco users and it was reported that there is increased risks for oral cancer for betel-quid chewing with tobacco. There was also a strong dose–response relationship for frequency and duration of tobacco use12.

The present study is a original research conducted in Sree Balaji Dental College and Hospital for assessing oral mucosal lesions, potentially malignant lesions or malignant lesions associated with tobacco use. Results showed the gender distribution with a higher percentage in males 908(61.2%) than females which is similar in ratio compared to other studies conducted in India (T.R Saraswati et al13). The most common form of tobacco use is smoking tobacco among which beedi[533 (62%)] is most commonly consumed.

On clinical examination, patients had oral mucosal lesions(93.9%) who were present with a wide range of lesions shown in table 1 & 2 which is higher than the prevalence among rural Indians by Bhowateet al(49.9%)14. This difference can be due to the variations in the study population surveyed that is a hospital-based study with mixed population and differences in the pattern and duration of habits. Smokers Melanosis [212 (62.1%)] was most commonly seen oral mucosal lesion which is present in more than half the study group.

Leukoplaikia was reported to be 81(5.5%) which is similar other studies15,16. Some studies show that 13.6% of smokers is associated with leukoplaikia17. While few others studies says there is no relation between leukoplasia and smoking18. The present study shows a statistically significant relation is seen between tobacco use and leukoplia. Oral submucous fibrosis is seen in 35(2.34%) which is similar to that seen in other studies15. Oral Squamous Cell Carcinoma was seen in 12(0.87%) of the study group which is attributed to the prolonged duration of habits and frequency of use.

Conclusion

We found overall prevalence of potentially malignant disorders in tobacco users have slight variations in our study when compared to other studies. This may be due to difference in habits, duration and frequency of use. Similar studies should be conducted with wider samples in different regional population across India and among the world with similar protocols to identify the various prevalence rates. With the wider data various tobacco control programs should be implemented so as to create awareness among the public regarding the deleterious effects of tobacco use and to implement various tobacco cessation programmes.

Acknowledgements: We would like to thank the Department of Science & Technology, India for the instrumentation facility provided through Fund for Improvement of Science & Technology (FIST)(SR/FST/College -2017/23).

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

Source of Funding: Nil

Conflict of Interest: Nil

References


12. IARC MONOGRAPH VOLUME 85


Sialolithis a Cause for Sialadenitis: A Case Report

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Abstract

Swelling of neck always have a wide range of differential diagnosis. Salivary glands are group of organs that secretes saliva which helps in normal functioning of the oral cavity. Many conditions affect the salivary gland because of its size and location. Sialadenitis is the inflammatory condition of the salivary gland which is commonly encountered yet infrequently discussed topic. Sialoliths are calcified organic matter that forms with in the secretory system of the major and minor salivary glands. Sialolithiasis is one of the major causes for sialadenitis which has been shown in many studies. Here we have discussed about a swelling which was present in the right submandibular region with a duration of 3 weeks for which OPG, Lateral Ceph and Ultrasound has been taken for finalising the diagnosis.

Keywords: Sialolithi, OPG, Parotid, Submandibular.

Introduction

Salivary glands are group of organs that secretes saliva which helps in normal functioning of the oral cavity. Many conditions affect the salivary gland because of its size and location. Sialadenitis commonly encountered yet infrequently discussed topic. Old age, debilitated and dehydrated patients are more prone to this disease¹. Sialadenitis may be caused by bacterial or viral infection, radiation, allergic reactions, trauma and autoimmune disorders². It can be of acute, chronic or recurrent.

Sialolithiasis is the formation of calculi in the salivary gland. It is both a cause and a consequence of chronic recurring sialadenitis. These commonly measure between 5 and 10 mm in size and all stones over 10 mm can be reported as sialoliths of unusual size and giant sialoliths measuring more than 35 mm are rare³. Since the glands are encapsulated, there is little space for expansion and enlargement that causes pain and discomfort⁴. Here is a case of sub mandibular siladenitis and intra ductal sialolith causing pain in the neck region.

Case Report: A 58 year old male patient came to the department of Oral Medicine and Radiology with a complaint of swelling in the right side of neck region for past 3 weeks. History revealed that he had pain in neck for past 1 week followed by a sudden onset of swelling, where it gradually increased in size to attain the present size. There was mild pain on touching the swelling and the pain got subsided on medication but the swelling did not reduce in size.

Image 1: Image showing swelling seen in the right sub mandibular region.
On general examination patient had normal gait, posture and was well oriented, conscious and moderately built. There was no evidence of pallor, icterus, cyanosis and clubbing. Patient’s medical history was unremarkable.

There was a diffuse solitary swelling seen in the right submandibular region which was about 4x3 cm in size approximately and the colour of skin over the swelling was normal. The surface of the swelling was smooth and margins and edges were ill defined. Pulsation and movement of the swelling on swallowing was absent. On palpation the swelling was firm in consistency, tender and mobile.

Intra oral examination revealed dental caries in relation to 36 and 47 and generalized periodontitis.

On correlation with history and clinical examination a provisional diagnosis of **right submandibular lymphadenitis and a differential diagnosis of Chronic Submandibular Sialadenitis** were made.

The investigatory work up included complete hemogram, intra oral radiographs, orthopantomogrph, Lateral cephalograh and ultrasonography. Routine hematological investigations were within normal limit. OPG and Lateral cephrrevealed a radiopaque structure seen on the right side angle of the mandible which was about 4x3 cm in size of oval shape and with a well defined periphery and smooth borders. The internal structure was completely radiopaque. There was also a radiopaque structure seen in the periapical region of 33. The IOPA and Occlusal radiographs showed no abnormalities.

Ultrasound of the neck showed right submandibular gland was enlarged in size and measures 3.3x2.2cm. The duct was also dilated measuring 4mm and shows 2 calculi within it, each measuring 13mm and 6mm in size.

The final Diagnosis was given as **Sialadenitis of right submandibular gland with intraglandular and intra ductal sialolith and** the patient were referred to the department of Oral Maxillofacial surgery for the management of removal of calculi.
Salivary gland diseases most commonly affect Parotid and submandibular salivary glands. Formation of calculi, inflammatory swelling of the salivary gland is very common these days. Sialoliths are calcified organic matter that forms within the secretory system of the major and minor salivary glands. The exact etiology and pathogenesis of salivary calculi is unknown. Most accepted retrograde theory proposed for sialolithiasis says, retrograde flow of substances or bacteria within the oral cavity into the salivary ducts lead to the formation of organic nidus that further shows calcification. Salivary stasis, increased alkaline nature of saliva, infection or inflammation and physical trauma to salivary duct or gland may predispose to calculus formation. It is difficult to determine since many cases are asymptomatic and very painful, due to its severity in pain and characteristics swelling, clinicians may tend to confuse with odontogenic infections and diseases. Studies have indicated that 92% of sialolithiasis occur in the submandibular gland, 6% in the parotid gland, and 2% in both the sublingual and minor salivary glands. Our case stands for this. Sialolithiasis one of the major causes for sialadenitis which has been shown in many studies.

Sialadenitis is the inflammatory condition of the salivary gland. This predominantly affects the Parotid and Submandibular salivary gland. Clinically, submandibular sialadenitis differs from parotitis mainly in the site of the swelling and discharge of pus from Wharton’s duct. A wide variety of bacteria has been incriminated, but *Staphylococcus aureus* has been the most frequently reported isolate. The other isolated organisms have included streptococci, *Pseudomonas aeruginosa*, *Escherichia coli* and *Moraxella catarrhalis*. During an acute inflammatory process, there is swelling of the affected gland, overlying pain, gland tenderness, fever, and on occasion difficulty in opening the mouth. Often the pain is intensified with eating in that food ingestion stimulates saliva flow, which will typically cause the gland to swell and thus exacerbate the pre-existing symptoms. In chronic gland disorder, the symptoms are similar, although much less intense.

**Conclusion**

The differential diagnosis of masses of lymph nodes or the submandibular salivary gland origin can be considered for swelling in the submandibular region. A careful history taking places a vital rule along with bimanual, intraoral and extraoral palpation is the first step in diagnosing and distinguishing between the masses of the submandibular gland and the nonsubmandibular gland origin.

**Ethical Clearance:** Not required since it is a case report.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**


Novel Oral Anticoagulants: A Review

Manigandan Thiruppathy1, Pavani D.2, Amudhan A.3, Sarumathi T.A.3, Hemalatha V.T.4

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Abstract

Dentists come across various medically compromised patients. Patients who are under anticoagulant and/or antiplatelet drugs should be taken into consideration as they are at a high risk to have increased bleeding tendency during minor oral surgical procedures. The substances, which prevent or prolong coagulation of blood, are called Anticoagulants1. The most commonly used medications for oral anticoagulant therapy are Warfarin, Aacenocoumarol. The novel oral anticoagulants (NOACs) or directly acting oral anticoagulants [DOACs] were developed with more pharmacokinetic and pharmacodynamic relationships, faster onset of action, and fewer potential interactions. The Novel anticoagulants include Dabigatran Rivaroxaban, Apixaban.

Keywords: Novel Anticoagulants, Dabigatran, Apixaban.

Introduction

Dentists come across various medically compromised patients. Among those, the number of patients who are under anticoagulants are constantly increasing. As dentists commonly perform minor oral surgical procedure in a outpatient setup. Patients who are under anticoagulant and/or antiplatelet drugs should be taken into consideration as they are at a high risk to have increased bleeding tendency during minor oral surgical procedures. Achieving hemostasis should be our primary goal. Managing such patients is a challenge for dental professionals. So, as a dentist we should have a thorough knowledge on mechanism of hemostasis, management of such patients and various anticoagulants which are used including the new orally administered anticoagulants.

The substances, which prevent or prolong coagulation of blood, are called Anticoagulants1. Blood clotting is natural response towards damage of blood vessels from injury or invasive procedures. Platelets in the blood are activated locally, resulting in an increased tendency to attach to each other and to the endothelium of the damaged blood vessels. At the same time, a cascade of reactions is initiated that converts inactive coagulation factors to their active forms, ultimately leading to the production of protein fibrin, the activated cross-linking form of fibrinogen2.

There are millions of patients worldwide who are administered medications that alter homeostasis and decrease the risk for thromboembolic events3. The most commonly used medications for oral anticoagulant therapy are: Anticoagulants with indirect action (Coumarin derivatives) which include Aacenocoumarol, Warfarin sodium. Warfarin interacts with many commonly used medications (notably non-steroidal anti-inflammatory drugs - NSAIDS and antibiotics) and some foods (green vegetables, grapefruit juice and Cranberries)3,4. Depending on the reason for the anticoagulation therapy (cardiovascular thromboembolic risk), the patient’s target INR therapeutic ranges may differ. Patients with atrial fibrillation or stroke have...
a target INR of 2.0 to 3.0, whereas after undergoing cardiac valve replacement surgery, patients have a target range of 2.5 to 3.5.5,6

There has been a need for a more convenient oral anticoagulant, which does not require frequent monitoring. Several alternative anticoagulants have been developed and have undergone large-scale clinical trials to ascertain efficacy and safety. These trials have shown that the new anticoagulants to be as, or more, effective than warfarin.7,8 The novel oral anticoagulants (NOACs) or directly acting oral anticoagulants [DOACs] were developed with more pharmacokinetic and pharmacodynamic relationships, faster onset of action, and fewer potential interactions. The Novel anticoagulants include Dabigatran, Rivaroxaban, Apixaban, Edoxaban.

Discussion

The mechanism of action of anticoagulants and pharmacokinetic and pharmacodynamics properties are explained in figure 1 and table 1

![Mechanism of Action of Anticoagulants](image)

Figure 1: Mechanism of Action of Anticoagulants

<table>
<thead>
<tr>
<th>Table 1: Pharmacokinetic and Pharmacodynamics properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Half-Life</strong></td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td><strong>Direct thrombin inhibitors</strong></td>
</tr>
<tr>
<td>Dabigatran</td>
</tr>
<tr>
<td><strong>Direct Factor Xa inhibitors</strong></td>
</tr>
<tr>
<td>Rivaroxaban</td>
</tr>
<tr>
<td>Apixaban</td>
</tr>
<tr>
<td>Edoxaban</td>
</tr>
</tbody>
</table>
Dabigatran Etxilate (Pradaxa): Dabigatran Etxilate (Pradaxa) is absorbed as a pro-drug with a bioavailability of 6%. It is subsequently converted into its active form by circulating esterase. Elimination is 80% renal, which has to be taken into account when the drug is given to patients with impaired renal function. Its half-life is 14–17 hours; therefore it is given twice daily. The recommended dose is 150 mg taken orally, twice daily for patients with creatinine clearance (CrCl) > 30 mL/min and 75 mg twice daily for patients with CrCl 15-30 mL/min. Dabigatran is a drug that is a viable alternative to warfarin in the prophylactic treatment of stroke and systemic embolism in patients with atrial fibrillation.

Patients treated with dabigatran can undergo invasive dental procedures without altering the dose of the medication. The dentist should consult the patient’s physician to plan the procedure, and confirm whether the patient will continue with the same dose after surgery in order to prevent thromboembolism, as well as, excessive bleeding.

Rivaroxaban: It is Factor Xa inhibitor that blocks FXa both in its free and prothrombin-bound states. It has a half-life of 7–11 hour requiring once- or twice-daily dosing, and a dual mode of elimination, with two-thirds of the drug being metabolized by the liver and one-third eliminated unchanged by the kidneys.

Apixaban: Apixaban is a potent, reversible, highly selective, direct inhibitor of free and prothrombinase bound factor Xa. It is characterized by > 50% oral bioavailability, peak plasma concentrations 1-3 to 4 hours after administration, and a 12-h terminal half-life. In contrast, the elimination of apixaban is only 25% renally and 75% metabolized by the CYP3A4 (Cytochrome P450 3A4) and via the CYP-independent mechanisms of the liver. It is indicated in the prevention of venous thromboembolism (VTE) after major orthopaedic surgery, treatment of acute VTE, prevention of stroke or systemic embolism in patients with atrial fibrillation and for secondary prevention in ischemic heart disease. It has low potential for drug-drug interactions.

Edoxaban: Edoxabanis a novel, orally available, highly specific, and direct inhibitor of factor Xa.

It is rapidly absorbed with good bioavailability, a half-life of 8–10 hours, and elimination largely via the kidneys. It has demonstrated a safety and efficacy profile comparable to warfarin in Phase I and II clinical trials. In comparison with other anticoagulant medications, edoxaban shows some safety benefits and does not require constant monitoring.

There is presently insufficient evidence to directly compare the relative bleeding risks associated with the various anticoagulants medications including the newer drugs for dental patients. Various clinical trials shows that incidence of bleeding risks in patients with atrial fibrillation who are taking dabigatran, apixaban or rivaroxaban were similar or lower than for those taking warfarin.

Conclusion
The dentists should be aware of the novel oral anticoagulants and other anticoagulants, their mechanism of actions, indications, contra indications, adverse drug reactions. Nowadays lot of patients are on novel anticoagulant for their systemic illness. So thorough knowledge about the medical history and drug history of the patient is important before doing any minor or major surgical procedures to avoid complications.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References


Immunomodulators in Oral Diseases: An Update

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Abstract

Immune-mediated diseases are some of the diseases that affect the patient’s quality of daily life due to their chronic nature. Of which most of them are mucocutaneous diseases and they involve the oral cavity. The treatment of these diseases is oftentimes challenging due to their immunological nature, comorbidity, frequent relapses and long term use of medications and their complications. Immunomodulators are the most rapidly developing current trend. They are used quite often for a large number of these diseases. This article discusses some of the lesions where immunomodulatory drugs are used.

Keywords: Immunomodulators, Immunosuppressants, Immunostimulants.

Introduction

Most mucocutaneous oral disorders are mediated by cellular or humoral response against the mucosal tissues. Immunomodulators can stimulate (immunostimulators) or suppress (immunosuppressors) the immune system and thereby regulating its responses¹ Some of the indications for immunomodulators are when there’s no response to corticosteroids and when it’s contraindicated, for recurrent cases and cases resistant to steroids and cases of the previous history of severe adverse effect with steroids.²

Classification:

According to Patil US etal (2002)³:

Immunosuppressants:

<table>
<thead>
<tr>
<th>Inhibitors of Lymphocyte Gene Expression</th>
<th>Glucocorticoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibitors of Lymphocyte Signaling</td>
<td>a. Calcineurin Inhibitors-Cyclosporine, Tacrolimus</td>
</tr>
<tr>
<td></td>
<td>b. mTOR Inhibitors-Sirolimus, Everolimus</td>
</tr>
<tr>
<td>Cytotoxic Agents</td>
<td>a. Antimetabolites-Azathiprine, Mthotrexate, leflunomid.</td>
</tr>
<tr>
<td></td>
<td>b. Alkylating agents-Cyclophosphamide</td>
</tr>
<tr>
<td>Cytokine Inhibitors (Anticytokine-Antibodies)</td>
<td>a. TNF-α Inhibitors-Etanercept, Infliximab, Adalimumab</td>
</tr>
<tr>
<td></td>
<td>b. IL-1 Inhibitors-Anakinra</td>
</tr>
<tr>
<td></td>
<td>c. IL-2 Inhibitors-Daclizumab, Basiliximab</td>
</tr>
<tr>
<td>Antibodies Against Specific Immune Cell Molecules</td>
<td>a. Polyclonal Antibodies Antithymocyte Globulin (ATG)</td>
</tr>
<tr>
<td></td>
<td>b. Monoclonal Antibodies-Alemutuzmab (Anti CD-52 Antibodies), Muromunab (Anti CD-3 Antibodies, OKT-3)</td>
</tr>
<tr>
<td>Inhibitors of Immune Cell Adhesion</td>
<td>Efalizumab (LFA-1 Inhibitor)</td>
</tr>
</tbody>
</table>

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e-mail: jemijudy7@gmail.com
Inhibitors of Lymphocyte Gene Expression | Glucocorticoids
--- | ---
Tolerogens | Glucocorticoids
Miscellaneous | Rho (D) Immune Globulin

**Immunostimulants**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Bacillus Calmette-Guerin (BCG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthelmintics</td>
<td>Levamisole</td>
</tr>
<tr>
<td>Thalidomide</td>
<td></td>
</tr>
<tr>
<td>Recombinant Cytokines</td>
<td>a. Interferons (α, β, γ)</td>
</tr>
<tr>
<td></td>
<td>b. Interleukins (human IL-2)</td>
</tr>
<tr>
<td></td>
<td>c. Colony stimulating factors-[filgrastim]</td>
</tr>
<tr>
<td>Isoprinosine</td>
<td></td>
</tr>
<tr>
<td>Immunocynin</td>
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</tbody>
</table>

**Glucocorticoids:** These traditional immunosuppressants lead to reduce vasoactive and chemotactic factors, decreased lipolytic and proteolytic secretion, decreased leukocyte extravasation into inflammatory areas and so reduced fibrosis. The expression of proinflammatory cytokines (COX2 and NOS2) can also be decreased by glucocorticoids. The cytokines, IL-1, IL-6 and TNF-α activate the HPA axis to increase ACTH release and directly facilitate the glucocorticoid stimulation are reduced. Cytokine network elements include IFN-γ, GM-CSF, IL-1, IL-2, IL-3, IL-6, IL-8 and IL-12, the colony-stimulation factor and TNF-α, which will be impeded.

**Therapeutic Uses:**

**Lichen Planus:** Topical steroids are used as a mouth rinse or a gel. Drug of choice 0.05% clobetasol propionate (very potent), 0.1 % Triamcinolone acetonide, 0.05% fluocinonide, 0.1%, fluocinoloneacetonide. The reasonable approach may be to apply the drug 2-3 times a day for 3 weeks followed by tapering during the following 9 weeks until a maintenance dose of 2-3 times a week is reached.

Systemic Corticosteroids should be administered only in recalcitrant lesions 1mg/kg bodyweight for 7 days, followed by a reduction of 10 mg each subsequent day. A maintenance dose with topical steroids may be commenced during the tapering of the systemic steroids.

Intralesional Corticosteroids used to manage persistent localized lesion and lesions unresponsive to topical therapy. 10-20mg of insoluble Triamcinolone acetonide is diluted with 0.5ml saline or 2% lidocaine injected to the lesion which solubilizes gradually 3-4 times/week or 2 times/week.

**Erosive Lichen plauns:** 0.5% Clobetasol gel: Erythematos lichen planus of gingiva - After prefabricated plastic trays, steroid gels in each treatment can be used to increase the steroid concentration in the gingival tissue for 30 minutes if symptoms persist.

OSMF- Intralesional submucosal injections of a combination of dexamethasone (4 mg/ml) and 2 parts of hyaluronidase (1500 IU) diluted in 1.0 ml of 2% xylacaine twice a week.

**Recurrent Apthous Stomatitis:** Topical agents-Dexamethasone 0.05 mg/ml rinsing three times a day, Dexamethasone 0.05 mg/ml with 0.2% chlorhexidine mouthwash for rinsing thrice a day, Clobetasol ointment 0.05% in orabase (1:1), Fluocinonide ointment 0.05% in orabase (1:1) three times a day, Triamcinolone acetonide 0.1% oral paste.

Systemic corticosteroid therapy- recommended for patients with recalcitrant cases Hydrocortisone 20 mg or triamcinolone 4 mg, Prednisolone (10-30mg/day) for 10-15 days.

SLE- to obtain relief of symptoms, potent topical steroids such as clobetasol propionate gel 0.05%, betamethasone dipropionate 0.05%, or fluticason propionate spray 50 μg aqueous solution is usually required.

**Erythema multiforme - Prednisolone 0.5–1.0 mg/kg/day tapered over 7–10 days:** Stevens-Johnson syndrome & Toxic epidermal necrolysis-Intermittent administration of high doses of IV corticosteroid and cyclophosphamide, (Pulsed therapy) three daily doses of dexamethasone (100 mg) or methylprednisolone (500–1000 mg) and cyclophosphamide (500 mg) given monthly as a single dose.

**Pemphigus Vulgaris:**

Mild case- Prednisolone 40–60 mg/day: Severe case - 60–100 mg/day in for 6–8 weeks. The dose should be increased by 50–100% increments until there is control if there is no response within 5–7 days. If doses
above 100 mg/day are required, pulsed intravenous steroids could be used.

**Bullous pemphigoid:** Localized lesions - High-potency topical steroids - clobetasol or betamethasone.

Moderate disease - minimize the use of systemic steroids (daily prednisolone equivalents of 0.5 to 0.75 mg/kg) by the use of dapsone or tetracycline, doxycycline.

Extensive disease - Systemic corticosteroids used alone or combined (daily prednisolone equivalents of 0.75 to 1.25 mg/kg) with immunosuppressive drugs such as azathioprine, cyclophosphamide, mycophenolate or rituximab.

**Mucous membrane pemphigoid:** Topical drugs Fluocinonide 0.05% or clobetasol propionate 0.05% in an adhesive thrice daily for 9–24 weeks. Triamcinolone acetonide can be used intralesionally (in a dilution of 5.0–10 mg/ml) to treat isolated erosions.

Systemic corticosteroid- Prednisolone 40 mg daily for 5 days followed by 10–20 mg daily for 2 weeks.

Behcet’s disease- Prednisone is used in combination with Azathioprine.⁸

Orofacial Granulomatosis-Intralesional corticosteroids-Triamcinolone 10–20 mg per dose (intralesional with weeks to months between doses).

**Calcineurin inhibitors:**

**Cyclosporines:** It specifically & reversibly inhibits immunocompetent lymphocytes in the G0 and G1 cell cycle phase. It binds with cyclophilin then binds to and inhibits calcineurin. Calcineurin-induced dephosphorylation is required for the induction of cytokine genes activates a nuclear component of T cells that initiate gene transcription for the IL-2 formation.²

**Therapeutic Uses:** Lichen Planus- Recalcitrant cases of OLP, Mouth rinse-5 ml of medication (containing 100 mg of cyclosporine per milliliter) three times daily (i.e., 500-1500mg/day). In a bioadhesive, 100 mg/ml, added to the alcohol phase of Zilactin to a final concentration of 0.5 mg/dl.⁶

Recurrent Aphthous stomatitis-Topical cyclosporine 100mg/ml for moderate cases. Systemic cyclosporine 3 to 6 mg/kg/day for chronic cases

Bullous pemphigoid-Cyclosporine 3 to 5 mg/kg daily, is infrequently used in addition to systemic corticosteroids.

**Mucous membrane pemphigoid -100 mg/ml:** Behcet’s disease - Topical cyclosporine 100mg/ml for moderate cases. Systemic cyclosporine 3 to 6 mg/kg/day for chronic case.⁸

**Orofacial Granulomatosis -Cyclosporine A – 25 mg, oral capsule:** Sjogren’s syndrome- Prescription eye drops containing 0.05% cyclosporine emulsion may help some with ocular moisture.

Graft Vs Host Disease (GVHD)- Prophylactic therapy with immunomodulatory and immunosuppressive drugs such as cyclosporine and prednisone should be given to prevent GVHD

**Tacrolimus:** It inhibits calcineurin by interacting with FK506-binding protein-12. Inhibits lymphokine apoptosis and degranulation, Inhibits calcineurin thereby inhibits T cell activation and cytokine release. Topical tacrolimus penetrates the skin better and its 100 times more potent than topical cyclosporine.

**Therapeutic Uses:** Erosive Lichen Planus - 0.1% Tacrolimus ointment application 2-4 times a day for 4-8 weeks. Also used for refractory erosive oral LP.

Lichen Planus (LP) and erosive LP- 1% Pimecrolimus application 2-4 times a day for 4-8 weeks

**SLE- Tracolimus 2-3 mg daily:** Pemphigus Vulgaris- 0.1% tacrolimus ointment twice daily for 3 to 4 weeks

**Antimetabolites:**

**Azathioprine:**

Mechanism of action is explained in (Flow chart 1)

Following exposure to nucleophiles, azathioprine is cleaved to 6- mercaptopurine

↓

6- thio-IMP (inosine monophosphate)

↓

6- thio-GMP(guanosine monophosphate)

↓

6-thio –GTP(guanosine triphosphate)
Incorporated into DNA
↓
Disrupts DNA and RNA formation and process of cell division
↓
Suppress cell-mediated immunity

Flow Chart 1: Mechanism of Azathioprine

**Therapeutic Uses:**
- **Lichen planus** - 50 mg twice PO (2mg/kg/day) for 3-7 months, daily.
- Recurrent Aphthous stomatitis - Azathioprine – Chronic cases, are non-respondent to primary drugs. 1 to 2 mg/kg/day (100–150 mg/day), Starting with 50 mg/day and escalated up to 150 mg/day.
- **SLE** - Azathioprine 2 mg/kg/day PO with or without low-dose corticosteroids
  - Erythema multiforme - Azathioprine 100 to 150 mg/day (2mg/kg/day in those with normal thiopurine methyltransferase [TPMT] activity), Pemphigus Vulgaris - Azathioprine - 0.5–4 mg/kg depending on TPMT level.
  - Bullous pemphigoid - Azathioprine is 1 to 3 mg/kg daily
  - Mucous membrane pemphigoid - Azathioprine - 1–2 mg/kg daily depending on TPMT levels.
  - Behcet’s disease - Azathioprine – Used for chronic cases, are non-respondent to primary drugs. 1 to 2 mg/kg/day (100–150 mg/day), Starting with 50 mg/day and escalated up to 150 mg/day.
  - Orofacial Granulomatosis - Azathioprine - 2.5 mg/kg/d (125 mg)

**Methotrexate:** Prevent conversion of dihydrofolate (DHF) to trihydrofolate (THF) by inhibiting dihydrofolate reductase. THF is required in purine and pyrimidine synthesis. DNA and RNA synthesis is suppressed.

**Therapeutic uses:**
- Oral lichen planus - Methotrexate - 7.5-10 mg weekly for 8 weeks.
- Erosive Lichen planus - Methotrexate -2.5 to 12.5 mg/wk
- Recurrent Aphthous stomatitis - Methotrexate - 7.5 to 20 mg weekly is effective in severe oro-genital lesions
- SLE- Methotrexate 7.5 to 25 mg per week for 3-6 weeks
- Bullous pemphigoid- Methotrexate 10 to 50 mg weekly.
- Behcet’s disease- Methotrexate - 7.5 to 20 mg weekly has been proved to be effective in severe oro-genital lesions.
- Orofacial Granulomatosis - Methotrexate 5–10 mg administered PO weekly

**Mycophenolate mofetil (MMF):** The active form, Mycophenolic Acid (MPA), a selective potent inhibitor of inosine monophosphate dehydrogenase (IMPDH), and is an essential enzyme in the de novo pathway of guanine nucleotide synthesis that was hydrolyzed from the prodrug, MMF. This prevents the synthesis of de novo purine synthesis by inducing IMPDH, affected cells B and T cells and also selectively inhibits lymphocyte proliferation and antibody formation, cellular migration, and adhesion.

**Therapeutic uses:**
- Lichen planus- Mycophenolate mofetil- 2–4 g day.
- SLE- Mycophenolate mofetil (Induction: 1 g PO q12hr with a glucocorticoid or 2-3 g for 6 months with glucocorticoids. Maintenance: 0.5-3 g/day or 1 g PO q12hr or 1-2 g daily).
- Erythema multiforme - Mycophenolate mofetil 1000 mg twice daily
- Pemphigus Vulgaris - Mycophenolate Mofetil - 2-2.5 g/day
  - Bullous pemphigoid-Mycophenolate mofetil (1000 mg, twice daily) is given in addition to systemic steroid therapy and is stopped when remission is achieved.
- Behcet’s disease- Mycophenolate Mofetil 2 g/day.
- Orofacial Granulomatosis - Mycophenolate Mofetil 2 g/day.

**Alkalysing agent:**

**Cyclophosphamide:**

It suppresses the proliferation of B-lymphocytes but can enhance T-cell’s response. By cross-linking DNA strands by forming covalent bonds by introducing alkyl groups with nucleophilic moieties, thereby preventing cell division and protein synthesis.
**Therapeutic uses**: SLE- Cyclophosphamide (500 mg IV every 2 weeks for 6 doses plus corticosteroids, then maintenance with mycophenolate mofetil or azathioprine)

Pemphigus Vulgaris- Cyclophosphamide - used alone i.e. 0.5–2 mg/kg daily or with steroid in the form of pulse therapy for severe cases.

Bullous pemphigoid- cyclophosphamide is 2 to 2.5 mg/kg daily, followed by aggressive oral hydration, and IV cyclophosphamide must be combined with oral or IV Mesna to prevent bladder toxicity.

**Biologics**:

**Therapeutic uses**: Lichen planus- Alefacept 15 mg/week IM for 12 weeks, Etanercept -25 mg twice weekly, Adalimumab - 40mg every other week.

Refractory oral lichen planus- Basiliximab, Etanercept

Erosive LP- Efalizumab- An initial dose of 0.7 mg/kg, followed by a dosage of 1.0 mg/kg/week, approximately 3 weeks had been administered successfully.

SLE- IV Rituximab 375 mg/m^2 weekly for a total of four courses, Belimumab Initial: 10 mg/kg IV q2Weeks x3 doses, then Maintenance: 10 mg/kg IV q4Week

Epidermolysis bullosa- Rituximab - 375 mg/m^2 of body-surface area weekly IV.

Pemphigus vulgaris- Rituximab is administered at a dose of 375mg/m^2 body surface area weekly for four weeks.

Behcet’s disease- Etanercept -2×25 mg/week subcutaneously, in a regressing oral ulcer, Infliximab- Refractory and recurrent oral and genital aphthous ulcer in a dose of 5 mg/kg body weight intravenously.

**Orofacial Granulomatosis-Infliximab 5 mg/kg**: Sjogren syndrome- Etanercept subcutaneously, 25 mg. 1,000 mg infusions of rituximab two weeks apart using a standard protocol with an escalation of the infusion rate to a maximum of 400 mg/hour. Infliximab 3 mg/kg IV, administered in week 0, week 2, week 6 and once every 8 weeks. Sjogren syndrome- Belimumab, 10 mg/kg IV, at weeks 0, 2 and 4 and then every 4 weeks.

Graft Vs Host Disease (GVHD) - Basiliximab used to prevent immediate transplant rejection in people who had received kidney transplants, in combination with other agents and is effective in the treatment of corticosteroid-resistant GVHD.

**Vaccine**: (BCG): BCG had been used to enhance immunity nonspecifically by the reticuloendothelial system stimulation.

**Therapeutic uses**: Erosive LP - Intralesional injection of 0.5 ml BCG-PSN every other day for 2 weeks can be administered.

**Antihelminthics- Levasimole**: It enhances Dendritic cells (antigen presenting cells) maturation and also increases the expression of major histocompatibility complex [MHC] molecules and costimulatory molecules like CD80, CD83, and CD86. Antigen and MHC complexes activate the T cells. Activated T cells release interferon γ thus enhancing the immunity.

**Therapeutic uses**: Lichen planus- Levasimole - 150-300 mg/day for 3 months (Monotherapy). In combination with 15 mg/day Prednisolone for 3 consecutive days each week and 150 mg/day levasimole.

Refractory oral candidiasis- Levasimole 150 mg/day for 2-4 days each week.

Aphthous ulcer- Levasimole- 150mg/day with or without combination with steroids (15 mg Prednisolone).

HSV- Levasimole- 150 mg/kg.

**Thalidomide**: It is banned for its teratogenic effect but reintroduced as an immunomodulator, and angiogenesis inhibitor antitumour drug and has anxiolytic, antiemetic, anti-inflammatory, adjuvant analgesic/antipyretic properties.

**Therapeutic Uses**: Severe corticosteroid resistant erosive oral lichen planus: Topical- Thalidomide 1% paste (150 mg Thalidomide powder dissolved in pure glycerol into a paste) Apply 3 times/day for 1 week. The systemic dose-Initial dose of 50 to 100 mg/day.

Recurrence Aphthous stomatitis- Thalidomide - 100 to 200 mg/day to start with and to be continued till remission, followed by a maintenance dose of 50 to 100 mg daily or 50 mg every other day.

SLE- Thalidomide 50 mg daily

Erythema multiforme- Thalidomide 100 mg daily
Graft Vs Host Disease (GVHD) - Thalidomide is a useful drug in cases of chronic GVHD which are resistant to standard therapy.

Recombinant cytokines:

Interferons (α, β, γ): Interferon causes certain enzymes to be induced by binding to cell surface receptors, inhibiting cell proliferation and enhancing the immune activity, including increased macrophage phagocytosis and increased specific T-lymphocyte cytotoxicity.

Therapeutic uses:

Leukoplakia – human β interferon105 I.U./g

OSMF- Intralesional injection of interferon γ (0.01–10.0 U/mL) 3 times a day for 6 months can be given.

Behcet’s disease- Intermediate (e.g. 6 × 106 IU thrice a week) or high doses (e.g. 9×106 IU thrice a week) of Interferon α2a (Roferon A) and b (Intron A) are principally more effective than low doses (3 ×106 IU thrice a week). Lower doses are recommended as a maintenance therapy when treatment is successful in the first 1 to 4 months.

Conclusion

A new line of therapeutic options is available in the form of steroid-sparing medications and biologics to prevent or recalcitrant oral lesions. Nonetheless, up until this point, the data is scarce to provide any clinical guidance. For scientific evidence using these newer medicines to establish the risk-benefit ratio for the treatment of oral lesion patients, properly powered randomised controlled studies are needed.

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References

Ayurveda: Panacea for Oral Health

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Abstract

Ayurveda is one of the world’s oldest forms of medicinal treatment which has been practiced since 12th century BC. Ayurveda aims to accomplish physical, mental, social and spiritual well being by adopting preventive, health promoting and holistic approach towards life. Dental and general health problems can be treated by balancing the three doshas (humors) of the human body- the vata (wind), the pitha (bile) and thekapha (phlegm). Side-effects arising with usage of allopathic medications can be avoided with an alternative therapy like Ayurveda. Treatment for any chronic diseases is made possible by use of herbs and herbal preparations that contain parts of plants or other plant materials as active ingredients in Ayurveda. This review article explores the various herbs used for treating oral diseases and to sustain oral health.

Keywords: Ayurveda, Oral health, Disease, Dental.

Introduction

In India, the different systems of medicine include Allopathy, Ayurveda, Homoeopathy, Naturopathy, Siddha, Unani, and Yoga [1]. Among these, Ayurveda is one of the oldest medical systems primarily practiced in India known since 12th century BC. Ayurveda uses varieties of herbs, herbal extracts and preparations containing parts of plants or other plant materials as active ingredient for treating diseases. There are approximately 1,250 medicinal plants being used in these formulations. Outcome of the treatment is seen on long-term use as the whole medicinal plants and their extracts work in conjunction with each other [2]. The two main characteristics that distinguish it from an allopathic drug is the use of crude herbs and prolonged usage.

Oral disease is a major health concern worldwide and gained importance as it is imperative to systemic health. The Use of herbs for various oral diseases is well described in ayurvedic classical Texts like Sushruthasamhitha and Charakasamhitha. There are numerous Ayurvedic drugs can be used in prevention as well as management of oral and dental diseases like dental caries, halitosis, oral ulcers, gingival and periodontal diseases. This article reviews the various herbs and practices adopted in Ayurveda for alleviating oral health problems and aid in oral care.

Ajowan (Trachyspermum ammi): It is also known as bishop’s weed. It has major phenolic compound thymol, which has germicidal, antispasmodic and antifungal properties. Ajowan has anticariogenic property and acts against Streptococcus mutans by inhibiting its adherence and biofilm formation on the tooth surface.[3] Aloe Vera (Aloe barbadensis): Aloe vera has many beneficial oral and systemic actions. Aloesin, aloemannan, the constituents of aloevera provides anti-inflammatory effect, anti tumor and immunosuppressive effect, potential immunostimulant, antiviral, antineoplastic, and gastrointestinal properties. It improves wound healing by enhancing the collagen turn-over rate and production [4]. A research conducted on acemannan, the clear-inner gel of aloevera exhibited dentin formation and increased pulp cell proliferation. Additionally, the commercially available SaliCept patch can be used as a dressing in the management of alveolar osteitis . It is considered an acceptable alternative to most used alvogyl as a dressing in the management of alveolar osteitis [5].

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Clove oil (Syzygium aromaticum): Clove oil is a most important ingredient for treating many oral problems. This ingredient is incorporated in tooth paste, mouth washes, tincture (1:5, 25% ethanol) and gels due to its medicinal values. Clove when used in gel form, proved as an alternative to benzocaine in topical anesthetics. Its extract consists of essential oil, eugenol, eugenol acetate and β-caryophyllene, lesser amounts of benzyl alcohol, chavicol, acetyl salicylate, humulenes and nutrients like calcium, minerals, iron, potassium, phosphorus, sodium, vitamin A & vitamin C [6]. It is used for treating bleeding gums, tooth ache, sore gums, mouth ulcers, post periodontal surgeries, root canal filling and as a temporary filling for tooth decay. [7]

Green tea (Camellia sinensis): Green tea has significant action against S. mutans, Porphyromonas gingivalis, and Streptococcus sobrinus producing anticariogenic effect. Catechin, an essential ingredient in green tea inhibits the growth of P. gingivalis, Prevotella nigrescens, Prevotella intermedia and the adherence of P. gingivalis on human buccal epithelial cells thus preventing occurrence of periodontal disease. [8]

Haritaki (Terminalia chebula): Haritaki in mouth rinse proved to be effective against the carious organisms like S. mutans by increasing salivary pH which is a prerequisite for a mouth wash. [9]

Honey: Honey is shown to have antibacterial properties on nearly sixty pathogens. It acts by altering the chemical pH and osmotic effect thus aiding in antibacterial action. Propolis is a natural resinous mixture produced by honey bees has high anti-inflammatory property and can be used in severely infectious cutaneous wounds. It also has an effective result in various oral ulcerative conditions like aphthous ulcer, acute necrotizing gingivitis, periodontitis and pulpitis. [10]

Liquorice (Glycyrrhiza glabra): The root portion of liquorice has many medicinal values. Its extract contains glycyrrhizin which shows anti-adherent property and acts by inhibiting glucosyl transferase activity of S. mutans, which is involved in the formation of insoluble glucans required for biofilm formation. Liquorice added with acidulated phosphate-fluoride solution, showed increased fluoride uptake by the enamel. Glycyrrhizin is fifty times sweeter than sucrose, acting on gustatory areas which may increase the salivary flow and hence reduced incidence of caries. [11] Liquorice is integrated in oral hygiene products like mouth rinse, tooth paste, gels etc.

Mango (Mangifera indica): Studies on mango leaves have reported that it possess inhibitory effect against P. gingivalis, P. intermedia, Streptococci, Lactobacillus acidophilus. Mango is rich in tannins, bitter gum and resin which aids in management of oral hygiene. Mango leaf in conjunction with a tooth brush will be the best home care for maintenance of oral hygiene. [12]

Miswak (Salvodorapersica): Miswak has antibacterial and antiplaque effect that helps in maintaining proper oral hygiene. Also chewing of miswak sticks have shown to provide antibacterial effect against cariogenic organisms [13].

Pomegranate (Punica granatum): Pomegranate is rich in polyphenolic flavonoids. Studies has shown that pomegranate possess antimicrobial activity against certain bacteria like Staphylococcus epidemidis, L. acidophilus, S. aureus, S. mutans, S. sanguinis and S. salivarius which is due to the presence of hydrolysable tannins and polyphenolics like substance punicalagin and gallic acid in its extract. [14, 15]. The phenol punicalagin which accounts for more than 50% of the juice has potent antioxidant activity.

Triphala (Myrobalans): It is traditional formulation which consists of three fruits, known as myrobalans. Triphala has many medicinal values towards oral health. Triphala along with sesame oil, alum, kshara (alkali), khadira (acacia catechu) can be used to treat the gingival hypertrophy by gently massage over the gingiva. Triphala is rich in tannins and phenolic compounds and provides antioxidants property [16]. Though chlorhexidine is a gold standard for mouth washes, triphala can also be used as mouthwash. Studies has showed that when 6% triphala mouth rinse used after scaling and root planning reduced the plaque index, gingival index and oral hygiene index with no staining of the tooth when for long term period. [17]. It also has anticariogenic property as it reduced the considerable amount of S. mutans count when compared to chlorhexidine. [7]

Tulsi (Ocimum sanctum): Traditionally tulsi has numerous medicinal values and was used to treat various diseases. It consists of tannins (4.6%) and essential oil (upto 2%), eugenol (upto 62%), methylchavicol (upto 86%), and α- and β-caryophyllene (upto 42%), methylcinnamic acid, linalool and 1,8-cineole. [18]. Tulsi produces COX-2 inhibitors which is helpful in reduction
of pain in tooth ache. It has a significant effect on oral diseases like oral submucous fibrosis, pemphigus, leukoplakia, lichenplanus,candidiasis and aphthous ulcers\[^{23}\]. Studies have proved that 4% tulsi extract used as mouth rinse significantly reduced S. mutans count\[^{18}\].

**Mustard oil (Brassica Nigra):** Mustard oil consists of oleic acid, fatty acids, and uric acid that help in prevention of periodontal disease. It is rich in antioxidants and produces antibacterial effect. Mustard oil stimulates and enhances blood circulation when massaged over the gingiva.\[^{7}\]

**Eucalyptus (Eucalyptus globulus):** Chewing gums containing eucalyptus extract has eloquent effect against plaque activity, probing depth, gingival and periodontal index. Macrocarpal, a constituent in eucalyptus acts against cariogenic bacteria and helps in maintaining alkaline pH in saliva.\[^{20}\]

**Amla (Emblica officinalis, Phyllanthusemblica):** Amla is generally known as Indian gooseberry or Dhatriphala. Regular intake helps in maintaining the teeth and gums. It is rich in vitamin-C which helps in production of hydroxyproline from proline. Amla is used along with triphala as mouthwash to treat periodontal disease \[^{21}\]. It also has antioxidant and astringent property that helps in preventing bleeding gums and gingival inflammation\[^{22}\].

**Garlic (Allium sativum):** Garlic is effective in reducing the tooth ache when crushed and applied on the tooth surface due to Allicin constituent \[^{23}\]. Also it strengthens the immunity and helps to fight against many diseases. It decreases blood pressure and cholesterol level and has a blood thinning property thus enhances the effect of antiplatelet drug and NSAIDS by inhibiting the prostaglandins production.\[^{24}\]

**Tumeric/Curcumin oil (Curcumin longa):** Turmeric is one of the beneficial herbs used from ancient times. It has constituents like monoterpenes, sesquiterpenes, zingiberene, curcumin, α- and β-turmerone. These constituents are also known as curcuminoids. It has various therapeutic actions and act as strong antioxidant, analgesic, anti-inflammatory agent by reducing histamine level. It also has antifungal, antiseptic, and anticarcinogenic properties. Studies have reported that turmeric can inhibits metastasis of melanoma cells and deactivates the carcinogens in chronic smokers.\[^{25}\]. Massaging roasted turmeric over the aching tooth reduces the pain and swelling. Combination of powdorof turmeric, cloves, and dried leaves of guava is used as a mouth rinse can reduce the tooth pain. Paste mixture of turmeric, salt and mustard oil when massaged over the gums, provides relief from periodontitis and gingivitis\[^{26}\].

**Jasmine (Jasminum grandiflorum):** Leaves of jasmine has antiulcer and antioxidant property which can be used in treatment of ulcerative stomatitis and other oral ulcers. \[^{27}\]

**Oral Care Practices in Ayurveda:**

**Dantapavan/Dattuna (Chewing stick for brushing):** Removal of plaque from the tooth surface helps in maintaining proper oral hygiene and prevents gingival and periodontal diseases. According to Sushruthasamhitha, chewing Dattuna (herbal sticks) in the morning after a meal provides anticariogenic and antibacterial property. A soft and healthy stem of the herb without knots and leaves is recommended for use. The soft part of the Dattuna is used as brush and it is chewed. After brushing the stick is torn and used as for tongue scapping. These herbal sticks are 9inches longer and thickness of a little finger. Advantages of using herbal brushes are low cost and various medicinal properties. Ayurveda recommends that the chewing sticks must be obtained from stems of specific plant which should have astringent (kashaya), bitter taste (tikta), pungent (katus) \[^{28}\].

**Pratisarana/Gingival Massage:** It is done with paste/combination of herbal powder/herbal oil. Commonly used powders in pratisarana include kushta (herb) with other herbs of Triphala, Trikatu, Trijata and oils used are mustard oil, triphala oil and turmeric oil. Massaging with turmeric oil can reverse precancerous changes in oral submucous fibrosis. Curcumin, an essential ingredient of turmeric has various therapeutic effects. \[^{29}\] Cikrikci et al., has reported that a combination of turmeric, salt and mustard oil when massaged on the gingiva and gums have showed improvement results in gingivitis and periodontitis.\[^{30}\]

**Kavala and Gandusha (Gargling):** In Ayurveda, Kavala and Gandusha are depicted as Dincharya, which means a daily regimen that is useful in preventing oral diseases. Gandusha means loading of medicinal oil or medicated oil inside the oral cavity for few minutes till there is uncontrollable salivation or lacrimation from eyes or mucosal discharge from nose. Kavala means holding a small quantity of medicated liquid inside
the oral cavity for few minutes followed by swishing, gargling and spitting out. This practice aids in preventing oral malodour, gum bleeding, oral ulcers, xerostomia, cracked lips and also helps to strengthens gums and teeth. The mechanism by which the oil pulling therapy causes plaque reduction is not known but it is suggested that viscosity of the oil inhibits bacterial adhesion and plaque co-aggregation on tooth surface. Other possible mechanism proposed was by saponification or the ‘soap-formation’ process that occurs as a result of alkali hydrolysis of fat. Emulsification enhances the surface area of the oil there by increasing its cleansing action. Commonly used oil for gandusha is sesame oil, coconut oil, sunflower oil and olive oil. Gargling with salt water or adding of fennel or peppermint to water has beneficial effects against gingivitis, periodontal disease and reduces the swelling abruptly.

Practicing Gandusha exerts an increased mechanical pressure inside the oral cavity which stimulates presso-receptor (stretch reflex) that are present in the mouth. Once these receptors are stimulated, they send signals to salivary nuclei in the brain stem (pons and medulla). As a result, there is an increased parasympathetic nervous activity which triggers motor fibre of facial (VII) and glossopharyngeal (IX) nerve increasing the salivary output and exerts an anticariogenic effect. Benefits of practicing gandusha are feeling of freshness, good cleansing effect and improved perception of taste and sense organs. A study on oil pulling with sesame oil has reported reduced incidence of gingival and plaque index and reduces count of aerobic bacteria causing plaque induced gingivitis.

Jivanirlekhana/Tongue Scraping: Jivanirlekhana is performed after brushing the teeth. It is done either with gold, silver, copper, stainless steel tongue cleaner with blunt end. This helps in removing numerous bacteria residing on the tongue causing halitosis and also improves taste sensation, proper oral hygiene and enhances digestion by stimulating reflex points and secreting digestive enzymes.

Conclusion

Ayurveda has been used from ancient years and has provided comprehensive and downright approach to various diseases. Our country is bound with enormous herbs and plant materials but still it’s usage in dentistry is not much implemented and practiced. Awareness is the need of the hour towards effectual application and implementation of ayurvedic practices. By integrating traditional ayurvedic formulation with modern dental practices, various oral diseases can be prevented and also can be made economically affordable to lower socioeconomic groups in the society.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References

2. WHO Guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems-Classification


Implant Surgery: What Can Go Wrong?

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Abstract

Implant surgery complications are frequent occurrences in dental practice and knowledge in the management of these cases is essential. The aim of this review was to highlight the challenges of treatment plan-related, anatomy related, and procedure-related surgical complications as well as to discuss the etiology, management and treatment options to achieve a satisfactory treatment outcome. (Implant Dent 2008;17:159–168).

Keywords: Dental implants, implant complications, implant failures.

Introduction

Surgical complications during implant placement are not uncommon. According to a retrospective study by McDermott et al, 1677 patients (2379 implants) were investigated, and an overall frequency of complications was 13.9%. Operative complications made up a mere 1% of the overall, whereas inflammatory and prosthetic complications were 10.2% and 2.7%, respectively.

A. Planning complications.

1. Lack of a Proper History: Well organized, thorough treatment plans lead to successful implant treatment and patient satisfaction, which are the ultimate long-term goals. Patient selection is one of the most important determinants of success or failure. Predictability of implant success can be jeopardized by absolute and relative risk factors. Therefore a complete medical record and patient analysis post treatment play a significant role.

2. Errors in Angulation: Implant angulation is yet another determinant for implant success. Proper angulation should be determined according to the future prosthesis with the consideration of buccolingual, apicocoronal, and mesio-distal positions. Surgical guides can help control the implant placement angle if they are made and used correctly.

Mandibular teeth in the natural dentition are lingually inclined in relation to both the mandibular base, specifically as 109 degrees, as well as the maxillary opposing arch dentition (eg, lingual cusp buccal inclination) and therefore implants should be placed at a similar inclination. Failure to do so may result in perforation of the lingual concavity, constriction of the lingual space or damage of the lingual artery.

Teeth adjacent to implant sites and surgical guides with long drill channels, often require the use of drill extensions and maximum opening by the patient which may be strenuous. Short breaks to relieve muscle tension, using a bite block and having the patient shift their jaw to the opposite side can help ensure the correct angulation of the drill. Yet another issue is the finger placement. Due to the length of implant drills (~10#20 mm), using a finger rest while drilling, results in an inclination of the drill towards the hand that is steadied. Hence, using finger rests is an ergonomic principle that should not be used for implant placement.

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3. Improper Implant Location: It should be ensured that the implant body is 1.5mm from the adjacent teeth and 3-4mm between adjacent implants. Preoperative measurements and planning are essential to achieve an ideal implant placement that facilitates future implant prosthesis. Hypothetically, a surgical complication could also occur, but not be realized by the surgeon at the actual time of surgery, especially when placing multiple implants, the one placed the away from an adjacent implant can have adequate stability and function but may later result in lateral bone loss.

4. Communication Failures: An informed consent form is an excellent way of communicating potential surgical risks and complications to a patient. Common problems to address include but are not limited to postoperative infection, bleeding, swelling, facial discoloration, transient pain, paresthesia, neuralgia, fracture, joint pain, muscle spasm, tooth looseness and sensitivity, recession, speech change, trismus, and swallowing of foreign objects. Should a complication occur during the post operative healing time, it is recommended to give emergency contact information as well.

B. Anatomical Complications:

1. Nerve Injury: When placing implants in the mandible, proper radiographs and pretreatment planning must be done to ensure complete aversion of the inferior alveolar, mental, incisive or lingual nerves. If the mandibular canal cannot be seen on a panoramic radiograph, a computer tomography (CT) scan should be taken to verify the location. Possible causes of nerve injury include poor flap design, traumatic flap reflection, accidental intraneural injection, traction on the mental nerve in an elevated flap, penetration of the osteotomy preparation and compression of the implant body into the canal. Radiographs should be taken if the surgeon has any doubt about where the drill is or if the drill or implant is in close proximity to or invading, neural anatomical structures. If the situation is the latter, the implant needs to be removed, or a shorter body implant should be placed instead. Within days or months, minor trauma injuries usually heal but permanent damage from neuritis can occur. Treatment options include neuronal anti-inflammatory drugs such as clonazepam, carbamazepine or vitamin B-complex.

2. Bleeding: Risk sites as described above in the posterior mandible include the sublingual fossa and lingual cortex. Life-threatening airway obstruction is a serious threat and early treatment is essential. Treatment involves having the patient stick out their tongue to compress the blood vessels against the body of the mandible. Placing pressure with gauze in the sublingual area does not work as one would intuitively think. Extraoral pressure to the submental or submandibular arteries for 20 minutes against the body of the mandible helps. The posterior superior alveolar and infraorbital arteries are located approximately 19 mm above the maxillary alveolar ridge, and the anastomoses of these arteries can pose a risk during sinus lift procedures by lateral window preparation. Bone wax, pressure, crushing, and electrocautery can alleviate hemorrhage. In summary, hemorrhage treatments at implant osteotomy sites include compression, finger pressure, vasoconstriction, cautery, bone graft, bone cement, and ligation of arteries.

3. Cortical Plate Perforation: The buccal cortical plate varies in thickness throughout the mouth and traumatic dental extractions can cause markedly thin plates or concavities, as well as overall ridge width deficiency. When preparing osteotomy sites or placing implant fixtures in areas with minimal labial plate thickness, or if the implant is placed too buccally, a fenestration or dehiscence implant defect is a common finding. Immediate correction with particulate bone grafting with or without a membrane during the time of implant placement, can be done as long as primary stability has been achieved. “Flapless” implant surgeries should be avoided in areas of potential perforation of the buccal or lingual bone.

4. Sinus Membrane Complications: Sinus complications often occurred when the membrane is perforated at time of surgery. Bone density after grafting should be assessed, regardless whether or not a perforation occurs, because poor bone quality often lead to a higher implant failure rate. Lastly, losing an implant into the maxillary sinus is a relatively uncommon surgical complication. However, in cases with less than 5 mm of bone, mastication can cause the implants to move during the graft maturation timeframe.
endoscopic surgery is a reliable, minimally invasive method for retrieving displaced objects from the maxillary antrum with minimal complications, but it does require having an endoscope or a referral to an ENT or oral surgeon.

C. Procedure Related

1. Mechanical Errors: Dense cortical bone (eg, type I bone quality), when compared with type III or IV soft cancellous bone, can be overheated when preparing osteotomies because more pressure is needed to advance the drill apically in comparison to soft bone. To reduce frictional heat, high speed handpieces, an up-down motion technique of the bone preparation, and copious irrigation can be used. According to Quirynen et al, 55 overpreparation or overheating osteotomies can result in inactive and active retrograde peri-implantitis lesions that can be detected on radiographs as periapical radiolucencies up to a month after insertion.

2. Lack of Primary Stability: It should be dealt with at the time of implant surgery. An unstable implant should be removed or an attempt to place a larger diameter should be completed. To leave an unstable implant without action can often lead to fibrous encapsulation that causes implant failure.

3. Mandibular Fracture: The mandible is the most frequently fractured facial bone. Attempts to place implants in patients with severely atrophic mandibles increases the risk of fracture, especially when monocortical grafts and ridge-splitting surgeries are completed. A fracture of the mandible should be restored to maintain form and function. Management should include stabilization with an attempt to also simultaneously eliminate atrophy if indicated. The most relevant option of our field includes combined bone augmentation, fixation and simultaneous implant placement. Increasing mandibular height after augmentation may be unpredictable but using implants concurrently may reduce bone resorption.

4. Aspiration and Ingestion: Most instruments have a special tip to help ensure screws and abutments transfer directly from the surgical tray into the patient’s mouth, but nevertheless, accidents happen. For these reasons, preventative measures such as gauze throat screens and floss ligatures on implant pieces are encouraged. If a patient swallows or aspirates an implant component, they should be referred to the hospital because acute obstruction can be life threatening and prolonging the removal of foreign objects may make a bronchoscopy technically more difficult. If the foreign object is aspirated it should be removed within 24 hours.

Conclusion

Surgical implant complications are not uncommon and should be addressed immediately. Causality may be iatrogenic, due to poor treatment techniques, or lack of communication between dental disciplines. Time should be spent in the implant “planning” stages, such as tracing preoperative radiographs, measuring models, taking CT scans and making proper surgical guides. Basic anatomy must not be forgotten and should be reviewed by the surgeon in every case. As more surgically inexperienced dental professionals start placing implants an increase in surgical complications will likely occur. In summary, a competent surgeon should be able to treatment plan a predictable surgery, and recognize how to remedy a problematic dental-implant situation.

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References


Peri-Implantitis: Effective Treatment Regimens

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Abstract

Peri-implantitis is a site-specific infectious disease that causes an inflammatory process in soft tissues, and bone loss around an osseointegrated implant in function. The etiology of the implant infection is conditioned by the status of the tissue surrounding the implant, implant design, degree of roughness, external morphology, and excessive mechanical load. Treatment will differ depending upon whether it is a case of peri-implant mucositis or peri-implantitis. This review article deals with the various treatment options in the management of peri-implantitis.

Keywords: Dental implant, peri-implantitis, peri-implant mucositis.

Introduction

Peri-implantitis is an inflammatory process resulting in loss of supporting bone whereas peri-implant mucositis has been defined as a reversible inflammatory change of the peri-implant soft tissues without bone loss (Albrektsson & Isidor 1994). These two descriptions of inflammation around implants are congruent with inflammation around natural teeth. The development of an adherent layer of plaque (of the biofilm) on the implant seems to be critical to the development of peri-implant diseases and could possibly be responsible for altering the biocompatibility of implant surfaces. The concept that bacteria play a major role in the etiology of peri-implant mucositis and peri-implantitis is well documented in the literature of implants. Peri-implant diseases have been associated with a predominantly Gram-negative anaerobic microflora (Pontoriero et al. 1994, Augthun & Conrads 1997, Salcetti et al. 1997, Mombelli & Lang 1998, Leonhardt et al. 1999, Quirynen et al. 2002, 2006). Reduction of the bacterial load to a level allowing healing is difficult to accomplish with mechanical means alone. Therefore, adjunctive therapies like antibiotics, antisepsics and laser treatments have been proposed in order to improve the non-surgical treatment options of periimplant mucositis and peri-implantitis. The following signs and symptoms are typical for peri-implantitis lesions: radiological evidence of vertical destruction of the crestal bone. There is usually a saucer shaped defect and there is osseointegration of the apical part of the fixture; vertical bone destruction associated with the formation of a peri-implant pocket; bleeding and suppuration on probing; possible swelling of the peri-implant tissues, and hyperplasia. Pain is an unusual feature, which, if present, is usually associated with an acute infection. The diagnosis of peri-implantitis needs careful differentiation from peri-implant mucositis, primary failures to achieve tissue integration, and problems lacking an inflammatory component. The diagnostic parameters used for assessing peri-implantitis include clinical indices, using a rigid plastic probe for peri-implant probing, bleeding on probing (BOP), suppuration, mobility, peri-implant radiography, and microbiology.

Management Modalities of Peri-Implantitis:

1. Local Debridement: The implant should be cleaned by instruments softer than titanium, such as polishing with a rubber cup and paste, floss, interdental
brushes, or using plastic scaling instruments\textsuperscript{2}. These have been shown not to roughen the implant surface unlike metal and ultrasonic scalers. Sub-mucosal debridement alone, accomplished by utilizing either an ultrasonic device or carbon fiber curettes, is not sufficient for the decontamination of the surfaces of implants with peri-implant pockets $\geq 5$ mm and exposed implant threads. So it seems reasonable to suggest that mechanical or ultrasonic debridement alone may not be an adequate modality for the resolution of peri-implantitis.

2. Impant Surface Decontamination:

Four Method were Experimented:

1. Air-powder abrasive technique followed by citric acid application
2. Air-powder abrasive technique
3. Gauze soaked in saline followed by citric acid application
4. Gauze soaked alternately in 0.1% chlorhexidine and saline.

Photodynamic therapy is a non-invasive method that could be used to reduce microorganisms in peri-implantitis.\textsuperscript{16} 2\% chlorhexidine or 3\% hydrogen peroxide can be used as topical antiseptics. Decontamination of affected implants with titanium plasma-sprayed or sandblasted/acid-etched surfaces may most easily and effectively be achieved by applying gauze soaked alternately in chlorhexidine and saline\textsuperscript{3}.

3. Anti-infective Therapy: The study by Schwarz et al. demonstrated that the treatment of peri-implant infection by mechanical debridement with plastic curettes combined with antiseptic (0.2\% chlorhexidine) therapy may lead to statistically significant improvements in bleeding on probing\textsuperscript{4}, peri-implant probing pocket depth, and clinical attachment level at 6 months compared with baseline. Patients suffering from localized peri-implant problems in the absence of other infections may be candidates for treatment by local drug-delivery devices. Local application of antibiotics by the insertion of tetracycline fibers for 10 days\textsuperscript{5} can provide a sustained high dose of the antimicrobial agent precisely into the affected site for several days. The use of minocycline microspheres as an adjunct to mechanical therapy is beneficial in the treatment of peri-implant lesions, but the treatment may have to be repeated.

4. Surgical Technique: Surgical resection is generally confined to implants placed in non-aesthetic sites.

A randomized comparative clinical trial by Romeo et al.\textsuperscript{7} concluded that resective surgical procedures coupled with implantoplasty could have a positive influence on the survival rates of rough-surfaced implants. The study by Schwarz et al. demonstrated that both nanocrystalline hydroxyapatite and guided bone regeneration provided clinically significant improvements in clinical parameters following 6 months of non-submerged healing.\textsuperscript{8} The application of the combination of natural bone mineral and collagen membrane seemed to correlate with greater improvements in those clinical parameters and, hence, was associated with a more predictable and enhanced healing outcome.

Discussion

The long-term success of oral implants depends on the maintenance of healthy tissue around them\textsuperscript{8}. Periimplantitis is a plaque-induced progressive marginal bone loss. It is observed on radiographs of implants that are surrounded by soft tissues exhibiting clinical signs of inflammation. Roos-Jansaker and colleagues reported periimplantitis rates of 16 percent for machined implants, with higher rates expected for roughened implants. Peri-implantitis is progressive, and studies with multiple-year follow-up are required to determine whether treatment is successful. Researchers have proposed different treatment strategies for this condition, including mechanical debridement techniques with or without local or systemic antibiotic therapy, resective surgery, grafting techniques and implant polishing.

Conclusion

Prognosis of the affected implant will be contingent upon early detection and treatment of peri-implant mucositis and peri-implantitis. Even though the studies dealing with different treatment modalities of peri-implantitis are not comparable, an overall picture of some clinical improvement emerges with the use of anti-infective therapies, in terms of resolution of inflammation and bone healing. This observation, coupled with our knowledge of the indisputable role of periodontal pathogens in the etiology of peri-implantitis, indicates that some form of anti-infective therapy must be coupled with any other strategy for dealing with this problem.
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References
Short Implants: A New Solution in Rehabilitation

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Abstract

Insufficient alveolar bone height is a common clinical situation encountered more in the posterior jaws. Advanced surgical procedures such as bone grafting, sinus lifting, and nerve repositioning are required to overcome this condition and make implant treatment possible for such patients. Short implants are considered as a viable alternative in patients with reduced alveolar bone height to avoid more invasive surgical procedures. They simplify the implant treatment, reduce patient morbidity, shorten the duration of treatment, and make it less expensive. With the improvements in the surface topography of implants, which increase the bone implant contact, and use of adapted surgical protocols similar survival rates as that of regular implants have been reported even with short implants.

Keywords: Bone grafting, bone implant contact, short implants, viable alternative.

Introduction

Quality of life in adults can be highly affected by tooth loss as a consequence of compromised oral function, loss of social status and diminished self-esteem [1]. The oral rehabilitation using implants has a positive implication in the reestablishment of all these factors that affect the life of patients. Oral implant placement also provides a more comfortable and aesthetical treatment option for partial and complete denture wearers, being widely accepted by patients as an efficacious method for replacing missing teeth [2, 3]. Multiple tooth extractions induce a considerable reduction in bone height, mainly in the posterior jaws [4]. In the maxilla, the absence of teeth promotes sinus pneumatization and consequently vertical bone loss [5], whereas the presence of the inferior alveolar nerve in atrophic mandibles limits the length of implants [6]. Therefore, the rehabilitation of edentulous posterior regions using implants becomes complex when severe ridge atrophy is presented. Rehabilitation with implants should be simple, cost effective, highly predictable, and of shorter duration. Short implants are considered as a viable alternative in patients with reduced alveolar bone height to avoid more invasive surgical procedures [2-4]. With the improvements in the surface topography of implants and use of adapted surgical protocols similar survival rates as that of regular implants have been reported even with short implants [5].

Rationale for opting short implants: When stress is applied to the natural tooth, it is distributed in to the underlying bone along the entire root length due to the presence of periodontal ligaments as the tooth tends to pivot around the center of the root. However in case of implants, where periodontal ligament is absent, the greatest magnitude of stress concentration is seen at the crest which tapers apically up to 5 mm from the crest. Stress concentration in the apical region is much less. [6] A basic mechanical principle states that when two materials of different moduli of elasticity are placed together with no intervening material and one is loaded, the stress concentration can be observed where the two materials first come into contact [7].

Increase in implant length will increase the total surface area of the implant and improve the primary stability by increasing the bone implant contact (BIC).
But the area that transfers the compressive and tensile loads to bone that is, functional surface area (FSA) is confined to the crestal 5-7 mm. Increasing the length of the implant will not change this where as a short implant with a wider diameter provides both, improved primary stability and increased FSA.[8]

Advantages of short implants: The main advantage of using short implants is that it simplifies the implant surgery by avoiding the more invasive procedures like bone grafting, sinus lifting, nerve repositioning, etc., and thus decreases morbidity and reduces the healing period. Advanced imaging modalities may not be required which will reduce the radiation exposure. Patient acceptance will be more as it avoids the need for complicated surgeries, reduces the duration of treatment period and cost. The poor quality of bone in the posterior region, especially in the maxilla, where short implants are mostly used is another contributing factor.

The following factors are important in the success of short implants:

1. Implant diameter
2. Surface topography
3. Macro geometric design
4. Bone density
5. Photofunctionalization of implants
6. Biomechanical method for stress reduction

Implant Diameter: An increase in the diameter reduces stress at the implant neck and is associated with good distribution of force compared with increases in implant length.[9] Implant strength and fracture resistance can be improved by increasing the diameter of the implant. Wider implants also facilitate the creation of a better emergence profile, especially in the posterior segment. An increase in diameter by 1 mm will increase the surface area by 30–200% depending on the implant design.[10]

A three-dimensional FEA demonstrated that increasing the implant diameter resulted in a 3.5-fold reduction in crestal strain, whereas increasing the implant length resulted in only 1.65-fold reduction in crestal strain.[11]

If wider implant cannot be placed, each molar can be supported with 2 short implants, thereby increasing the FSA.

Surface Topography: The fact that alteration of the implant surface can influence the success of osseointegration has been proven in various studies.[12-14] Rough implants offer extensive area for osseointegration. It increases the BIC and FSA in addition to improve the wettability of the implant surface.

Macro Geometric Design: Increasing the diameter is a logical option for increasing the surface area of short implants. But there is an anatomical limit to how much the diameter can be increased. Increasing the number of threads per unit area (decreased thread pitch) and increasing the thread depth also enhance the FSA of short implants.

Bone Density: Bone density is directly proportional to its strength. Less dense bone may demonstrate a reduction of its strength by 50-80% compared to higher density bone. Poor bone quality is strongly linked to higher failure rates in implants.[15] Increased failure rates of short implants in the early trials were attributed to the use of machined implants in poor quality bone, especially in the posterior maxilla. This negative effect is somewhat dampened by rough surfaced implants now. A two-stage implant placement approach was suggested by Gentile et al.

Photofunctionalization of Implants: Treatment of implants with ultraviolet (UV) light has been found to increase the BIC from 55% to near maximum level of 98.2%. This resulted in 3-fold increase in the strength of osseointegration.[16-18] A recent human study has demonstrated the effectiveness of photofunctionalization in complex cases using short implants with lesser diameter.[19] It allows for the placement of short implants in the alveolar ridges which are not wide enough to allow the placement of larger diameter implants.

Discussion

During oral rehabilitation of atrophic areas, the avoidance of bone augmentation procedures reduces discomfort, treatment time and costs for the patient. All these factors make the placement of short implants an attractive choice of treatment for both patient and clinician if the success rates are not substantially decreased. Short implants (≤7 mm) had a survival rate similar to longer implants placed in the augmented bone area after oneyear post-loading, however, the marginal bone loss at short implants sites was lower than the longer implants sites. Placement of short implants is a predictable alternative for the rehabilitation of atrophic
posterior regions, avoiding all the disadvantages intrinsic to bone augmentation procedures.

**Conclusion**

Insufficient alveolar bone height for implant placement is a commonly seen problem in the posterior jaws. Traditional way of overcoming this difficulty is by undergoing adjunctive surgical procedures. Though they are proven to be successful, these procedures result in delayed healing, increased morbidity, and prolonged treatment period. Short dental implants have been successfully used in such situations with comparable survival rates with that of longer implants. Various method to increase the surface area and BIC along with the stress reduction to the implant prosthesis have made short implants a viable and more predictable alternative to advanced surgical interventions.

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**References**


Superior Orbital Fissure Syndrome: A Review of Literature

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Abstract

Superior orbital fissure syndrome is a complex of cranial nerve impairment that affects the CN III, IV, V and VI all of which enters the orbit through the superior orbital fissure. Superior Orbital fissure syndrome occurs as a result of compression of all or some of these nerves passing through the fissure. Three major factors contributing to the syndrome includes traumatic injury, neoplasm and inflammation. This article takes into account the various data previously reported in literature and aims at providing a detailed knowledge about the anatomy of the superior orbital fissure to provide a better understanding about the syndrome.

Keywords: Superior orbital fissure, trauma, cranial nerve.

Introduction

Superior orbital fissure syndrome is a very rare complication occurring as a result of craniomaxillofacial trauma which was first described by Hirschfeld in 1958[1]. Later in 1896, Andre Rochon Duvigneaud a French ophthalmologist considered the syndrome as a pathological entity and presented a report on the syndrome in four syphilis patients[2]. Other etiological factors that results in SOFS due to either compression of SOF contents or un natural narrowing of the SOF includes vascular disorders[3] like spontaneous aneurysms of the Internal carotid artery; neoplasm in cavernous sinus or the orbital apex like meningioma, pituitary gland tumours; inflammation in the orbital apex and cavernous sinus thrombosis can also attribute to the development of SOFS[4].

Anatomy of the Superior Orbital Fissure: The boundaries of the superior orbital fissure are as follows:

Laterally – Greater wing of sphenoid bone
Medially – Lesser wing of sphenoid and
Superiorly – Frontal bone

The superior orbital fissure lies at the orbital apex and at the border between the orbital roof and the lateral orbital wall. It serves as a pathway between the orbit and the middle cranial fossa. The shape of the fissure looks like an elongated pear with its broader part at the nasal side medially to the apex laterally with the long axis extending upward at a 45 degree angle. The size of the fissure in an adult is around 22mm in length, 2 to 3mm width at the apex and about 7 – 8 mm at the base[5]. The tendon of the lateral rectus muscle divides the tissue into two parts: the superior and inferior part. The superior part contains the trochlear nerve (IV), frontal and lacrimal branches of the ophthalmic division of the trigeminal nerve and the superior branch of the ophthalmic vein whereas the inferior part contains the superior and inferior branches of the oculomotor nerve(III), abducens nerve (VI), nasociliary nerve(V) and the inferior branch of the ophthalmic vein. All these structures are confined within the tendinous ring making them more susceptible to shearing injury during craniomaxillofacial trauma.

Clinical Signs: Superior orbital fissure syndrome presents with the following signs

- Paraesthesia – loss of sensation over the forehead, cornea, upper eyelid and bridge of the nose
resulting from the compression of the ophthalmic division of the trigeminal nerve involving the supratrochlear and supra orbital branches. There might also be lacrimal hyposecretion and possibly retro orbital pain along the path of the nerve[6].

- External ophthalmoplegia – it is the slowly progressive paralysis of extra ocular muscles that develops secondary to the transmission blockade of the oculomotor, trochlear and abducent nerves. Patients also will typically present with ptosis as a result of loss of tension and loss of function of the levator palpebrae superioris muscle and loss of tone in sympathetically innervated mullers muscle.

- Proptosis – prolapse of the globe anteriorly out of the orbit as a result of loss of extraocular muscle tone or retrobulbar hematoma or ophthalmic vein compression[7,8].

- Ptosis- Drooping of the upper eyelid because of loss of tension and loss of function of the muscle levator palpebrae superior and loss of tone of mullers muscle.

All of these clinical signs present in various degree depending upon the severity of injury and stage of healing. CN III,V and the nasociliary nerve passing through a tendinous ring are more susceptible to compression injuries than the other contents of the superior orbital fissure. Complete/partial involvement of these three nerves is indicated by the term “partial superior orbital fissure syndrome”. In SOFS the optic nerve and the vision is usually unaffected; if the optic nerve gets involved and if there is a subsequent compromise of vision the condition is termed as “orbital apex syndrome” coined by kjaer[9].

Radigraphic Considerations: Diagnosis is usually based on the clinical symptoms and radiographic examination. However a plain film cannot be obtained in case of severely traumatized patients. In such patients Caldwell projection[10] is used which is a 20 – 25 degree tilt of the head that facilitates optimal projection of the superior orbital fissure.

CT scan serves as an excellent tool for the diagnosis of SOFS. CT slices of 2mm thickness are usually recommended for visualization of any compression around the fissure. The development of new spiral CT serves as a promising tool for improving the accuracy of a radiographic diagnosis by providing clear details of the SOF in axial and coronal projection without the need for neck extension.

Treatment:

**conservative/medical management**
- Observation until complete recovery of sensory and motor function
- Steroid therapy
  - A. Dexamethasone 4mg Q6H
  - B. Loading dose of 1mg/kg dexamethasone followed by 0.5mg/kg Q6H
  - C. Megadose steroid with methylprednisolone 30kg IV loading dose followed by 15mg/kg Q6H for 3days

**surgical intervention**
- Only in cases of comminuted fracture + optical atrophy
- Four routes for decompression
  - A. Extra nasal-intraorbital
  - B. Modified Extra nasal-intraorbital
  - C. Extra nasal Tranethmoidal
  - D. Tran temporal
Conclusion

Therefore the treatment plan for various cases will differ from case to case and a tailormade treatment has to be given. Certain cases will require conservative approach and some will require a surgical approach. It also depends on the choices made by the doctor or surgeon, for there is the famous phrase “The only good surgeon is a surgeon who knows when not to touch the knife”.

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References

Tissue Repair in Maxillofacial Region

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Abstract

The region of face is the most aesthetic part of the body and one of the most important parts of the personality of a person. Thus trauma or congenital defects resulting in aesthetic defects in the face are a huge problem to a person’s confidence. Over the decades, craniofacial plastic surgeons, maxillofacial surgeons and aesthetic surgeons have struggled to administer the best possible treatment to achieve near absolute aesthetic results. This also is dependent on the material used as a graft to fill the void in the defect. This article aims to review various articles and find out the efficacy of the various materials used for graft.

Keywords: Tissue repair, tension, scar, wound closure.

Introduction

The face is the most important means of communication and not only in term of verbal communication. The principal aim of the maxillofacial reconstruction still remains to avoid or to repair gross aesthetic disfigurement in cases of congenital malformation, tumor resection, post traumatic deformities. In addition to facial aesthetics, maxillofacial reconstruction also has important functional aspect in the reconstructive measures strive for the institution of the complex functions of the upper oro-digestive tract.

Methodology:

Pubmed database was searched for the keywords “Tissue repair” “Maxillofacial trauma” “Maxillofacial reconstruction” 40 articles were found.

Out of the 40 articles, the non dental articles were excluded to get 38 articles.

The duplicates were excluded to get 31 articles

Discussion

Tissue repair, management of surgical or traumatic soft tissue wounds is an important precondition for successful plastic reconstruction because adequate skin coverage of the reconstructed part is mandatory and access to deeply situated structures has to pass through the skin surface. Closure of a skin¹ wound generally should be accomplished without tension. Lines of minimal skin tension running across the face in a well-known pattern which represents adaptation to two different types of functional mechanisms; The first type is represented by the lines of habitual expression in the face the second type, the lines of skin relaxation (such as circular lines in the neck). A scar within or parallel to the lines of minimal tension is not subjected to the intermittent pull of sub adjacent muscle and subsequent widening of the scars from tension.

A tissue graft² is defined as a portion of tissue removed from one side and placed at another, either in the same or in another individual, in order to repair a defect caused by operation, accident or disease. The autografts reflects the traditional way of solving surgical problem, namely success obtain mainly through pragmatic approach. Allograft³, because they present problem of immunology, vitality, remodeling and storage. Have demanded a more extensive scientific study using animal to achieve some clinical success (BURWELL 1994).
Clinical uses and function of bone graft: Bone graft is used to provide a bridge of osteogenic tissue. The condition which surgeons are called to treat bone grafting include:

1. The delay and non-union of fractures
2. The arthrodesis of joint.
3. The filling of cavities in bone
4. The replacement of bone and joint loss
5. The augmentation of skeleton deficiency in the face.
6. The fusion of bone growth plate cartilages.

Autografts: The autogenous bone graft has several advantages over allo- or xenograft. It has greater osteogenic capacity and is biocompatible. As the autograft resorbs, revascularization recruits mesenchymal cells differentiates as osteogenic, chondrogenic or other cell lines (BROWN & CRUESS). The high osteogenic potential of cancellous bone derives from the bone marrow it contains, and the marrow part as such can be used to induce bone growth into different porous materials (NAD et al. 1983). The cancellous graft is moldable and resistant to infection. It vascularize fast and can be obtained quiet easily, usually as ‘chips’ from the iliac crest (BURWELL, 1966). Unfortunately the amount of cancellous bone is limited moreover, it cannot be used in stress bearing area, and harvesting causes morbidity such as pain, hematoma, infection, nerve injury (BANWART et al 1995) or even iliac hernia or ureter injury (CHARLES et al 1975); (ESCALIS & DEWALT 1977). Major complication rate is 8.6%, minor complication 20.6% (YOUNGER & CHAPMAN 1989).

Cortical bone is used when mechanical support is needed. Common donor site used to be fibula, ribs and iliac crest. Unfortunately to biocompatibility of the compact bone is poorer than the cancellous bone. Microvascular graft has overcome some of the drawbacks associated with the reconstruction of some of the large defects. Large cortico-cancellous grafts can be harvested with their nutrient vascular pedicle allowing the vessel to be anastomosed to suitable artery and vein in the recipient site. The healing takes place in the interface of graft and recipient bone as in the normal bone situation(WEILAND et al 1984). Donor site complication may however be more severe because the graft tends to be very large.

Allograft: The known limitation of autografting example secondary operation, limited availability of bone and operation morbidity, have encouraged the search for other option. The natural choice is allograft bone, human bone, usually harvested from a dead person or obtained in a hip fracture. The basic concept underlying allograft bone use was established in the early 1990’s (BASCHIRZE V & PETROV) showed that most of the cell components in the graft after transplantation and that bone regeneration starts from the host bed (1992)

Allografts demonstrate a lower osteogenic capacity, higher resorption rate and larger immunogenic response and less revascularization of the grafts than autograft (CHASE & HERDON, 1955; FRIEDLANDER et al, 1978). Despite of these drawbacks allograft offers a useful adjunct to the range of bone graft material. Bone can be minced and mixed with autogenous grafts in spinal fusion or hip prosthesis surgery’s (BURWELL, 1966). Allograft bone can even be used for large grafts comprising whole joints in tumor surgery. The results however are somewhat contradictory(AHO et al, 1998). To maintain the availability of the allograft bone, a well organized bone bank is needed (TOMFORD et al, 1987). The possibility of transmitting viruses may limit the use of allograft (BUCK & MALIN, 1994; KHAN et al 1998).

Xenografts: The xenogenic bone graft, that is a graft made with bone from another species, presents similar problem as that of allograft. It elicited acute antigenic response with high failure rate. Partial deprotonations and defatting have been demonstrated to increase the antigenic response (KIEL BONE) at the cost of osteoinductive capacity. They are indeed rarely used.

Demineralized bone, decalcified bone was first studied in the rat in 19th century, when it was mainly used for filling cavity’s in osteomyelitis operation (SENN,1889). It is manufactured in a process whereby first the bone marrow is removed, then the bone is defatted and then finally the mineral contents are decalcified with hydrogen chloride leaving the collagen matrix intact. Demineralized bone can be used in powder form, in chips, or in corticancellous form. YUREST & coworkers noted the osteogenic capacity of demineralized bone and latter attributed to the influence of morphogenetic protein. Clinical demineralized bone has been used primarily for craniomaxillary reconstruction (MULLIKAN et al 1951).
The successful transfer of tissue for the closure of defect or repair of a defect depends on the survival of the graft, which in turn depends on the adequate vascular supply. Regarding the vascular supply it may be divided into no vascularized pedicle and vascularized flaps or grafts.

Cartilagerafts\(^3\), unlike iliac bone or rib bone cartilage autograft survive well when in contact with cartilage or other tissues (muscle, fat, fascia) \(\text{PIERIE, 1964}\). Costal cartilage, costochondral graft are widely used for reconstructive surgery. Such, grafts are obtained as living transplant are used for augmenting the external nose, forehead, zygoma, maxilla, mandible, mastoid, auricle and eyelids (\text{GILLIES & MILLARD, 1957}). The perichondrium should be retained when the costochondral graft is used (\text{BREADON et al., 1972}).

Auricular grafts\(^\text{10}\), the uses and limitations of auricular composite autografts to reconstruct the external nose; nasolabial angle and auricle in man have been reviewed (\text{CARLMOUNT & CONLY, 1978}).

**Conclusion**

The term transplantation designates the removal of a colony of living cells from a donor area and its transfer to the recipient site where it is capable of propagating a lineage of living cell. Skeleton tissues are now widely used in surgery as transplant to serve many proposes.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**

A Review on Role of Tongue in Malocclusion

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Abstract

Tongue is the most agile, versatile appendage in the body. It is the largest organ of the oral cavity. Dental arches are enveloped on both the sides by muscular tissues. Tongue alone counteracts various buccal forces exerted by cheek and lip musculature. Precise balance between these forces is utmost importance for normal inter and intra arch relationship. The unstable forces induced by abnormal functions such as mouth breathing, tongue thrust, swallowing and unilateral chewing and abnormal postures of oral circumferential muscles such as forward tongue thrust, tongue biting, low tongue at rest were correlated with varieties of malocclusion. Thus it is necessary for proper understanding of these structures. The purpose of this article is to discuss the role of tongue in malocclusion.

Keywords: Tongue, malocclusion, abnormal posture.

Introduction

The morphology of the craniofacial complex, the dynamics of the stomatognathic system & the arrangement of the dentition is an integrated functioning unit. Muscles are potent force, whether they are in active function or at rest. The teeth & supporting structure are constantly under the influence of the contiguous musculature.

Since long time, role of tongue in malocclusion has been remained controversial. LeFoulon (1839) was the first to propose role of tongue in malocclusion. “When tongue strikes against the upper front teeth, it pushes teeth forward”. Breitner (1942) was the first to highlight the importance of functional equilibrium among the forces of tongue and those produced from action of lips and cheek musculature. Sweet (1948) pointed out that in improper swallowing, tongue thrusts forward against the anterior teeth and hard palate in order to push bolus of food into the pharynx. This thrusting force cause proclination of anterior teeth. Proffit, based on his equilibrium theory, proposed “that duration of force is much more important than magnitude of any force acting on dental or skeletal units”. According to this theory, concept of tongue hitting and moving the anterior teeth forward is not valid but, abnormal posture and position of tongue can definitely cause malocclusion.

Discussion

Development and anatomy of tongue: Tongue, a soft muscular tissue is mainly made of mucosa, muscles and its vascular and nerve supply. The mucosa of body of tongue (anterior 2/3rd) is formed from the first pharyngeal arch and the mucosa of base of tongue (posterior 1/3rd) is formed from the third pharyngeal arch.(fig.1) Skeletal muscles of tongue develops from myoblast that migrate from occipital somites. Tongue starts its development near the end of 4th week of embryonic life. Another important developmental aspect of tongue is it’s contribution for normal development of palate.¹

Muscles of Tongue

Intrinsic Muscles

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>superior longitudina•</td>
<td>makes the dorsum concave</td>
</tr>
<tr>
<td>Inferior longitudina•</td>
<td>makes the dorsum convex</td>
</tr>
<tr>
<td>Transverse</td>
<td>decreases the width of tongue</td>
</tr>
<tr>
<td>Vertica•</td>
<td>flattens the tongue</td>
</tr>
</tbody>
</table>
Extrinsic Muscles

Muscle | Action
--- | ---
Genioglossus | depresses tongue, its posterior fibers protrude tongue
Hyoglossus | depresses and retract tongue
Styloglossus | retracts tongue
Palatoglossus | retracts tongue and draws it up

Basis for possible involvement of tongue in malocclusion: Tongue alone counteracts various buccal forces exerted by cheek and lip musculature. Any disturbance in this delicate equilibrium will lead to instability of dentoalveolar complex.

Buccinator Mechanism: Starting with the decussating fibers of the orbicularis oris the buccinator runs laterally and posteriorly around the corner of the mouth it inserts into the pterygomandibular raphe just behind the dentition. Here it mingles with the fibers of superior constrictor which attaches to pharyngeal tubercle of occipital bone. Thus completely encircling the face.

Lingual pressures are significantly greater during postural rest, deglutition and even little more during maximal effort. Resting pressure appears greater only on the labial aspect of the mandibular incisors. Imbalance in these muscle forces is compensated by metabolic activity within the periodontal membrane through phenomenon of ACTIVE STABILIZATION. According to Garliner, tongue may act as impeding force or as a moving force.

- Impeding force prevent any natural movement of dental units (eg prevent eruption of teeth).
- As moving force, it actually moves the teeth. But again, duration of force (impeding or moving) is more significant than magnitude of force.

Figure 1: Development & Muscles of Tongue
Tongue Movements and Malocclusion: Tongue, a bundle of muscles with a free end, moves in complicated ways. In orthodontic practice, it has been controversial whether abnormal movement of the tongue during improper swallowing induces malocclusion.

1. Infantile (Visceral) Swallow

Characteristics of Infantile Swallow:

- The jaws are apart, with the tongue between the gum pads
- The mandible is stabilized by contraction of the muscles of the 7th cranial nerve & the interposed tongue.
- The swallow is guided, & to a great extent controlled by sensory interchange between the lips & the tongue.

Transition Period: At about the 5 to 6th month of age, as the incisors begin to erupt, certain proprioceptive impulses come into play & the peripheral portions of the tongue starts to spread laterally. An average infant would show a dominant & exclusive thrusting swallow for the first 6 months of life,a transitional thrusting & lateral spread of tongue during the next year & a dominant somatic swallow thereafter.

2. Mature (Somatic) Swallow

Characteristics of Mature Swallow:

- The teeth are together
- The mandible is stabilized by contraction of the mandibular elevators, which are primarily 5th cranial
- The tongue tip is held against the palate, above & behind the incisors. There are minimal contractions of the lips during the mature swallow.

Deglutition Cycle:\textsuperscript{3}

- **Preparatory Swallow:** Starts as soon as liquids are taken in, or after the bolus has been masticated. The liquid or bolus is then in a swallow preparatory position on the dorsum of the tongue. The oral cavity is sealed by lip & tongue.

- **Oral phase of swallowing:** Soft palate moves upward & the tongue drops downward & backward. Larynx & hyoid bone move upward. Smooth path for the bolus as it is pushed from the oral cavity by the wave like rippling of the tongue. Oral cavity is stabilized by the muscles of mastication, & maintains the anterior & lateral seal.

- **Pharyngeal phase of swallowing:** Begins as the bolus passes through the fauces. The pharyngeal tube is raised upward en masse. Nasopharynx is sealed off by closure of the soft palate against the posterior pharyngeal wall. Hyoid bone & base of tongue move forward as the pharynx & tongue continue their peristaltic - like movement of the bolus of the food.

![Figure 2: Infantile & Mature Swallow](image-url)
• **Esophageal phase of swallowing:** Commences as the food passes the cricopharyngeal sphincter while peristaltic movement carries the food through the esophagus, the hyoid bone, palate & tongue return to their original positions

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**Figure 3: Preperatory Swallow, Oral Phase of Swallowing, Pharyngeal Phase of Swallowing, Esophageal Phase**

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3. **Simple Tongue Thrust:** Defined as tongue thrust with teeth together swallow. Usually associated with history of thumb/digit sucking habit even though this predisposing habit no longer be practiced. Prolonged thumb sucking habit lead to development of anterior open bite which necessitate tongue to form anterior oral seal. hence, this simple tongue thrusting habit is almost always adaptive response to open bite malocclusion rather than being cause of it.

4. **Complex Tongue Thrust:** Defined as tongue thrust with teeth apart swallow. Complex tongue thrust is likely to be associated with chronic naso-respiratory distress, tonsillitis etc. When tonsils are enlarged and inflamed, root of tongue encroach these enlarged tonsils causing pain and discomfort. To avoid discomfort, mandible reflex drops down separating teeth and providing room for tongue to thrust forward during swallow for more comfort.

**Malocclusion associated with complex tongue thrust has two distinguished features:**

• **Poor occlusal fit:** There is no firm intercuspidation when study models are oriented together. This finding is unique for malocclusion associated with complex tongue thrust. Reason being that since teeth are not held in centric occlusion during swallowing, which over a prolonged period of time, will lead to instability of natural occlusal fit.

• **Generalized anterior open bite:** Unlike simple anterior tongue thrust, open bite produced by complex tongue thrust is diffuse

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**Figure 4: Simple Tongue Thrust**

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**Effects of Tongue Thrusting:** Thumb sucking + Tongue thrusting: If the finger displaces the maxillary incisors labially, the tongue thrusts forward to maintain lip seal. Accentuates the open bite tendency & prevents the incisors from erupting & forces them labially. Lips become more hypotonic & no longer contact each other during rest. Mouth breathing is aggravated.

Increased over jet – lower lip cushions to the lingual of the maxillary incisors. Mentalis muscle activity increases – puckering of the chin. Tongue drops lower in the mouth & no longer approximates the palate. Tongue elongates in shape. Balancing effect on the buccal
segment is decreased. Lateral peripheral portions no longer overlie the occlusal surfaces of posteriors.\textsuperscript{4}

**Net Effect:**
- Narrowing of the maxillary arch
- Over eruption of the posteriors
- Inter occlusal space is eliminated
- Posterior cross bite

**Figure 5:** Figure Horizontal Growth Pattern & Vertical Growth Pattern

**Tongue posture and malocclusion:**\textsuperscript{5}

- **Tongue Posture in Neonates:** Tongue is postured forward & touches the lips while the gum pads are held slightly apart.

**Infantile to Mature Tongue Posture**

1. Eruption of incisors
2. Downward & forward growth of the mandible – increases the intraoral volume
3. Growth of the alveolar process in vertical direction

- **Mature Tongue Posture:** During mandibular posture, the dorsum touches the palate slightly and the tongue tip normally is at rest in the lingual fossa or at the crevices of the mandibular incisors.

- **Abnormal Tongue Posture:** Abnormal tongue posture produces more obvious malocclusion than tongue thrust because abnormal posture is maintained almost all the time unlike thrust which occur only during swallow.

1. Retracted tongue posture
2. Protracted tongue posture
   A. (Retained infantile tongue posture) Endogenous
   B. Acquired adaptive

1. **Malocclusion Associated with Retracted Posture:**
   - Crowded mandibular incisors with lingual tipping & rotation
   - Excessive overclosure
   - Distoocclusion
   - Posterior open bite
2. **Protracted Tongue Posture**
• **Endogenous Protracted Posture**: Retention of infantile tongue posture Adaptation to excessive anterior facial height

• **Acquired Protracted Posture**: Transitory adaptation to enlarged tonsil, pharyngitis or tonsillitis

**Facial morphology and tongue dysfunction**: Morphology of facial skeleton and effects of tongue dysfunction are related to some extent.

• A horizontal growth pattern in conjunction with tongue thrust results in bimaxillary dentoalveolar protrusion A vertical growth pattern with tongue thrust, lower incisors are inclined lingually while upper incisors are proclined.

**Tongue Posture in Various Malocclusions**

• **Class I malocclusion**:
  - Most common type of tongue abnormality seen in class I cases is tongue thrust habit causing anterior openbite.
  - Occasionally bimaxillary protrusion is partly attributed to tongue abnormality being large or posture forward causing forward positioning of both arches

• **Class II Malocclusion**
  - Class II div I
    - Retracted and low
    - Buccinator force is not balanced by the tongue & this leads to narrow, ‘V’ shaped maxillary arch.
    - Lip and tongue team up to accentuate deformity.

  - Class II, Division 2 malocclusion: Since most of class II div 2 cases have horizontal growth pattern, deep bite and large free way space, tongue tends to accentuate the excessive curve of Spee by interting with the eruption of the posterior teeth. (lateral tongue thrust).

  - Class III Malocclusion:
    - The tongue tends to lie lower in the floor of the mouth below the occlusal plane
    - Since the maxillary arch does not have the balancing effect of tongue, the maxillary arch is usually narrow and the interocclusal space is either very small or entirely absent.

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**Figure 6: Tongue Posture**
Abnormal Size of the Tongue

1. Macroglossia
   - Psuedomacroglossia
     1. Habitual posturing
     2. Hypertrophied tonsil/adenoid
     3. Low palatal vault
     4. Severe mandibular deficiency
   - True Macroglossia
     Congenital:
     1. Muscular hypertrophy
     2. Glandular hyperplasia
     3. Hemangioma
     4. Lymphangioma
     5. Downs syndrome
     Acquired:
     1. Acromegaly
     2. Cretinism/Myxedema
     3. Amyloidosis
     4. Cysts/tumor
     5. Tertiary syphilis

Clinical Features of Macroglossia:
- The oral cavity is filled by the tongue mass
- Epipharynx is narrow
- Patient is able to extend the tongue to the nose tip/chin
- Indentations are evident on the tongue periphery
- Generalized spacing between the teeth
- Procumbent anteriors
- Open bite
- Treatment: Surgical trimming of the tongue

2. Microglossia or Hypoglossia
- Rare condition
- Protruded tongue tip reaches the lower incisors at best
- Floor of the mouth is elevated & visible on each side of the diminutive tongue
- Dental arch is collapsed & reduced with extreme crowding in the premolar area
- Severe class II malocclusion
- Impacted III molars

Conclusion

Though it is not yet established cause and effect relationship between tongue dysfunction and malocclusion, it seems that tongue thrust and/or particular posture and position of tongue may be associated with particular type of malocclusion.

As most of the tongue thrusting habits are adaptive in nature, care should be taken not to provide any room iatrogenically for this habit to start or continued. Complex thrusting and retained infantile swallow habits have definite effect on occlusion.

A thorough functional analysis of tongue should be performed to know exact dysfunction of tongue since prognosis varies for each of the abnormality. Wherever possible, underlying cause should be identified and eliminated.8

Ethical Clearance: Not needed as it is a review article.

Source of Funding: Self

Conflict of Interest: Nil

References


Invisalign: A Review of Literature

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Abstract

The purpose of this narrative review was to analyze publications that assessed the accuracy and efficiency of the Invisalign® system. A search strategy to identify articles that referenced Invisalign®, which were published between 2001 and 2019 was adopted and the relevant articles were segregated and perused to evaluate the accuracy of Invisalign technology in achieving predicted tooth positions with respect to direction of tooth movement and tooth type as also its indications, limitations, advantages & disadvantages. It could also be surmised that in comparison with the traditional fixed appliances, patients treated with Invisalign had a better periodontal health but the results achieved with it were not as accurate as those achieved by treatment with fixed appliances.

Keywords: Invisible orthodontics; Invisalign; Clear aligners.

Introduction

Movement of teeth without the use of bands, brackets or wires was described as early as 1945 by Dr. H. D. Kesling, who reported on the use of a flexible tooth positioning appliance. Minor tooth movements have also been achieved with a technique developed by Raintree Essix (New Orleans, LA) which used clear aligners formed on plaster models of the teeth. However, movements were limited to 2 to 3 mm and beyond this range another impression and a new appliance was needed.

Invisalign, a trademark held by the developers of the system “Align Technology, Inc.” was introduced in 1999 in USA. This appliance was the first orthodontic treatment method to be based solely on three-dimensional (3D) digital technology. The CAD-CAM technology was used in combination with laboratory techniques to fabricate a series of aligners in polyurethane capable of producing tooth movement in increments of about 0.25-0.3mm. Development of new aligner materials, staging of tooth movement, interproximal reduction, attachments on teeth and interarch elastics to address a wider range of malocclusions were the other dramatic improvements made in this Invisalign technology.1,2

Discussion

This review of literature highlights the role of the Invisalign system in orthodontics as also sheds light on the indications, contraindications, advantages, disadvantages and techniques of the same.

Boyd RL & Vlaskalic V3 (2001) reported the treatment results for cases of complex malocclusions including extractions. Patients in this study demonstrated excellent compliance, little discomfort and improved esthetics and hygiene when compared to fixed appliances.

Norris RA et al4 (2002) reported an interdisciplinary treatment approach using the Invisalign system for orthodontics in combination with restorative dentistry. The Invisalign system was used for opening the bite anteriorly, space distribution and midline correction. The restorative dentistry procedures involved veneering to enhance the maxillary incisor length-to-width ratio and provide anterior guidance.
Meier B et al. (2003) conducted a prospective study to produce a profile of those patients who were interested in treatment with the Invisalign® system and concluded that women between 20 and 29 years of age were interested in it for esthetic reasons.

Neumann et al. (2004) stated that the Invisalign system could be used as a space-maintaining and regaining appliance for a comfortable, rapid and hygienic distal movement and uprighting of the maxillary first molars after premature loss of deciduous molars and subsequent loss of space in sagittal dimension.

Miethke RR & Vogt S. (2005) evaluated the periodontal health in patients during treatment with either fixed orthodontic appliances or the Invisalign system. They concluded that periodontal health was not jeopardized even though the Invisalign system aligners covered all the teeth and the keratinized gingiva in part.

Giancotti A & Ronchin M. (2006) stated that malocclusions treated with the Invisalign system initially involved only mild crowding of 3-6mm. However, more complex cases involving premolar extractions, molar distalization, deep bites, open bites, crossbites, and periodontal complications have also been reported. The article demonstrated a case report of pre-restorative treatment of a non-growing patient using Invisalign appliance.

Kuncioa et al. (2007) in a comparative cohort study compared the postretention dental changes between patients treated with Invisalign and those treated with conventional fixed appliances and concluded that patients treated with Invisalign relapsed more than those treated with conventional fixed appliances.

Breznia N & Wasserstein A. (2008) concluded that OIIRR phenomenon (orthodontically induced inflammatory root resorption) was seen in a patient treated by the Invisalign technique. They treated a patient with Class III malocclusion using Invisalign technique. The patient experienced severe root shortening during treatment. They concluded that the OIIRR phenomena can unpredictably appear with the Invisalign treatment technique just as it does with all other orthodontic treatment modalities.

Eliadesa T et al. (2009) stated that the aligners were safe and do not release Bis-phenol A (BPA). The results showed that there was no evidence of cytotoxicity on human gingival fibroblasts and no stimulation of proliferation of the MCF-7 cell line at any concentration, indicating no estrogenicity of aligner elements.

Marcuzzi E et al. (2010) stated that recent advances in the Invisalign technique – particularly attachment designs that improved the three-dimensional control of tooth movement had resulted in new treatment strategies for patients who needed orthognathic surgery. The InvisalignClinCheck could be used for diagnosis, visualization of treatment results and sharing of information with the patient and dental colleagues throughout treatment.

Schupp W et al. (2010) stated that the Invisalign offered a comfortable and almost invisible treatment option for closing anterior open bites and that simulated rotation of the mandible in the ClinCheck analysis could be helpful if intrusion of the posterior segments was planned.

Schott TC & Goz G. (2011) evaluated the color fading in aqueous solutions of the blue dot wear-compliance indicators of the Invisalign Teen H System outside the oral cavity and concluded that the compliance indicators were not immune to simple intentional or unintentional manipulations and that they can best show an estimate of wear time but cannot be recommended as objective wear-time indicators.

Drake CT et al. (2012) examined the role of in vivo aligner material fatigue and subject-specific factors in tooth movement and concluded that over eight weeks, in two-week intervals, material fatigue did not play a significant role in the rate or amount of tooth movement.

Thyagaseely et al. (2014) evaluated the cellular responses of oral epithelium exposed to Invisalign plastic in vitro. Oral epithelial cells were exposed to eluate obtained by soaking Invisalign plastic in either saline solution or artificial saliva for 2, 4, and 8 weeks. Cells grown in media containing saline solution or saliva served as controls. Morphologic changes were assessed by light microscopy. Exposure to Invisalign plastic caused changes in viability, membrane permeability, and adhesion of epithelial cells in a saline-solution environment. It was opined that microleakage and hapten formation secondary to compromised epithelial integrity might lead to isocyanate allergy, which could be systemic or localized to gingiva. However, the results suggested that saliva might offer protection.

Marieke et al. (2014) quantified the forces and
moments delivered by a single aligner and a series of aligners and investigated the influence of attachments and power ridges on the force transfer. The forces and moments generated by aligners of the Invisalign system were within the range of orthodontic forces and it was deduced that the force change was exponential while a patient was wearing removable thermoplastic appliances.

Fujiyama et al\textsuperscript{18} (2014) evaluated and compared the difference in the level of pain using the visual analog scale (VAS) between cases treated with edgewise appliance and Invisalign and concluded that Invisalign treated patients experienced less pain than edgewise appliance.

Gerard et al\textsuperscript{19} (2015) investigated the mechanical and chemical alterations of Invisalign appliances after intraoral aging and concluded that despite the lack of detectable chemical changes, intraoral aging adversely affected the mechanical properties of the Invisalign appliance.

Ojima et al\textsuperscript{20} (2016) reported that a successful outcome with satisfaction, motivation and improved compliance by accelerating orthodontic tooth movement while changing aligners every three days, by means of accelerated treatment with OrthoPulse could be successfully achieved.

Houle JP et al\textsuperscript{21} (2017) investigated the prediction of transverse changes with Invisalign and came to the conclusion that for maxilla the mean accuracy of expansion planned with Invisalign was 72.8% and that for the mandibular arch it was 87.7% and that Clincheck overestimates expansion by bodily movement; when in actuality more tipping was observed.

Flores-Mir et al\textsuperscript{22} (2018) surveyed patients to assess their oral health-related quality of life and satisfaction immediately after completion of their orthodontic treatment and concluded that Invisalign and bracket-based treated patients except for chewing and eating had statistically similar satisfaction outcomes across all dimensions analyzed and that more satisfaction was reported by the Invisalign group.

Galan-Lopez et al\textsuperscript{23} (2019) did a systematic review to analyze publications that assessed the efficiency and accuracy of the Invisalign® system and concluded that the results achieved by it were not as accurate as those achieved by treatment with fixed appliances.

Indications for clear aligners:
- Mildly crowded and malaligned problems (1–5 mm).
- Spacing problems (1–5 mm).
- Deep overbite problems (Class II division 2 type malocclusions) where the overbite can be reduced by intrusion and advancement of incisors.
- Narrow arches that can be expanded without tipping the teeth too much.
- Minor tooth rotations.
- Orthodontic relapse.
- Active and passive retainers.

Limitations:
- Crowding and spacing over 5 mm.
- Skeletal antero-posterior discrepancies.
- Centric relation and centric occlusion discrepancies.
- Severely rotated teeth (more than 20 degrees).
- Anterior and posterior open bites.
- Extrusion of teeth.
- Severely tipped teeth (more than 45 degrees).
- Teeth with short clinical crowns.
- Arches with multiple missing teeth.
- Impacted teeth.

Advantages:
- Esthetics
- Comfort
- Better oral hygiene
- Bonding to enamel defects
- Numerous restorations and crowns
- Speech
- Appointments can be spaced at greater intervals
- Fewer emergencies
- No metal allergy
- Control of bruxism

Disadvantages:
- Limited control over root movement (such as
root paralleling), gross rotation correction, tooth uprighting and tooth extrusion.

- Limited intermaxillary correction: Severe skeletal discrepancies cannot be contemplated with Invisalign alone.
- Lack of operator control. If the treatment goes off track, then new impressions are needed and the case is ‘rebooted’ through the ClinCheck® mechanism and the treatment should be started from scratch.
- As they are removable, application of continuous force is questionable.
- Largely dependent on the patient’s habits and their consistency in wearing.
- Removal and re-insertion each and every time during eating.
- Damage to aligners while grinding or clenching teeth during sleep.

Techniques and Technology

Data Collection: It is essential to take high quality pre-treatment records- study models, panoramic and lateral cephalometric X-rays and photographs. These records (apart from the study models) are sent to Align Technology. Digital X-rays, digital models and photographs are an advantage. If impressions need to be taken they should be done with a polyvinyl silicone material, a single phase impression technique, or Pentamix 2, a dual-phase impression technique. Alternatively, it is possible to use a polyether material, a single-phase impression technique. A silicone bite material is also needed to record maximum intercuspation. The orthodontists’ input into this technology is the ‘prospective’ treatment planning. Unlike conventional orthodontics, Invisalign asks us to ‘visualize’ the completed result, so we can convey our intentions in the treatment planning process.

Treatment Planning: The orthodontists’ prescription is followed in positioning the teeth and the bite to proper alignment virtually on the computer with the company’s Treat software (Align Technology, Santa Clara, Calif). Once the final setup has been done, tooth movements are staged so that there are no occlusal and interproximal interferences. The data is then sent to the referring orthodontist to check the proposed treatment on the Invisalign Web site. The treatment plan is then translated into tooth movements and the orthodontist can view this ‘virtual correction’ stage by stage and from any angle. This process is called ClinCheck and alterations to the treatment plan are unlimited. Once the orthodontist has approved the treatment plan, the aligners will be manufactured so that the movements seen on the computer screen can be transferred clinically to the patient. The 3-D models of each step in the realignment are transformed into hard copy models through a process of laser build up. These models are then used to make the pressure formed aligners. A movement of 0.5 mm can be made with the initial aligner appliance and the teeth can be moved 1 mm with each of the following appliance. A typical Invisalign treatment will take around 25 aligners and 50 weeks of treatment, but can vary from 10 to 50 aligners depending on the severity of the problem.

Conclusion

Invisalign is an appliance to effect tooth movement in orthodontic therapy carried through ‘an invisible’ way. It adopts a method of fabricating clear custom fabricated aligners designed to gradually and sequentially move teeth to their desired positions using a computer assisted technology. However, future prospective randomized clinical trials with sound scientific evidence is deemed mandatory to accept this modality of treatment in the broader perspective of invisible orthodontics.

Ethical Clearance: Not required since it is a review article.

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Conflict of Interest: Nil

References


Finite Element Method in Orthodontics

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Abstract

Finite element analysis, an engineering method for analysing stress and strain has created a niche in the field of orthodontics because of its ability to deliver detailed and precise information regarding stress on load application. It divides the object of study into a finite number of elements and the connected by a meshwork and equations are developed for each elements thereby making each element an individual object of study. Several studies have been conducted using the finite element method and there is a lot of scope for this experimental method to be used in future as well.

Keywords: Finite element analysis; mesh; software.

Introduction

Finite Element Method (FEM) is a mathematical method in which, the shape of complex geometric objects and their physical properties are computer constructed. It is a modern tool for numerical stress analysis, which can be applied to solids of irregular geometry that contain heterogeneous material properties. For orthodontists, it provides quantitative data that can extend the understanding of physiologic reactions that occur within the dentoalveolar complex. Using FEA, the orthodontic force applied can be simulated and the results can be shown on a three dimensional model that can be fabricated using a CT scan. One can derive a precise and detailed description of the responses of periodontal structures to stress application.[1]

History: Finite element analysis was initially developed in the 1940’s, where R. Courant first developed this technique to study structural defects in aircrafts [2]. It was introduced in implant dentistry in 1976 by Weinstein. In 1972 Yettram started using this tool for orthodontic purposes.

Steps:

• Pre-processing.
• Conversion of geometric model into finite element model.
• Assembly/Material Property data representation.
• Defining the boundary conditions.
• Loading Configuration.
• Processing.
• Post-processing.

Pre processing:

Construction of the Geometric model:

• This can be achieved by:
• 3D – CT scanner: done for modeling complex structures or living tissues. eg: craniofacial skeleton, maxilla or mandible
• To achieve improved resolution CT cross-sections of at least 0.25 mm should be obtained. The sections will be recorded on DICOM format (Digital Imaging and Communication in Medicine) and imported into an image processing and digital reconstruction software and a virtual model is built using software(I Cat, Xoran Technologies).[3]
• Micro CTs can capture more details on gauge scale; but the high radiation, high costs and difficult access justifies the use of computed tomographies.\(^{(3)}\)

• 3D – Laser scanner: done for modeling inanimate objects.
  eg: modeling of brackets.

• to build a virtual model (Fig 1) using an image, processing and digital reconstruction softwares, such as Mimics (Materialize, Leuven Belgium), Simpleware 4 (Simpleware Ltd., Exeter, United Kingdom) or ITK-SNAP Open Source Software are used.

• The constructed models are stored in STL format.

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**Fig 1: Virtual reconstruction of maxilla using computed tomography**

**Conversion of Geometric model to Finite Element Model:** Discretization is the process of dividing the model into several small elements, connected with nodes (Fig 2). All elements and nodes help to establish a matrix connectivity which affects the computing time. It is essential that the elements are not overlapping but are connected only at the key points, termed as nodes.

The joining of elements at the nodes and eliminating duplicate nodes is termed as ‘Meshing’\(^{(4)}\) Fig 3. The process of representing a component as an assemblage of finite elements is known as discretisation. The process of meshing can be done by softwares like MSC Patran (MSC Software, Inc., USA), Ansys Inc., Canoneburg, PA, USA).

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**Fig 2: Schematic view of linear discretization of elements and nodes**
Assembly/Material Property data representation:

- For each element in the FEM mesh equations are developed and a set of global equations that model the properties of the entire system is assembled.
- Basic material properties required are poisons ratio and young’s modulus.

<table>
<thead>
<tr>
<th>Material</th>
<th>Young’s modulus (kg/mm²)</th>
<th>Poisons ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth</td>
<td>$2.6 \times 10^6$</td>
<td>0.15</td>
</tr>
<tr>
<td>PDL</td>
<td>$6.8 \times 10^2$</td>
<td>0.49</td>
</tr>
<tr>
<td>Alveolar Bone</td>
<td>$1.40 \times 10^3$</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Defining the Boundary Conditions:

- Boundary conditions means that if an element is constructed on the computer and a force is applied to it, it will act like a free-floating rigid body which will undergo a translatory or rotatory motion or a combination of the two without any deformation.
- To evaluate its deformation, restricting some degrees of freedom (movement of the node in each direction $x$, $y$, and $z$) is necessary for some of the nodes. Such constraints are called boundary conditions.

Loading configuration:

- Applying force at various points of geometry and its configuration

Processing:

- Is the process of solving the system of linear algebraic equation.
- The stresses are determined from the strains by Hooke’s law.
- Strains are derived from the displacement functions within the element combined with Hooke’s law.

Post-Processing:

- The output from the FEM is primarily in numerical form. It usually the output is in the form of nodal displacement and element stresses.
- Graphic outputs and displays are usually more informative.
- The curves and contours of the field variable can also be plotted and displayed. Deformed shapes are displayed and superimposed on unreformed shapes.
- The output is primarily is shown in the form of color-coded maps. Interpreting these maps help in the quantitative analysis. Fig 4.

Discussion

FEM is a technique where a complex mechanical problem is divided into a collection of much smaller and simpler domains (elements) in which the field variables can be incorporated by using shape function. The FE analysis has the following advantages: it is a noninvasive technique; the actual amount of stress experienced at any given point can be theoretically measured and is very accurate since its based on mathematical properties of the structure; Structures like the tooth, alveolar bone, periodontal ligament, and craniofacial bones can be simulated and their material properties can be assigned to the nearest one that possibly can simulate the oral environment in vitro; the displacement of the tooth can be visualized graphically; the displacement of the tooth can be visualized graphically; the displacement of the tooth can be visualized graphically; the point of application, magnitude, and direction of a force may easily be varied to simulate the clinical situation; reproducibility does not affect the physical properties of the involved material; and the study can be repeated as many times as the operator wishes\[^5\].
Application in Orthodontics: Finite element modeling can be applied in three areas:

(i) analysis of the skeleton,
(ii) analysis and design of orthopedic devices
(iii) analysis of tissue growth, remodeling and degeneration.

The FEM can also be applied to the problem of stress strain levels induced in internal structures. Thus, FEM becomes an ideal method for accurate modeling of the tooth and periodontium though it has a complicated 3-dimensional geometry. The FEM makes it possible to analytically apply the various complicated orthodontic force systems at any point and in any direction. Orthodontic tooth movement is achieved by remodeling processes of the alveolar bone, which are triggered by changes in the stress/strain distribution in the periodontium. The finite element (FE) method can describe the stressed situation within the periodontal ligament (PDL) and surrounding alveolar bone. It is also an effective tool to study orthodontic tooth movement. FEM is also used for morphometric analysis in craniofacial biology.

The cephalometric finite element analysis (CEFEA) program incorporates the advanced features of the finite element method. This program uses the color graphics display of common personal computers to show size change, shape change, and angle of maximum change which are pictured as colored triangles of clinically relevant regions between pre- and mid- or post treatment lateral head films. The program have their features of interest in both clinical practice and research.

The effect of altering the geometry of the bracket base mesh on the quality of orthodontic attachment employing a three-dimensional finite element computer model is another application of FEM in orthodontics as discussed by Knox et al. The CAD/CAM template helps orthodontists to safely place miniscrews.

Conclusion

FEM is powerful analytic tool for calculating stresses and strains within mechanically loaded structures. Through this method models of intricate structures consisting of various shapes and materials under complex loading can be made.

In Orthodontics, FEM is one of the very important applications in the field of bio-mechanics and cranio-facial biology. The orthodontist can precisely determine the effect of various biomechanical materials involved in tooth movement and provides quantitative and detailed data regarding physiologic response in tissues. The only drawback is the roots, periodontal ligament and teeth are represented in idealized geometric forms and physical properties are assumed to be homogenous, isotropic and linear.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References


Role of Vitamin-D in Orthodontics: A Review

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Abstract

Orthodontic tooth movement is planned for moving the teeth inside the tissues of the alveolar procedure of the maxilla and mandible, and changing the occlusal conditions, in this manner it is conceivable to improve the capacity and style of the masticatory framework. The orthodontic treatment depends on a powerful procedure of rebuilding the tissue structures of the alveolar procedure of the maxilla and mandible. At the point when the power is applied on teeth for quite a while, cutoff points of versatile disfigurements of tissues can be surpassed and translational relocation of a tooth can be watched. The got tooth development influences changes in the shape and organization (particularly in connection to the calcium-phosphate balance) of bone tissue and encompassing delicate tissues.

Keywords: Vitamin-D, Calcium, Lumisterol, Tachysterol.

Introduction

Historical and Physiological Perspectives:
Vitamin D is comprehended in light of the fact that the most seasoned all things considered and specialists have found the nearness of this ailment inside the early verdure species Emiliani huxleyi¹, that produces calciferol following sun exposure¹. elective maritime living things use the high calcium substance of E. huxleii for neuromuscular and metabolic exercises. As vertebrates advanced in territories encompassing seas, they held their requirement for calcium, a fundamental component in the improvement of the skeleton and bone mineralization¹. Be that as it may, vertebrates expected to keep up Vitamin D generation for calcium ingestion on land¹. A human body needs around 3,000–5,000 IU of vitamin D each day². A considerable extent of the body’s day by day prerequisite of vitamin D3 originates from dietary admission, particularly greasy fish, eggs, and braced foods³,⁴. An ongoing cross-sectional investigation in the UK contrasted meat and fish eaters with veggie lovers and veggie lovers, uncovering that vitamin D plasma levels were altogether higher among nonvegetarians contrasted with vegetarians⁵. Hosseinzadeh and Holick⁶ demonstrated that when individuals ingest vitamin D, the body joins it into chylomicrons. The body at that point discharges it into the lymphatic framework, and from that point, it enters the venous blood⁶. In the venous blood, vitamin D ties to vitamin D-restricting proteins and lipoproteins, which are moved to the liver⁶. Next, the liver procedures vitamin D2 and vitamin D3 by 25-hydroxylation to make vitamin D metabolite, which clinicians and scientists use to work out patients’ calciferol standing⁶. At that point, in the kidneys, the vitamin D metabolite experiences further hydroxylation to frame the secosteroid hormone calciferol⁶,⁷. Be that as it may, the principle wellspring of vitamin D is daylight presentation. In another investigation, Hollik demonstrated that following sun introduction, the body changes over vitamin D into previtamin D3, lumisterol, and tachysterol by means of a procedure known as photoconversion, and that sun presentation improves isomerization to sustenance
D3 by a warmth instigated membrane4. When vitamin D3 is shaped, vitamin D-restricting proteins convey it to the dermal slender bed8. During this procedure, the nearness of tachysterol and lumisterol averts vitamin D inebriation when people are presented to sunlight based bright B (UVB) radiation for delayed durations8. A few variables have been appeared by scientists to impact sustenance D3 generation, including skin pigmentation, age, apparel, the utilization of sunscreen salves, time, season, scope, and altitude2,7-9. In winter, the wide peak edge of the sun causes the sun oriented UVB photons to travel longer through the ozone layer before coming to the earth8. This may clarify why above and underneath around 33° scope, little, assuming any, nourishment D3 is made inside the skin all through winter10. This could moreover put forth a defense for why sustenance D3 blend happens exclusively between pretty much ten inside the morning and 3 toward the evening in central regions10.

Effect of VIT D3 on Tooth Movement: Vitamin D3 has conjointly pulled in the eye of some someone to its job inside the increasing speed of tooth development; 1,25 dihydroxycholecalciferol could be a discharge style of fat-dissolvable vitamin and assumes a significant job in nuclear number 20 harmony with thyroid hormone and endocrine (PTH).

Another arrangement of investigators 10, has caused a test where they to have infused vitamin D metabolite on the PDL of felines for a little while; it was discovered that vitamin D had quickened tooth development at an hour over the administration bunch in view of the addition of osteoclasts on the weight site as recognized histologically. A correlation between neighborhood infusion of vitamin D and PGEs on two distinct gatherings of rodents was likewise researched.

It was discovered that there’s no significant qualification in speeding up between the 2 groups. In any case, the quantity of osteoblasts on the weight aspect that was infused by fat-dissolvable vitamin was greater than on the PGE2 feature. This shows fat-dissolvable vitamin could likewise be progressively handy in bone turnover11.

Another specialist that may influence tooth development is vitamin D, 1,25-dihydroxycholecalciferol is the most dynamic metabolite of this vitamin. It primarily anabolically affects the bone tissue (to a little degree likewise catabolic)12. So also to PTH, sub-periostal organization of vitamin D upgrades the action and multiplication of osteoblasts13. These properties provoked analysts to style creature tests endeavoring to change the course of treatment.

Collins et al. utilized calcitriol broke up in DMSO (dimethylsulfoxide) – an intensify that promptly enters cell layers, just as has a high solvency coefficient for vitamin D) – controlled every day into the periosteum14,15. Following 3 weeks, the withdrawal scope of the canines was 60% higher contrasted with the benchmark group. Different specialists arrived at comparable resolutions, this time testing the activity of this vitamin on rodents. They saw an expanded number of the two osteoclasts and osteoblasts16-18. Kawakami and Takano-Yamamoto underlined the continuation of escalated redesigning during the maintenance time frame as well17. Thusly, Kale et al. seen that distalization of the maxillary incisors expanded by 23%.20 In a couple of clinical preliminaries, the increasing speed of orthodontic tooth development was likewise demonstrated19. After a day by day oral portion of 0.25 μg of vitamin D, the mean contrast in the withdrawal development between the exploratory gathering without vitamin D, there was a huge impact of vitamin D organization was higher than in the gathering and the benchmark group (who experienced orthodontic treatment without supplementation) was 1 mm/multi day. Notwithstanding, the utilization of a low portion of the enhancement in the examination seems, by all accounts, to be sketchy (10 IU versus the day by day proposals of 1000–2000 IU).

Narmada et al20 led an examination and presumed that osteoclast and RANKL expression in the gathering with vitamin D organization was higher than in the gathering without vitamin D, there was a huge impact of vitamin D on the tooth development in pregnant rodents. Vitamin D can quicken orthodontic tooth development by animating alveolar bone renovating during pregnancy.

Bone redesigning, following the utilization of orthodontic powers, incorporates resorptive and bone arrangement stages at the alveolar process21. A connection has been appeared between vitamin D receptor polymorphisms and periodontitis and bone metabolism22. Specialists have indicated that vitamin D, parathyroid hormone, and calcitonin direct calcium and phosphorus levels23,24. In different examinations, vitamin D invigorated bone resorption by inciting the separation of osteoclasts from their forerunners and expanding the movement of existing osteoclasts24-26. One of the previous endeavors was made by Boyce and Weisbrode27, who assessed the impacts of calcium-rich
weight control plans and vitamin D metabolite infusion on bone development in rodents. On day 1, osteoclasts in treated rodents expanded in contrast with controls. On days 3 and 4, the scientists watched a reduction in the quantity of osteoclasts. Boyce and Weisbrode reasoned that the exploratory gathering encountered a net increment in bone arrangement. Collins and Sinclair exhibited that intraligamentary infusions of vitamin D metabolites cause an expansion in the quantity of osteoclasts, and thusly in the pace of bone resorption, prompting an increment inside the pace of tooth development all through canine withdrawal. Afterward, in 2004, Kale et al thought about the impact of the organization of prostaglandin and 1,25-dihydroxy cholecalciferol (1,25 DHCC) on tooth development. Both were found to expand the measure of tooth development essentially when contrasted with controls. An expansion in the quantity of osteoclasts on the outer surface of the alveolar bone was expanded after the organization of 1,25 DHCC in contrast with prostaglandin organization. In this manner, the creators made open the job of 1,25 DHCC in encouraging tooth development through the guideline of bone testimony and the resorption processes. Some agents have proposed that notwithstanding quicker teeth development, limited organization of vitamin D improves tooth position soundness.

These research center investigations recommend that orthodontic patients with vitamin D inadequacy may encounter a more slow pace of tooth movement. There was a significant beginning increment in osteoclastic movement pursued by an osteoblastic action. These discoveries propose that vitamin D and its metabolites may encourage orthodontic treatment. Additional proof is expected to see the security of cholecalciferol treatment in orthodontic patients yet due to the best amount and site of use for this reason. Plus, given the high commonness of vitamin D insufficiency worldwide, it is significant that analysts investigate the clinical utilization of vitamin D metabolites to help the speed of tooth development during orthodontic treatment.

Consequences of Vitamin D Deficiency: The work of a fat-dissolvable vitamin is to deal with humor nuclear number 20 and phosphate fixations, which are significant for some physiological functions. These incorporate ordinary mineralization of bone, muscle compression, nerve conduction, and counteractive action of hypocalcemic tetany. Scientists accept that 1,25(OH)2D is fundamental for the body’s capacity to lift intestinal calcium ingestion to 40% and intestinal phosphorus assimilation to 80%, which are essential for skeletal prosperity in humans. Sniadecki contended that lacking presentation to daylight in youth causes destroying bone deformations known as rickets.

This ascent in the occurrence of hypercalcemia drove specialists to preclude the stronghold of milk and other dairy items with vitamin D. Researchers have connected vitamin D inadequacy to muscle torment and muscle weakness. In extreme situations, scientists have discovered that muscle decay is elucidated to optional hyperparathyroidism, coming about in hypophosphatemia. An ongoing meta-examination of old individuals indicated that taking supplemental and dynamic assortments of the fat-dissolvable vitamin day by day decreased the rate of falls by 19% and 23%, respectively. Additionally, a few examiners have demonstrated that the occurrence of specific sorts of malignant growth was higher among populaces in higher scopes, who experienced diminished sun exposure. Past examinations have revealed insight into the association between vitamin D insufficiency and cardiovascular diseases. In the planned Intermountain Heart Collaborative Study, which had in excess of 40,000 members, the scientists demonstrated that members with levels of 1,25(OH)2D under 15 mg/mL were bound to experience the ill effects of hypertension, hyperlipidemia, fringe vascular sickness, coronary supply route malady, myocardial dead tissue, cardiovascular breakdown, and stroke contrasted and sound controls. Truth be told, the frequency of type 2 diabetes mellitus was 52% higher among people with vitamin D levels over 25 mg/mL contrasted with those with levels underneath 14 mg/mL. From another point of view, a few investigations have indicated connects between the degree of vitamin D and the rate of immune system diseases. Numerous sclerosis, provocative entrail ailment, rheumatoid joint pain, and Crohn’s infection are progressively normal in high scopes and in regions with low sun exposure. This relationship was additionally bolstered by a few analyses exhibiting the job of vitamin D in controlling chemokine creation, checking immune system aggravation, and empowering the separation of invulnerable cells. Besides, specialists have demonstrated that vitamin D improves invulnerability against tuberculosis, flu, also, popular upper respiratory tract infections.
Various examinations have assessed the outcomes of vitamin D inadequacy. Notwithstanding, the information have been conflicting, which may be because of varieties in the demonstrative marks and cut-off qualities in characterizing an insufficiency state. Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

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Osteocalcin as a Skeletal Maturity Indicator: A Review

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Abstract

Bone mineral metabolism helps in understanding the sequence of boneloss and bone remodeling and in identifying those persons at risk from osteoporosis. One of the approaches that has yielded useful information is the examination of the role of collagenous and noncollagenous bone proteins in bone mineral metabolism. Osteoblasts are the cells responsible for new bone formation, and osteoclasts the cells for resorption. Osteocytes are derived from osteoblasts but their function although not precisely established probably involves calcium homeostasis and bone cell destruction comparable to osteoclastosis. The term remodeling or bone turnover refers to the sequential processes of resorption and subsequent formation for maintenance of mineral homeostasis. In normal man this remodeling cycle occurs at a particular site about every 3 months. The osteoclasts and osteoblasts which are responsible for remodeling appear to be anatomically linked or coupled in equilibrium. Osteocalcin (OC) acts as a regulator of bone mineralization. It also regulates osteoblast and osteoclast activity. This review article lays emphasis on the structure and interaction of OC with various other molecules; its skeletal effects and therapeutic applications.

Keywords: Osteocalcin; remodeling; bone turnover; osteoclasts; osteoblasts.

Introduction

Osteocalcin (Gamma carboxyglutamic acid or Gla) isolated and sequenced in 1977 is the most abundant non-collagenous matrix protein associated with bone. It is a small gamma carboxyglutamate protein preferentially expressed by osteoblasts and able to bind to calcium ions.¹ Osteocalcin (OC) was irrevocably established as a marker of bone formation and bone turnover.² In 1974, Vitamin K was identified as a cofactor for the formation of Gamma-carboxyglutamic acid (Gla). OC was thus identified as a vitamin K-dependent protein that undergoes carboxylation to bind hydroxyapatite in bone and has higher affinity for calcium facilitating bone mineralization.³

Methodology: A Pubmed search for articles relevant to the topic “Osteocalcin- A skeletal maturity indicator”, was done using MeSH terms – Osteocalcin, Skeletal Maturity Indicator. The search was limited to the period January 1980 to December 2019. 76 abstracts were perused out of which 37 articles pertinent to the topic were selected for the review.

Discussion

Osteocalcin has been observed to be high in cortical bone in comparison to trabecular bone.⁴,⁵ Higher peak osteocalcin values are observed in males as compared to females and this might be associated with greater cortical thickness observed in males as compared to females.⁶ Different mechanisms with complex interactions between associated biomarkers may regulate bone growth during puberty. The endocrine hormone such as the growth hormone stimulates skeletal growth by various mechanisms and it is also known to induce the production of osteocalcin in osteoblasts.⁷ The level of osteocalcin is correlated with the bone formation rate and hence is considered a more sensitive marker than serum alkaline phosphatase.

With increasing age the presence of osteocalcin in bone matrix may alter bone remodeling by promoting osteoclastic activity.⁸ Mature osteoblasts secrete osteocalcin into the extracellular space where this protein either enters the circulation or diffuses through osteoid and binds mineralized bone. An important step in the resorption of bone requires the recruitment and fusion of

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monocytes or macrophages to augment the population of multinucleated osteoclasts. Several studies suggest that the presence of osteocalcin in the extracellular matrix of bone may represent an important chemotactic signal for resorption.

The immunohistochemical distribution of osteocalcin in the extracellular matrix of bone indicated changes in the pattern of distribution of osteocalcin within individual osteons and these changes were age and gender specific. Bone is heterogeneous with respect to the distribution of osteocalcin in osteons. The presence of immunodetectable osteocalcin in the outer lamellae of osteons and its absence in the inner aspects may reflect the maturational state of the osteon. Perhaps the morphologic pattern of osteocalcin in osteons of male and female bone is due to alterations in the endocrine milieu associated with age or gender that affect bone remodeling. These site-specific biochemical changes in osteocalcin may in turn impart altered bone remodeling. During bone resorption, degradative products from bone matrix, including osteocalcin, are released into the extracellular space and are thought to further promote monocyte recruitment. Site-specific differences in osteocalcin in the extracellular matrix may influence site-specific remodeling events.

The Gamma carboxyglutamic acid (Gla) residues and the helical register in osteocalcin structure is essential to fully achieve the adsorption specificity for hydroxyapatite. The affinity of osteocalcin for hydroxyapatite is greatly diminished by decarboxylation of the Gla residues. When osteocalcin is adsorbed to hydroxyapatite, its Gla residues are protected from thermal decarboxylation. When Gla content is diminished, it results in reduced affinity for bone mineral. The low concentration of osteocalcin in human bone may relate to its apparent content of only two Gla versus the usual three Gla.

Osteocalcin synthesis is induced by the vitamin D metabolite, 1,25-dihydroxy-D3 (1,25(OH),D3). This induction is transcriptionally mediated by the nuclear vitamin D receptor (VDR), by virtue of a 1,25(OH),D3 response element in the osteocalcin gene. Vitamin A (retinoic acid) is also involved in the genomic regulation of osteocalcin synthesis.

Specific hormone interactions for each cell type are needed, and retinoic acid is required for the phenotypic expression of the 1,25(OH),D3 and thyroid hormone response element. The 1,25(OH),D3 response element of the osteocalcin gene is the element conferring retinoic acid responsiveness. Thus, vitamins K, D, and A are all involved in osteocalcin synthesis regulation. The interrelations between vitamin K, osteocalcin, and osteoporosis were reviewed by Binkley and Suttie.

The Gla protein is encoded by the bone gamma-carboxyglutamate gene located in the long arm of chromosome. The transcription of this gene requires modifications in the chromatin structure and nucleosomal organization that renders the regulatory sequences at promoter level.

Runx2 belongs to the RUNT domain transcription factors family and regulates the basal bone specific trancription of the OC gene; Mutations of the Runx2 sites results in altered chromatin structure and reduces OC transcriptional activity in bone-derived cells. Vitamin D serves as the principle enhancer of OC expression after basal transcription is initiated by Runx2. Vitamin D3 modulates the expression of the OC gene, presumably depending on the different skeletal site of origin and is able to increase OC gene transcription by three to fivefold. Hence, Runx2 gene and Vitamin D3 are considered to be the key regulators of osteocalcin.

Osteocalcin is also synthesized by odontoblasts but not by enamel-synthesizing cells (ameloblasts).

Osteocalcin may play a regulatory role in both resorption and mineralization. Evidence strongly supports OC being involved with mineralization and appearing at the time of mineralization. Osteocalcin also retards mineralization of bone and dentine and contributes to serum calcium homeostasis by inhibition of calcium phosphate precipitation and hydroxyapatite-seeded crystal growth. As OC strongly associates with calcium ion and hydroxyapatite, it also acts a negative regulator for mineral apposition and bone formation. It is proposed to be a chemo attractant for progenitor/mature osteoclasts.

The level of serum osteocalcin which represents the fraction escaping from the aqueous phase near the mineralization front may reflect osteoid volume rather than the rate of mineralization. Normal values of Osteocalcin range from 3-25 ng/ml depending upon the antisera employed. Hyperparathyroidism is associated with high levels of osteocalcin. The level of serum osteocalcin has been found to correlate with levels of PTH, serum calcium and adenoma mass. The increase
in OC in primary hyperparathyroidism has been shown with Ca kinetics or by bone histomorphometry to correlate with bone mineralization rate and formation. The estimated levels of OC are found to be more accurate than alkaline phosphatase.  

In normal males and females, some studies have reported an increase in serum osteocalcin with increasing age. The increase in females appears to be most striking at the time of menopause. This increase correlates inversely (P < 0.001) with concomitant decrease in bone mineral density of the lumbar spine, mid-radius, and distal radius. The overall positive correlation with alkaline phosphatase, urinary hydroxyproline, and serum PTH suggests an increase in bone turnover with aging. OC has been shown to exhibit chemotactic activity in the presence of peripheral blood monocytes and this activity may assist in the recruitment of monocytes to phagocytose dead bone or may cause osteoclastic bone resorption.

Osteocalcin is a negative regulator for mineral apposition and bone formation. Osteocalcin-deficient mice developed a phenotype marked by higher bone mass and bones of improved functional quality. The absence of OC in the mice lead to an increase in bone formation without impairing bone resorption. Hence, osteocalcin is proved to be a determinant of bone formation.

In light of these pieces of evidence and considering the role of vitamin K as the cofactor of carboxylase that converts uncarboxylated OC into OC, it is not surprising that low vitamin K status and intake predicted the risk of fracture in elderly women. A recent report demonstrated that uncarboxylated OC decreased significantly in the earlier period immediately after steroids administration in patients treated with risedronate. Moreover this steroid effect is not reversed by vitamin K supplementation, bringing into question the studies that demonstrated the uncarboxylated-Osteocalcin as an indicator of vitamin K status. It is also presumed that vitamin K itself is not able to correct the inhibition of OC synthesis by glucocorticoids which act at promoter level and suppresses the OC transcription gene.

It has been reported in literature that local application of osteocalcin accelerated the rate of orthodontic tooth movement by enhanced recruitment of osteoclasts on the pressure side. Serum osteocalcin levels undergo circadian rhythmicity in normal men and women. Changing hormonal status in women with regular menstrual cycles did not affect the pattern. Osteocalcin levels fluctuated twofold over the 24-hour study period. Hence, if OC is used as a marker in clinical investigations it is important to regulate the time of serum collection. Evidences report that various other factors also might influence the amount of circulating osteocalcin. Catabolism of osteocalcin is dependent on renal function, while 1,25-dihydroxyvitamin D3 is known to regulate its synthesis. It has been suggested that OC has effects on regulation of energy metabolism and fat mass. OC is the principle osteoblast secreted peptide that regulates energy metabolism and fat mass, targeting adipocytes and β pancreatic cells.

Besides its role in energy metabolism, it appears that OC may also have role in the regulation of angiogenesis and male reproduction. Further investigations are needed in humans to identify the extra-skeletal effects of osteocalcin and its therapeutic applications.

**Conclusion**

The relationship of bone activity, renal function, age, hormones and minerals to osteocalcin rhythmicity is mutual, however, extensive studies are required before firm conclusions could be drawn.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Association of Dental Occlusion, Body Posture and Temporomandibular Disorders: An Overview

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Abstract

Correlation between malocclusions and body posture and temporomandibular disorders have been a controversial topic, even though it has been discussed in the last decades, but there is still a lack of consensus in the literature. The available literature was searched to determine the current evidence regarding: (i) The relationship of the dental occlusion–body posture physiology, (ii) The relationship of temporomandibular disorders with occlusion and body posture and (iii) The availability and accuracy of the instrumental devices (surface electromyography, kinesiography and postural platforms) to measure the dental occlusion–body posture–Temporomandibular disorders relationship. The above said method and devices do not find any association between body posture and dental occlusion. This result can be due to the many compensation mechanisms taking place within the body’s neuromuscular system. The use of clinical and instrumental method for assessing body posture is not supported by the available literature, mainly because of wide variations in the techniques.

Keywords: Temporomandibular, Occlusal, Sensitivity, Specificity.

Introduction

Over the last 100 years, many theories have attempted to explain the cause of malocclusion. Most have stated that it is inherited, but, more recently, greater emphasis has been placed on the influence of the environment, especially the activity and the posture of the oral soft tissues. Unfortunately, it is not possible to measure long-term posture with any precision, and this has reduced its perceived importance. When some evidence is missing and much of the rest conflicting, there is merit in moving from the traditional “prove-it” attitude to philosophical reasoning to separate the probable from the improbable. We do not know to what extent posture and parafunction might be inherited, but there can be no doubt that facial and dental structures are, at times, strongly influenced by the soft tissues and that some malocclusions appear to have a postural basis.¹,²,⁴

Appropriate measures need to be adopted to measure the stomatognathic function and to assess its relation with the body posture. For this, several mechanical or electronic devices have been used as measurement tools in the research setting, they include surface kinesiography (KG), electromyography (sEMG), postural platforms and posturographic devices. However, their use in the clinical setup as stand-alone diagnostic method has raised a lot of negative criticism within the scientific community (5-6). Of course, the most common application for some of the above devices is in the diagnosis of TMD symptoms (8).

Method: A Pubmed search for articles relevant to the topic “Dental occlusion, body posture and temporomandibular disorders”, was done using MeSH terms –“occlusion,posture,temporomandibular joint “. The search was limited to the period January 2005 to September 2019. 98 abstracts were perused out of which 58 articles pertinent to the topic were selected for the review.

Occlusion, body posture and TMD symptoms: Undeterred by the attempts made to assess and improvise the accuracy of the instrumental devices for the research of the stomatognathic system and its association with body posture (9-13), they have their own limitations to their clinical use due to the lack of normative values controlled for age, sex, weight, facial morphology and height.

Furthermore, data interpretation is unreliable due
to the high intra- and inter-examiners variability(14). Most of the instrumental data on the stomatognathic system were achieved with sEMG recordings, which aid in assessing the kinesiology of movement disorders, myoclonus and dystonia, to evaluate gait and pace disorders, to discriminate between different tremors, to measure psychophysical reaction time. The most useful and unique field of application for sEMG is the research setting, even though too many shortcomings do not suggest its clinical application in diagnosis(15). Regarding the association between occluso-postural features and clinical symptoms, the literature shows poor predictive rate of occlusal features for TMD symptoms(16-17). Also, it must be considered that myogenous TMD pain could be responsible for muscle tone and postural adaptations, so the information renders less valuable. Moreover, even the most recent systematic literature reviews did not comply with the use of irreversible occlusal therapies for TMD treatment and/or prevention(18-20). Despite the numerous amounts of papers concluding that studying dental occlusion is not a key factor in the TMD diagnosis. Occlusal features are neither found to be associated with TMD(21) nor with muscle disorders(22), even though they are the way through which muscle forces get transmitted to the various structures of the stomatognathic system(23). Also, the presence of occlusal abnormalities in patients with TMD could be due to joint degeneration and/or remodelling leading in an occlusal shift(24). Data from randomized controlled studies suggest that in healthy subjects the play of an occlusal interference leads to a deterioration of the EMG activity of the masseter muscles(25) and doesn’t majorly affect pressure pain thresholds(26). Furthermore, subjects with a TMD history seemed to respond differently to iatrogenic occlusal interferences in comparison with the subjects who had no history of previous TMD(27). Besides, an acute experimental occlusal alteration cannot be compared with a clinical diagnosis of the presence of a ‘non-ideal’ dentition which the patient gradually adapted over the years(28,29). Temporomandibular disorders have a multifactorial etiology and there is no single factor causing it thereby deriving weak associations between occluso-postural factors and TMD as described by few authors in their study(30,31). The role of occlusion in the etiology of TMD have well established concepts in field of prosthetics and orthodontics, since wrong occlusion on restored/treated dentition has the potential to lead to iatrogenic trauma(32,33). To conclude, a mechanical approach to TMD management by ways of irreversible occlusal treatments, which are recommended on the basis of diagnostic assessments of patients with TMD, should be discouraged from a scientific viewpoint and also condemned from an ethical viewpoint(39). Owing to the poor knowledge on TMD etiology(34-37), the treatment for TMD treatment is based on symptoms management by reversible and non-invasive treatments(40); most patients suffering with TMD symptom are good responders to unspecific treatment regimens, due to symptom fluctuations and and placebo effect(41,42).

**Diagnostic reliability of technological devices:** Practically, to be useful clinically, the instrument should have repeatability and technical efficacy, accuracy to measure the main pathological marker (i.e. presence vs absence of disease) renders the validity of the instrument. The main pathological marker is pain in the field of TMD. The quest to determine the association between clinical symptoms (e.g. pain evoked with palpation) and instrument efficacy lead to development of better recognizing measures, such as magnetic resonance imaging(43,44), for accurate diagnosis(45,46). The same concept applies on clinical efficacy of sEMG, KG and postural platforms, which have internal validity. Many authors showed that these techniques have a low accuracy to distinguish amongst patients with TMD and asymptomatic subjects(47-49). Their involvement as diagnostic or even treatment-planning tool in patients with TMD can be justified owing to greater false positives, almost up to 80% for various parameters (e.g. sEMG values at rest, all postural platform variables and all kinesiographic parameters)(50-51). Despite this, the literature also projected that sEMG they usage can be relied in the clinical setting. According to the pain adaptation model

and(50-51), motor units recruitment are affected negatively and maintaining normal physiological functioning causes reduction in maximum muscle force. Standardized approaches under controlled experimental conditions allowed recording accurate measurements(52), with valid values of sensitivity and specificity for sEMG values at the time of maximum clenching(50). Standardized sEMG in laboratory settings showed a sensitivity of 86% and a specificity of 92% to discriminate between patients with TMD and those with pain in the neck but they cannot identify asymptomatic subjects(52-54). Those two studies assessed respectively an asymmetry index of the body sway area on postural platforms applied in controlled laboratory settings(55), and few clinical parameters for the trunk postural analysis on the sagittal plane(55). Therefore, numerous
studies, even if positive outcome were claimed on the use of postural platforms even though not substantiated by their own study (52-54), discouraged the use of clinical postural assessment and posturographic devices in the field of dentistry (56-59).

**Conclusion**

To conclude, there is no evidence substantiating association between occlusal and postural features, and it is quite evident that TMD pain is unrelated to the existence of measurable occlusopostural abnormalities. Therefore, the employment of instruments and techniques aiming to measure occlusal, electromyographic, kinesiographic or posturographic abnormalities can’t be justified in the evidence-based TMD practice.

The use of devices to assess dental occlusion and body posture have to be restricted to controlled research settings. Only then, hypothesis-tested clinical revelations can be drawn. From an ethical viewpoint, all medical professionals involved in the management of patients with TMD have to recognize their role of care-providers taking care of the patients’ interests within the boundaries of evidence-based medicine.

**Ethical Clearance:** Not required since it is a review article.

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Dermatoglyphics in Orthodontics: A Review

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Abstract

The word dermatoglyphics is basically a greek word meaning derma=skin, glyphae = carve. It is the scientific study of friction ridges on the palmar and plantar surfaces of hand and feet. Fingerprints are usually formed at the 13th to 19th week of an embryo. It is revealed 6 months after birth. They remain constant, except for the change in their sizes. Embryological development of oro dental structures occurs around the same time. Hence many studies were done to establish the association between dermatoglyphics and dental and skeletal malocclusions. In developing countries with a large population, the simplicity of dermatoglyphic technique and its inexpensiveness warrants its continued use as a diagnostic tool. When combined with other clinical and investigative features dermatoglyphic study can serve to strengthen a diagnostic impression and can be used as a useful screening device.

Keywords: Dermatoglyphics, Finger prints, Hypodontia.

Introduction

The history of dermatoglyphics goes back through centuries when Chinese used it as a means of fortune telling. Ancient Indians believed that the presence of ten whorls destined a person to be an emperor.

In 1684, Nehemiah Grew, a physician, published the first description of the epidermal ridges making distinct patterns while recording fingerprints. These “innumerable little ridges of equal width and distance, and everywhere running parallel one with another,” contain the pores of the sweat glands. Grew also described them as “ellipticks” and “triangles.” After which, another paper was published in Amsterdam of a brief account in Bidloo’s (1685) Anatomia Humani Corporis. After a couple of years, a comparable description was given by Malpighi in De Externotactusorgano. After a long time, in 1823, Purkinje, described nine types of patterns (or varieties of curvature) on the fingers.

However, Galton in 1892 carried out the first systematic study. Initially, the value of fingerprints for personal identification was studied, for their uniqueness and constancy. He was the first to study dermal patterns in families and racial groups. It was further elaborated and improved by Sir Edward Richard Henry of Scotland Yard for identifying criminals. And they are increasingly used in anthropology, medicine, and genetics. Dermatoglyphics, as Harold Cummins of Tulane University, named the study of epidermal ridges in 1926, cuts across all these disciplines.

For many years, evidence has accumulated, which suggest that fingerprint patterns are determined by heredity. Yet qualitative analysis and other features of fingerprint patterns such as form and direction led to inconclusive results. In 1950, Cherrill published a paper on fingerprints and diseases. As a result of examination of the hands of decomposed cadavers over a long period, he noticed that the muscles and skin of the left-hand exhibit signs of greater decomposition than the right. Cherill’s work was followed by Fang’s “A note on a-b ridge count and intelligence.”
During the 1950s, the most relevant paper to appear was Walker’s, “The use of Dermal Configurations in the Diagnosis of Mongolism” (1957), which extended the knowledge of dermatoglyphics in this condition and attempted to quantify dermal configurations for use as a meaningful diagnostic tool.

In the past 50 years, a lot of work has been done on various aspects of dermatoglyphics and developmental disorders, to name a few: on rudimentary palms of infants damaged by Thalidomide. “A dermal configurations in the diagnosis of Down syndrome; “Unusual dermatoglyphic associated with major congenital malformations;” Palmar and digital dermatoglyphics in Congenitally deaf subjects.

**Morphology:** Cummins and Midlo\(^3\) classified various pattern types on fingertips as:

1. Arch
2. Loop
3. Whorl
4. Composites.

**Fig 1:** Three basic patterns of fingerprints

1. Loops: Ridges entering from a side and exiting from the same side is a loop. All loops have one delta. Loops were divided into single loop or double loop.
2. Whorl: Has at least two deltas and a type line. One ridge must complete the circuit. Ridge can be spiral, oval, or any variant of a circle. The whorl was further sub-classified into symmetrical and spiral whorls.
3. Arches: They do not have a type line, deltas, or cores. Simple arch is the simplest and constitutes ridges extending from one side of the print to the other side at the center of the pattern, thus forming a wave-like structure. The tented arch is similar, but rises sharply in the center, causing a thrust/spike, or the ridges meet at an angle less than 90 degrees\(^4\)

**Use of Dermatoglyphics in Dentistry:**
Dermatoglyphics is used in dentistry to determine oral pathology like oral clefts, dental caries, and submucous fibrosis\(^4\). The different patterns of fingerprints like plain loop, double loop, arch with loop, plain whorl, double whorl, arch with whorl, plain arch, tented arch and central pocket loop have an important role in determining the degree of dental caries with increase in whorls a person is more prone to dental caries while less number of loops decreases a person’s susceptibility to caries\(^5\). Increased whorls, higher total finger ridge count and higher interdigital radial and ulnar loops are characteristics of caries. In case of cleft lip and palate, there is high incidence of arches, double loops and ulnar loops.

**Method of Recording Dermatoglyphics:**

**Ink Method:** This is one of the most widely used method. The various required equipment are printer’s ink, a roller, a glass or metal inking slab, a sponge rubber, and good quality paper.\(^6,7\)

**Faurot Inkless Method:** In this method, commercially available patented solution and specially treated, sensitized paper are used.\(^7\)

**Photographic method**

It is based on the total internal reflection. \(^8\)

**Transparent adhesive tape method:** In this method, a dry coloring pigment is applied to the skin and is lifted off with the transparent adhesive tape.\(^9\)

**Special method:** This helps in studying the correlation between the epidermal patterns and the underlying bone structures.\(^9\)

**Numerical method:** In this method, an algorithm of images of fingerprints is used

**Dermatoglyphics in Orthodontics:** Kharbanda et al.,\(^10\) in 1982, conducted a study on 25 North Indian males by with true mandibular prognathism which was confirmed with cephalometric Down’s analysis. They compared this with the dermatoglyphic findings of individuals with Class I occlusion and craniofacial pattern. They stated in their study that the craniofacial
skeletal Class III pattern was associated with an increase in arches and ulnar loops at the expense of whorls on all digits except digit II, there was an increased frequency of whorls and radial loops, and an increased frequency of carpel loops on interdigital area of palms.

Lakshmi conducted a study in 1989, where they studied the fingerprint patterns of twenty patients with hypodontia and compared with those of twenty normal males and 20 normal females. The frequency of whorls and arch patterns was more compared to that of the loop patterns in individuals with hypodontia as compared to normal females. An increased frequency of whorls and decreased frequency of loops and arch patterns were found as compared to normal males.

In 1997, the study was conducted by Reddy et al. where dermatoglyphics was used to predict and compare Class I, Class II division 1, division 2, and Class III malocclusion. The study revealed that increased frequency of arches and ulnar loops and decreased frequency of whorls were associated with craniofacial Class II division 1, division 2, Class III malocclusion was associated with an increased frequency of arches and radial loops with decreased frequency of ulnar loops.

A study was undertaken by Trehan et al. in 2000 to analyze and compare the dermatoglyphic patterns of patients with normal occlusion and various classes of malocclusion. The study showed an association of increased frequency of radical loops and arches with Class I and Class II division 1 malocclusions. Furthermore, an association of an increased frequency of whorls with Class I and Class III malocclusion was seen when compared to normal occlusion.

A study was conducted by Reddy et al. in 2013 in an attempt to compare the dermatoglyphic patterns of individuals with normal occlusion and various classes of malocclusions. Particular predictive occurrence of patterns was not found to be associated with each group, but some of the fingerprint patterns such as twinned loops were seen with an increased frequency in Class II malocclusions and radial loops were absent in Class III malocclusions.

In 2019, a study by AlShahrani, to assess correlation of dermatoglyphic pattern with quantitative palatal anatomic parameters measured using three-dimensional scanning of dental casts and to explore the possibility of utilizing these to predict future occurrence of malocclusion.

**Conclusion**

In can be concluded from the above studies there is a co-relation between ridge patterns and malocclusion. However, dermatoglyphics can only be used as a screening method but not the diagnostic method because, numerous other factors such as ethnic and racial variations, congenital, environmental and other local factors can also influence the development of malocclusion.

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Application of Resonance Frequency Analysis in Orthodontics: 
A Review

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Abstract

The success of mini implants depends on primary stability followed by secondary stabilization. Resonance frequency analysis has been used to assess the primary stability of implants used in dentistry. There is a paucity in the literature regarding its use in orthodontics. This review attempts to showcase the efficiency and reliability of resonance frequency analysis for assessing stability of orthodontic implants.

Keywords: Mini implants; resonance frequency analysis; primary stability.

Introduction

Primary stability results from mechanical interlocking of implant threads with cortical bone and secondary stability develops from regeneration and remodeling of bone and tissue around the implant post insertion. The combined effects of primary and secondary stability determine the total clinical stability of an implant.¹

There are different method to measure the stability of mini-implants. The most widely reported approach is measurement of maximum insertion torque during insertion for which precise torque sensors are commonly used. Periotest device is yet another equipment used for measuring stability. It works on the principle of capturing the damping characteristics of a mini-implant. This is accomplished by percussing the implant head with a small pestle that will rebound at a specific speed depending on implant stability. During contact, a piezoelectric crystal inside the head of the pestle is deformed, thus creating an electric impulse that reveals the duration of contact. This time based information is converted to stability expressed as Periotest values. This method first developed to measure tooth mobility, was introduced to implant dentistry by Bragger et al. ²

In 2000, the Osstell device³ (Integration Diagnostics AB, Göteborg, Sweden) was introduced for monitoring dental implant status. When a detection device is used for resonance frequency analysis (RFA), stable coupling between the SmartPeg transducer and implant is needed. A transducer suitable for the size and structure of a particular mini implant may be difficult to obtain. The main advantage of RFA over traditional method such as torque assessment is the ability to perform measurements without changing or disrupting the mechanical characteristics of the bone-implant interface⁴ making it the most appropriate method to monitor the stability of implants throughout their clinical application.

This review of literature focuses primarily on the efficiency and reliability of resonance frequency analysis in measuring the primary stability of orthodontic mini implants.

Method

A Pubmed search for articles relevant to the topic “Resonance frequency analysis in orthodontics”, was done using MeSH terms –“Orthodontics”, “Resonance Frequency Analysis”. The search was limited to the
period January 2005 to September 2019. 86 abstracts were perused out of which 19 articles pertinent to the topic were selected for the review.

Discussion

RFA is considered to be the gold standard noninvasive method for measuring the clinical stability of dental implants immediately after placement. One of the method to check the primary and secondary stability of implant is measuring the peak insertion and removal torque values. Disadvantage with this method is that it can be done only during insertion and removal of the mini implant. Orthodontic mini-implants differ from prosthetic dental implants with respect to size, design, surface characteristics, insertion method and insertion sites due to which the results of RFA measurements are significantly affected. To assess mini-implant stability several authors tried various method to make the smart peg compatible with the mini implant head.

Meredith et al 5 described the resonance frequency analysis using Osstell device. Osstell devices have been manufactured since 1999 by the Integration Diagnostics Ltd. Company (Sävedalen, Sweden). Several generations of this device have followed one another for implant stability measurement like Osstell, Osstell Mentor and OsstellISQ. This device uses transducers that are connected to the implant. One difficulty that is encountered is the connection between the mini implant and the SmartPeg. The transducers (SmartPegs) produce a lateral force on the fixed components and the system shift is then measured. Thus, RFA measures the stiffness and deflection of the implant-bone complex 5. The value obtained by Osstell is automatically translated into an index called Implant stability Quotient (ISQ), ranging from 1 to 100 with 100 being indicative of highest stability value (Fig 1). It also allows stability to be evaluated over time.

Yu yusu et al 6(2009) performed a study regarding RFA for mini implants used adhesive fixation of a magnet to the mini implant’s head. The results suggested that RFA might work for mini implants. However, it should be noted that the bonding strength between the transducer and the implant could be affected by factors such as acrylic resin thickness, moisture contamination, or available bonding area. Moreover, it is still unknown whether similar results could be obtained with different adhesives. Veltriet al 7 soldered the SmartPeg over the implant head using an abutment. However, this method was not suitable as the soldering process might affect the magnetism property of the SmartPeg.

In a study by Ureet al 8, the SmartPegs were screwed into the head of the mini implants and tightened with finger pressure. Screwing the Smart Peg into the head of the mini implant and unscrewing it after the recordings may have contributed to the high failure rate, because all of the failures occurred while attempting to unscrew the Smartpeg.

A study done by Nienkemper et al 9 have found a strong correlation between Periotest values and RFA and they have suggested that RFA is a feasible measurement method for orthodontic mini implants. Nienkemper et al 10,11 modified the SmartPegs to fit with the inner screw thread of orthodontic mini-implants. Therefore, it
would be desirable to use RFA to evaluate orthodontic mini implants as well. Because of the sensitivity of this measurement technique, a stable, solid, and reproducible connection must be ensured to make it work. However, this screw coupling cannot be made on the mini implant head as the head of the mini implant is used for various mechanics purpose, and moreover, the head of the mini implant is small to provide a screw coupling. To meet all the requirements of an ideal connector, Hosein et al. described a universal adaptor (MISPA) that fitted with multiple mini-implant designs without altering the implant itself. However further clinical trials are required to check its efficiency and accuracy. Suzuki et al. in his study, to evaluate the possibility of using RFA to assess the stability of miniscrew implants made a custom connector to allow the attachment of the transducer to the head of the miniscrew implant head. Tseng et al. used a RF analyzer (Implomates, BioTech One, Inc., Taipei, Taiwan) in many of his studies in which the mini-implant’s head was impacted by the tapping rod of Implomate.

Conclusions

- RFA is a reliable method for measuring orthodontic mini-implant stability provided there is adequate bonding strength between the transducer and the implant.
- It could be effectively used for clinical evaluation of current stability and stability-related loading of mini-implants in order to reduce the failure rate of mini implants.

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References

Role of Respiration and Malocclusion: A Review

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Abstract

Prevalence of Malocclusion has been increasingly reported. A proper diagnosis of the etiological factor is crucial to achieve a successfully completed treatment. Malocclusions have peculiar distribution of occurrence. This can be attributed to the geographical condition, developmental anomalies or habits that are acquired over time. A thorough investigation of the malocclusion, the reason for its development and others factors that could influence the treatment outcome should be analysed before starting any procedure. This review article specifically analyzes the role of respiration and how its alterations can result in the particular type of malocclusion. A proper understanding of the basic anatomy and physiological process, guides in clinical correlation of the aberration. Furthermore, other additional diagnostic method to assess the qualitativeness and quantitativeness of the type of respiratory disorder will aid in accurate diagnosis and various treatment modalities that can be included to eliminate this etiological factor in intercepting the malocclusion. Dentists maybe the first healthcare professionals to have contact with a mouth breathing child. Thus early detection and need for appropriate treatment can be made possible when there is a series of tests that can be implemented to assess the need for management.

Keywords: Malocclusion, Gingivitis, Periodontitis.

Introduction

Nasal breathing is a key factor that influences the growth and development of the orofacial complex by aiding proper functioning of the oral cavity. Ideal cycle of normal respiration includes cleansing, humidification and moisturization of the inspired air.

Any obstruction or congestions of the upper respiratory tract may negatively impact the most optimal respiratory tract. This switch from nasal to oral breathing leads to serious consequences. They have a negative impact on the developing orofacial region and often result in other symptoms such as sleep disorders, such as frequent waking-up, nocturia, difficulties falling asleep. Chronic muscle tension around the oral cavity could result in the widening of cranio-vertebral angle, posterior position of mandible and narrow maxillary arch. Among dental alterations the most common are class II malocclusion (total or partial) with the protrusion of the anterior teeth, cross bite (unilateral or bilateral), anterior open bite and primary crowded teeth. Apart from malocclusion, chronic gingivitis, periodontitis, candida infections and halitosis are frequently present in mouth-breathing patients.

Mouth breathing is defined as the habitual respiration through the mouth instead of the nose which can be either Obstructive, Habitual or Anatomical type. There are various factors that contribute to this of which commonly seen ones are Nasal Obstruction that includes hypertrophy of nasal turbinates due to allergies, chronic respiratory infections, pollution or hot and dry climatic conditions, Pharyngeal Lymphoid tissue hypertrophy such as tonsillitis, adenoids enlargement. Other conditions associated with it are Intranasal defects – deviated nasal septum, allergic rhinitis, nasal polyps.
genetic predisposition, short hypotonic lip, Obstructive sleep Apnoea syndrome or habitual.

Therefore, it is necessary to intervene early on these aetiological factors of malocclusion to prevent its development or worsening and, if already developed, correct it by early orthodontic treatment to promote skeletal growth.  

Basic Anatomy and Physiology: Breathing is defined as pulmonary ventilation, wherein there is a movement of air between the atmosphere and the lung alveoli. It involves 2 events: inspiration and expiration.

The airways are subdivided into conducting zone (airways) and respiratory zone. The conducting airway carry the air in and out of the lungs. It comprises of the following: the nose, the nasopharynx, larynx, trachea, bronchi, bronchioles and terminal bronchioles. Orthodontists can influence and bring about changes if the derangement is around the nasopharynx region.

Respiratory need are the predeterminant of the posture of the jaws and the tongue. An altered respiratory pattern (mouth Breathing) could change the position of the jaw, head and tongue. Thus the mandible and tongue are lowered, head extended, and face height would increase, posterior teeth would supraerupt. The mandible tends to rotate downward and backward, opening the bite anteriorly and increasing the overjet giving the descriptive appearance of adenoid facies.

Clinical Correlation of Applied Anatomy: Mouth breathing habits are frequently associated with orthodontic problems. In the nasal area, the lack of ventilation leads to an underdevelopment of the maxilla: lateral and sometimes anterior cross bites appear. In the buccal area, the need of maintaining the mouth opened induces a new postural position of the mandible which alters the pattern of growth of the mandible (“long face”). The functional context of the buccal praxis is also altered: low or protruded tongue, deviant swallowing, troubles of speech. The treatment of this pathological context needs a pluridisciplinary approach where the otorhinolaryngologist, the dentist, the orthodontist and the speech pathologist have to play an important role. In the orthodontic fields, we have to carry out an orthopedic treatment (rapid maxillary expansion, facial masks) to normalize the growth of the maxilla before the orthodontic treatment.

The prevalence of posterior crossbite is higher in mouth breathing children than in the general population. During mixed and permanent dentitions, anterior open bite and class II malocclusion were more likely to be present in mouth breathers. Although more children showed these malocclusions, most mouth breathing children evaluated in this study did not match the expected “mouth breathing dental stereotype”. In this population of mouth breathing children, the obstructive size of adenoids or tonsils and the presence of rhinitis were not risk factors to the development of class II malocclusion, anterior open bite or posterior crossbite.

Felcar et al 1 found absence of sealed lips in 58.8% of mouth breathers, and sagging and hypofunction of the orbicularis oris muscle were considered causes of lack of lip seal in 67% of mouth breathers. Absence of sealed lips suggests the presence of vertical and sagittal facial discrepancies, inadequate lip length, increased lower facial height, abnormal breathing function, and altered lip tonicity. Increased lower facial height, a characteristic of the dolicho facial type, in

The most prevalent malocclusions found in the mouth-breather group were atresic palate and anterior open bite. Several studies have confirmed the close relationship established between teeth, supporting tissues and the functional activity of the neuromuscular system. When abnormal pressure of muscles interferes in facial growth, it can determine the appearance of a malocclusion. The tongue can take a low and forward position, which is common in the presence of hypertrophic palatine tonsils as an attempt to increase posterior airway space and ease breathing. The low position of the tongue decreases internal pressure in the upper arch, increasing the external pressure of perioral muscles and causing an atresic palate. Because imbalance can cause anatomical and functional changes, proper balance between bones, muscles, and dental structures is essential.1

Postural problems were noted to be significantly more common among children with mouth breathing syndrome, thus highlighting the need for early interdisciplinary treatment2 he principal etiologic bases of MBS are mechanical obstruction of the upper airways (adenotonsillar hyperplasia, inferior turbinates hypertrophy and nasal septum abnormalities), inflammatory diseases (allergic rhinitis) and congenital malformations with craniofacial deformities. In chronic mouth breathing air reaches the lungs via a shorter and easier path. This can lead to changes in respiratory rhythm with deglutition of air, which causes abdominal
distension and flaccidity, compromising thoracic expansion and pulmonary ventilation. Changes to muscle strength balance have also been observed, in addition to effects on growth and development, caused by poor respiratory mechanics and function.

Mouth breathing children with snoring tend to have a more convex profile than non snorers. Clinical examination can reveal lips to be apart, deep breathing, hoarseness of voice, malocclusion.

**Method of Diagnosing Disorders of Respiration:** Reliable way to quantify the extent of mouth breathing is to establish how much of total airflow goes through the nose and how much goes through the mouth, which requires special instrumentation to simultaneously measure nasal and oral airflow. For the average individual, there is a transition to partial oral breathing when ventilatory exchange rates above 40-45 L/min is reached. At maximum effort, 80 or more of air is needed. At rest, a minimum of 20-25 L/min is present but heavy mental concentration or even normal concentration leads to increased airflow and transition to partial mouth breathing.

COMMONLY USED clinical testing method include:

1. Mirror test
2. Butterfly test – Massler and Zwemmer
3. Water holding test
4. Rhinomanometry
5. Cephalometrics

Cephalometric variations include considerable backward and downward rotation of the mandible, increased overjet, increase in the mandible plane angle, a higher palatal plane, and narrowing of both upper and lower arches at the level of canines and first molars thereby predisposing to clockwise rotation of the mandible with disproportionate increase in anterior lower vertical face height and decreased posterior facial height.

Use of EEG to find if mouth breathing is acquired as a learned habit: Continuous mouth breathing results not only morphological deformations but also poor learning outcomes. A study was conducted to investigate the changes in brain activity during mouth breathing while the participant simultaneously performed a cognitive task using electroencephalography (EEG). Mouth breathing showed different brain activity patterns, compared to nose breathing. The reason for this change seems to relate to the decreased oxygen saturation during mouth breathing, suggesting that when cognitive abilities are required, mouth breathing can act as one of the variables that cause different outcomes in brain activities.

Three dimensional morphological changes associated with mouth breathing: Mouth-breathing children have significantly reduced inter-molar width, palatal volume, and surface, and substantially increased palatal height, leading to different developmental patterns of the palatal morphology.

Lingual and Maxillary Labial Frenuloplasty with Myofunctional Therapy as a Treatment for Mouth Breathing and Snoring: A case report explores the case of a three-year-old girl with mouth breathing, snoring, noisy breathing, and oral phase dysphagia that was successfully treated with lingual and labial frenuloplasty as an adjunct to myofunctional therapy. Within four days of the procedure, the patient had stopped snoring and demonstrated complete resolution of open mouth breathing. The patient was also observed to have increased compliance with myofunctional therapy exercises. This report highlights the effectiveness of surgical interventions to improve the efficacy of myofunctional therapy in addressing open mouth posture and low tongue resting position.

<table>
<thead>
<tr>
<th>Table 1: Proposed guidelines for clinical recognition of mouth breathing</th>
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<td>Clinical Recognition of Mouth Breathing</td>
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<tr>
<td>These guidelines can be used to examine children and aid recognition of mouth breathing</td>
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<tr>
<td>1. Visual assessment</td>
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<tr>
<td>The dentist should assess at least the presence of the following characteristics:</td>
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<tr>
<td>With the patient standing:</td>
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<tr>
<td>• Lack of lip seal</td>
</tr>
<tr>
<td>• Posture changes</td>
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<tr>
<td>• Dark eye circles</td>
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<tr>
<td>• Long face</td>
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<tr>
<td>With the patient sited:</td>
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<tr>
<td>• Anterior open bite</td>
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<tr>
<td>• High narrow palate</td>
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<td>• Gingivitis in maxillary incisors</td>
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<td>2. Questions</td>
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<tr>
<td>Questions should be directed to the child or parents</td>
</tr>
</tbody>
</table>
Clinical Recognition of Mouth Breathing
These guidelines can be used to examine children and aid recognition of mouth breathing

Do you:

- Sleep with your mouth open? () YES () NO
- Keep your mouth open when you are distracted? () YES () NO
- Snore? () YES () NO
- Drool on your pillow? () YES () NO
- Experience excessive daytime sleepiness? () YES () NO
- Wake up with a headache? () YES () NO
- Get tired easily? () YES () NO
- Often have allergies? () YES () NO
- Often have a stuffy nose and/or runny nose? () YES () NO
- Have difficulty in school? () YES () NO
- Have difficulty concentrating? () YES () NO

3. Breathing tests

The child must be sitting. At least two tests should be performed.

a. Graded mirror test

After the second output of air on the mirror, mark the halo area with a marker (Fig 1).

(Low nasal flow: up to 30 mm; Average nasal flow: 30-60 mm; High nasal flow: above 60 mm)

b. Water retention test

Place water in the patient’s mouth (approximately 15 ml) and ask him/her to hold it for 3 minutes.

c. Lip seal test

Seal the patient’s mouth completely with a tape for 3 minutes.

4. Training to eliminate the habit of mouth breathing

Training should be performed at home on a daily basis until the child is able to return to nasal breathing.

Lip seal test

Seal the child’s mouth with masking tape when he/she is distracted or focusing his/her attention on another activity. Progressively increase the time each day until the child is able to breathe only through the nose for, at least, two consecutive hours.

Treatment and Management Considerations:

Once diagnosed, early intervention of respiratory disorders is required. Treatment considerations should include age of the child, appropriate ENT examination, timing of the treatment. Treatment should aim at eliminating the cause by surgical management (septoplasty, tonsillectomy, removal of enlarged adenoids), local medication, rapid maxillary expansion in cases of constricted maxillary arches. Habit interception can be achieved by physical exercises (deep breathing in the morning and at night), lip exercises (extending the upper lip, lower lip exercise, playing a wind instrument, holding of celluloid strip or metal disk, maxillothoracic myotherapy (macacay activator), oral screen, oral shield appliance, monobloc activator, chin cap.

Conclusion

Orthodontists are perhaps, one amongst the most earliest the diagnose respiratory disorders during their routine clinical examination. Respiratory disorders and malocclusion are like double edge swords. Disorders of one will lead to the defective development and functioning of the other. An early diagnosis and intervention will intercept the problems and can be managed non surgically. Mouth breathing, in short, may contribute to the development of orthodontic problems but is difficult to indict as a frequent etiologic agent. It is important for the entire health care community (including general and pediatric dentists) to screen and diagnose for mouth breathing in adults and in children as young as 5 years of age. If mouth breathing is treated early, its negative effect on facial and dental development and the medical and social problems associated with it can be reduced or averted.

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References


A Beginner’s Guide to Surgical Treatment Objective: An Orthodontist’s Point of View

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Abstract

Visualising the result of any proposed treatment, not only guides us in each part of the journey toward the final result but also to assess if the treatment objectives are met. Any adverse effects can be easily determined, before the start of the treatment, and necessary alterations to the treatment plan can be made. Various method in which the result of an orthognathic surgery can be visualised are – overlay tracing, template tracing, cephalometric prediction tracing, computer prediction, feasibility mock surgery, etc. How to carry out these predictions are discussed in detail in this article.

Keywords: Surgical treatment objective (STO), Cephalometric prediction tracing, feasibility mock surgery, template tracing, dolphin imaging, 3D cephalometric analysis.

Introduction

The lateral cephalogram’s advent is one of the milestones in orthodontics. It paved the way of better understanding, diagnosing and ultimately treating the underlying dentofacial anomaly.

A lot of contributions have been made by various authors, like Tweed’s diagnostic triangle in 1954 which gained a lot of attention. Following him, various other cephalometric analyses were proposed by Steiner’s, Mc Namara, Down’s. In 1960, Rickett proposed a method of predicting growth with the help of serial cephalograms taken at different points of time, over a period of time. Hold away in 1983, stated the importance of the soft tissue parameters in the orthodontic treatment, and suggested a VISUALIZATION of the treatment objective (VTO) – to have an idea as to how the outcome of the treatment would affect the profile of the patient.

This method of visualization, led to the development of a cephalometric prediction tracing by Epker and Fish, which gave a mental image at the outcome for a surgical intervention. In 1985 – Larry Wolford, introduced the term – “Surgical Treatment Objective(STO)”, which is basically a visualization of the outcome of an orthognathic surgery prior to the start of treatment, to better assess the end result.

Types:

The prediction can be for
1. Orthodontic and surgical use
2. Surgical use

The Orthodontic and Surgical VTO is the discussed further in detail in this article. Surgical VTO is more important from an Oral and Maxillo-Facial Surgeon’s point of view.

Orthodontic Surgical VTO: When a malocclusion is too severe to be corrected by only orthodontic interception, the patient might need a surgical correction, it involves an interdisciplinary approach where the orthodontist and the oral surgeon work together as a team in achieving the best treatment results for the patient.

When surgery is planned in the treatment, it is adviceable to perform the surgery earlier on in the...
treatment, as the precision achieved by fixed appliance in orthodontics is better than that of the surgery. There will be rapid tooth movement 3 months Post-Surgery, due to the inflamed bone and there is early improvement of the facial appearance, which aids in better patient compliance.

Two–Patient Concept: Epker and Fish, came up with something called as the “TWO PATIENT CONCEPT”. A mock surgery was performed in the patients casts and the new set of casts were treated as a second patient. The mock surgery helps the Orthodontist to assess with a Pre – Surgical Orthodontic phase is required or not. If the Mock surgery is carried out after a Pre-Surgical Orthodontic Phase is over, it helps the orthodontist assess if any other corrections need to be made prior to surgery or if the Clinical situation presented before him, at the end of surgical phase (with the help of mock surgery) can be handled and tackled by him, in the Post Surgical Orthodontic Phase.

Another method of applying this two patient concept, is with the help of Cephalometric Prediction Tracing. Various method of Cephalometric prediction can be carried out and the Prediction obtained at the end can be treated as a Second patient. Now the task is to simply start with patient one and reach the results of patient two. So it becomes easier to envision and tackle the complicated malocclusion involving surgery.

Various Method of Cephalometric Prediction: For decades, Cephalometric prediction was done by hand, manually, by taping acetate sheets to radiographs. In this method the angles were measured directly with the help of protractor, ruler, divider, etc. Then came into play the Computerised method, in which the landmarks can be directly digitised with the help of an electronic pen or a crosshair cursor. For indirect digitization, a scanner or a digital camera captures the image and stores in the computer’s memory.

Manual Method

The first manual method used to predict a mandibular surgery was given by Cohen(4). In this method he demonstrated the soft tissues changes by carrying out the usual cephalometric tracing of maxilla, maxillary teeth, followed by the tracing of the lower face. Then another tracing of only the mandible and the lower face was done and cut out. He used divider to record the amount of Mandibular movement and he slid the cut out section over the original section to mock the surgery. Another tracing was done with the new position of the mandible and the soft tissue changes were observed.
A similar method of Overlay tracing was given by Mc Neil (5), in which he oriented the patients casts to the post surgical position and that helped determine the amount of posterior movement of the overlay.

Henderson (6) proposed a method of using the patient’s profile photograph with a transparency of 1:1 superimposed over the Cephalometric tracing in order to better understand the soft tissue changes. The photographic prediction method was also advocated by Hohl at al (7).

The method of surgical-orthodontic cephalometric soft tissue prediction tracing for mandibular advancement, maxillary superior repositioning and combined maxillary and mandibular surgery was proposed by Fish and Epker (8). The authors believed that the three method explained by them would suffice to predict any Orthognathic surgery.

**Computerised Method:** The computerised method, involves digitising the cephalometric tracing and landmarks or to save the image digitally and carry out the tracing on the computer, virtually. There are numerous softwares available which can carry out the Cephalometric Prediction tracings (9). The first computer software was developed by Bhatia and Sowray (10), where they used graphics to mimic the outcome of the surgery.

Later on many softwares were introduced and used by various authors like, Harradine and Burnie (11), Walters and Walters (12), Freihofer (13), etc.

Currently there is a wide variety of computerized cephalometric software systems for orthognathic surgery prediction. Quick Ceph was the first commercially available software for orthognathic surgery prediction. The Quick Ceph Image (Quick Ceph Systems, San Diego, California) it is designed for Macintosh computers. It permits a wide range of functions based on a 28-point digitization. When orthodontic and surgical movements are simulated, horizontal and vertical changes are recorded by the computer. The soft tissue adjusts automatically according to predetermined ratios. The majority of these ratios are derived from Wolford et al. (1,14).

The various other softwares available include, The dentofacial planner, Vistadent, Orthodontic Treatment Planner (OTP), Orthognathic Prediction Analysis (OPAL) (15), Dolphin Imaging Software (16), etc.

**Video Imaging:** More recently, the introduction of computer software programs with video imaging by Sarver et al. (17), surgery has greatly facilitated and improved the communication of the final predicted esthetic outcome and allowed the clinician to rapidly analyze, plan, perform the simulated surgery.

True vision image processing system (TIPS) (18) is a software that superimposed the patients profile image, captured from the video imaging, over the cephalometric prediction to better visualise the soft tissue changes. Another video imaging software was given by Grubb (19) where the patients study casts data and Cephalometric data can be fed onto the computer and various analysis are carried out by the computer software.

The purposes of calibrating the cephalogram to the profile video image are to: (a) relate the underlying hard tissue to the soft tissue, (b) allow quantification of movements needed for occlusal correction and aesthetic ideal to be achieved, (c) allow realistic movements to be planned and, (d) permit the treatment plan to be designed as close as possible to the patient desires.

Video Imaging poses as a major addition to the contribution of computers towards Orthognathic Surgery treatment planning. However, there are also some errors encountered with the use of softwares in Superimposition of facial images and Cephalometric radiographs (20).

The 2D views have limitations such as Head positioning errors, rotational errors, etc. It particularly gets tricky when it comes to planning complex surgeries such as in patients suffering from various syndromes, cleft lip and cleft palate, asymmetry, deviated chin etc. (21,22)

**Three Dimentional Prediction Method:** Nowadays, with the advent of various imaging facilities that can capture the patient’s hard and soft tissue details in 3D, it has become more easier to predict the outcome of the treatment, in a three dimentional manner. The various three dimentional imaging facilities available are the Computed Tomography (CT), Cone Beam Computed Tomography (CBCT), and Magnetic Resonance Imaging (MRI).

The data obtained from these diagnostic imaging can be fed to the computer and the 3D cephalometric softwares available can be used to carry out the various prediction tracings (23), mock surgeries etc.
The software uses graphic interpretation and mocks the soft tissue changes almost flawlessly, by adapting the soft tissue profile of the patient obtained from the diagnostic imaging. This customised prediction, better enables the visualization for both the clinician as well as the patient who is undergoing the surgery. Surgeons can benefit from performing mock surgeries, osteotomies on the software, to determine and plan the accuracy of their osteotomies.

The first complete 3D model for prediction of orthognathic surgery developed by Nakasima et al., which can be adjusted to the patient’s head from cephalograms, 3D stereophotographs and dental casts. The fusion model replaces the need for model surgery, since the virtual head can be used to design a surgical wafer, which can be used as a surgical guide.

**Conclusion**

Surgical treatment objective, is a systematic approach towards visualising the end result of surgery, as a part of treatment planning, to better enable both the Surgeon as well as the Orthodontist, to work hand in hand towards the benefit of the patient. The various method of predicting or mocking a surgery available were given in this article. It is upto the clinician to choose wisely which method to employ bearing in mind the limitations of each each technique. Each method has its owns perks, like being cost effective, simple, quick and easy. It is also noteworthy to mention that the clinicians be mindful in experimenting with various method available in order to choose the method that works best for them.

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**References**


The Relevance of Nose in Achieving Aesthetic Outcome in Orthodontic Treatment: A Review

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Abstract

The nose being the centre of the face and one of the most striking facial features influences the aesthetic outcome of orthodontic therapy. This topic has not received as much emphasis as it should. The nose plays an important role in every aspect of orthodontic therapy such as the diagnosis, treatment planning and post treatment prognosis. Most of the patients treated orthodontically are growing patients. Many a times, both the orthodontist and patient may be satisfied with the facial appearance at the end of orthodontic treatment. But as the growth of the nose continues till about the age of 16, the facial appearance may change.

Keywords: Facial esthetics, Nose, Orthodontics, Growth, Rhinoplasty.

Introduction

Orthodontic treatment has as its goal to achieve a balanced facial profile. A balanced facial profile has been recognized as one of the most important goal of orthodontic treatment because consciousness of beauty or physical attractiveness of patient’s face has a major psychosocial effect on acceptance and perceived success in society. Facial harmony in orthodontics is determined by the morphologic relationships and proportions of the nose, lips, and chin. The nose dominates the middle portion of the face and is in close harmony with lips and chin as it defines the characteristic facial appearance of an individual. Nose serves as a main guideline while planning orthodontic treatment. Although the functionality of the nose has been given importance, not much importance has been given to its contribution in maintaining a balance in facial esthetics. This article focuses on the importance of the nose in orthodontic diagnosis and treatment planning to achieve facial esthetics. The examination of the nose, its growth potential and changes occurring with orthodontic treatment have been elaborated in this article.

Examination of the Nose:

The upper face on frontal and profile examination is dominated by the nose, which is an area that has not been emphasized in orthodontic training. There is a great deal of orthodontic literature on the subject but it has not gotten the attention from orthodontists it deserves. An orthodontist should include examination of the nose in routine extra-oral examination procedures.

Profile Examination:

Radix: It is referred to as the root of the nose. On profile, this is orthodontically referred to as the soft-tissue nasion. It would be unacceptable to remove the dorsal hump in this type of nose because it would result in a nose with excessive tip projection. Recommended rhinoplastic treatment includes augmentation of the nasofrontal angle with nasal septum or ear conchacartilage grafts.

Nasal Dorsum: One third to one half of the nasal dorsum is called the bony dorsum because it is formed by the confluence of the two nasal bones. The nasal dorsum is the area of the nose that gets the most attention and recognition from patients. The removal of an over projected dorsal hump is one of the most common rhinoplastic procedures. Although dorsal hump removal is a commonly performed procedure, it is not uncommon to see patients who exhibit a lack of dorsal projection, or a saddle deformity. Because it is often a result of traumatic injury, it has also been termed as boxer’s nose. Recommended augmentation procedures include autografts, homografts, and implantation.

Nasal Tip-The nasal tip is part of what is often
referred to as the anterior nasal lobule. The supratip break is described as the area just cephalic to the nasal tip where the lobule meets the dorsal portion of the nose. On anesthetic nose, a slight depression is present on the supratip, which should be more pronounced in the female than the male.\[^9\][\[12\]

Goode’s method is used to evaluate nasal projection to nasal tip ratio. The vertical axis is from nasion to the alar groove. Horizontal line is from ala to the tip. Nasal projection should be 60% of nasal length. This is expected as a ratio with ala-tip nasion-tip equalling 0.55-0.60.\[^{13}\]

**Columella:** The columella is the portion of the nose between the base of the nose (subspinale) and the nasal tip. It comprises of the cartilaginous nasal septum and membranous septum. The angle formed where the columella meets the central upper lip is the columellar-labial angle; its position is determined partially by the caudal border of the septum and the nasal spine, as well as the anterior surface of the premaxilla and teeth. The soft tissues contributing to the formation of this angle are skin, muscle (mainly depressor septi nasi), and some fat and fibrous tissue.\[^{14}\]

**Nasolabial Angle:** The nasolabial angle measures the inclination of the columella in relation to the upper lip. The nasolabial angle should be in the range of 90 to 120 degrees. Its morphology is a function of several anatomical features.\[^{15}\]

**The anteroposterior position of the maxilla:** Procumbency of the maxilla tends to produce an acute nasolabial angle. Maxillary retrusion tends to produce an obtuse nasolabial angle.

**Maxillary procumbency.** Maxillary procumbency often contributes to an acute nasolabial angle. This skeletal problem may be camouflaged dentally with extraction of first premolars and orthodontic retraction of the anterior teeth in both adults and adolescents with extraction of first premolars and orthodontic retraction of the anterior teeth.\[^{17}\]

**The vertical position and projection of the nasal tip:** The high nasal tip tends to produce obtuseness to the nasolabial angle, whereas a low position of the nasal tip contributes to an acute nasolabial angle. Rhinoplasty can modify both of these problems.\[^{18}\]

**Soft-tissue thickness of the maxillary lip:** The thin upper lip contributes to a flat nasolabial angle, and lip augmentation is indicated. Procedures for this correction include injecting cosmetic fillers into the lip. These tend to be temporary solutions. Cheiloplasty with lip plumping may also be recommended. The thick maxillary lip creates an acute nasolabial angle. Reduction cheiloplasty can correct this but tends to be an unpredictable procedure.\[^{19}\]

**Frontal examination:**

**Alar Base Width:** The width of the alar base should be approximately the same as the intercanthal distance, which should be the same as the width of an eye.\[^{20}\] If the intercanthal distance is smaller than an eye width, it is better to keep the nose slightly wider than the intercanthal distance. In the growing patient, there is a little fluctuation in the alar width in females after age 14, and in males there is a significant spurt from ages 11 to 13. The width of the alar base is heavily influenced by inherited ethnic characteristics.

**Columella:** The columella is located between the nasal tip and the base of the nose. It is divided into three segments: the anterior lobula, the intermediate (narrower portion of the columella), and the basal (wider portion of the columella at the base of the nose) segments. The segments are approximately equal in dimension.\[^{14}\]

**Nasal tip:** On frontal view, the nasal tip should have four defining points. If any of these points are not in the correct position, it should be determined which is out of position and how can it be improved. The nares should be barely visible when the head is in natural head position. There is a “gull in flight” contour to the base of the nose, and the columella is slightly lower than and parallel to the ala when viewed in any direction. Tip refinement techniques may be performed through intranasal or extranasal approaches.\[^{21}\][\[22\]][\[23\]][\[24\]

**Nasal dorsum:** The nasal dorsum should be outlined by two slightly curved divergent lines extending
from the medial supraciliary ridges to the nasal tip defining points. This contour describes the desirable curvature from the brow to the nasal tip, and its width is determined by the skeleton of the external nose. The external nose resembles a pyramid, with the upper half being comprised of bone and the lower half of cartilage. Narrowing of the nasal dorsum is performed routinely in cases of dorsal hump reduction but may also be narrowed if the width of the dorsum is undesirable. [9][10][11]

**Growth of the Nose:** The orthodontist should keep in mind the age and growth factors inherent in the face of the individuals. It must also be remembered that these changes have to be harmonized with many variations that will take place, regardless of orthodontic treatment to the end that a desirable result is achieved. During treatment planning, the orthodontist must take into consideration the nose, its growth potential and most important its shape changes in analysis of facial profile. Numerous papers [25][26][27][28] have been published regarding nasal growth and its contribution to the development of the facial profile. Nevertheless, this is a topic that has not received as much emphasis as it should.

Several other studies have documented the downward and forward growth of the nose. [25] [29][30] [31] Manera and Subtelny [27] studied 46 serial headfilms from the Bolton-Brush sample, representing ages 10 to 16. Included in the sample were subjects of various angle classifications: 20 class I subjects, 22 class II subjects, and 4 class III subjects, none of whom had undergone orthodontic treatment. This study confirmed Subtelny’s documentation of the downward and anterior growth of the nose and indicated a general tendency for girls to have slightly more nasal growth than boys during the early period of adolescence.

Genecov et al [32,34] tested not only for sexual dimorphism but also for potential differences between angle classifications I and II. The data analysis collected in this study was for both sexes and angle classes to show similar amounts of soft-tissue growth from ages 7 to 12, but for a considerable dichotomy to occur between the sexes from ages 12 to 17. The females demonstrated equal, if not slightly greater, amounts of nasal projection at age 7 and experienced slightly more growth coincident with the adolescent growth spurt. Nasal projection in the females remained virtually constant from ages 12 (generally after the adolescent growth spurt) to 17.

Posen [33,35] found that in the normal child the nasal bones, as measured from nasion to rhinion, increased in length in an orderly, linear fashion between the ages of 3 months and 13 years. After a short period in which little additional growth was noted, the nasal bones showed added increases in length at 15 years and again at 18 years of age. He stated that what appears to be a pleasing and harmonious facial profile at 13 years may be radically changed by the age of 18 years.

**Changes in Nose with Orthognathic Surgery:** Orthognathic surgery alters the position of the maxilla and mandible, and consequently changes the nasal shape.

Alar base cinching is a rhinoplastic technique to correct this. With rhinoplasty performed simultaneously with maxillary osteotomy, the nasal reaction to maxillary surgery is addressed at the time of surgery, rather than having the patient endure unesthetic nasal characteristics for the period of 6 to 12 months required before a secondary rhinoplasty can be considered. In addition, the patient undergoes one surgical experience instead of two. [36][37][38]

Repositioning the maxilla inferiorly causes both the alar base and columella to move downward, overlying tissues to become thinner, and nasolabial angle to become more obtuse. [38][39]

Advancement of the maxilla results in tip of the nose being moved forward and slightly upward. The alar base will enlarge, and depression in supratip area will get accentuated. [40][41]

Although maxillary setback is a rare procedure, it has been found to decrease the projection of tip of the nose. Mandibular surgeries were seldom found to change the appearance of the nose. [41]

**Conclusion**

Over the years, improvement of facial esthetics has been the key objective of orthodontic treatment. Facial harmony in orthodontics is the outcome of the morphological balance of the nose, lips and chin. The nose being the most prominent structure when visualising the face, has been found to greatly influence orthodontic treatment outcomes. It is clinically important for the orthodontist to understand the changes of the nose that occur not only with orthodontic treatment but also the amount and direction of growth expected after completion of treatment.
Ethical Clearance: Not required since it is a review article.

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References


Breastfeeding and Early Childhood Caries: A Review

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Abstract

Breast milk is the first and foremost nutrition a child receives. The enormous benefits of breast feeding have been well documented over the years. However its association with early childhood caries (ECC) has been a constant subject of debate. The etiology of ECC is multifactorial thus posing a difficulty in attributing the risk towards a single factor. The increased duration and frequency of breastfeeding along with poor dietary habits and oral hygiene practices have been reported as contributing factors for ECC. Certain constituents of breast milk have an inhibitory effect on Streptococcus mutans, the major organism implicated in the initiation of ECC. Awareness of ECC and its preventive strategies should be emphasized to young mothers along with the importance of nutrition obtained from breast milk and the benefits of breast feeding. This review is a consolidation of various factors that have been conferred as being associated with breast feeding and ECC.

Keywords: Breastfeeding, Early Childhood Caries, Risk factors, Nutrition.

Introduction

Early childhood caries (ECC) is defined as presence of one or more teeth decayed teeth (cavitated or non-cavitated lesions), missing teeth (due to caries), or a filled surface on any primary tooth of children under the age 6 years. Any sign of caries in children younger than 3 years of age is indicative of severe early childhood caries (S-ECC) [¹]. An Analytical study revealed the prevalence of ECC in India to be 49.6%. Andhra Pradesh was found to have highest prevalence of ECC with 63%, and Sikkim had the lowest prevalence with 41.92% [²]. The main risk factors in the development of ECC can be categorized as microbiological, dietary, and environmental. The major contributing factors responsible for development of ECC are improper feeding practices, familial, socioeconomic background, lack of parental education, high sugar intake, lack of access to dental care, lack of oral hygiene, lack of fluoride exposure, and enamel defects [³,⁴]. ECC has been reported to affect the quality of life of children physically, mentally and emotionally. This includes pain, trouble in sleeping, eating hard foods, hot or cold food [⁵].

Early Childhood Caries ans it’s Risk Factors: Early childhood caries is a multifactorial disease produced by interaction of three factors such cariogenic microorganism, cariogenic diet and susceptible host over a period of time. Harris et al. 2004 has reported risk factors for ECC into 3 categories: socio demographic, diet, oral hygiene, bacterial flora and breast/ bottle feeding. In this systematic review, duration and frequency of breastfeeding, nocturnal breastfeeding, breastfeeding to stop baby crying at night and breastfeeding at 12-18 of months of age were reported as possible risk factors for early childhood caries. However researchers have found difficulty in establishing a clear relationship between ECC and breastfeeding. Some authors recommend cessation of breastfeeding at around 12th month of life, as soon as the infant can able drink from a cup. The association was attributed to a certain pattern of consumption such as ad libitum breastfeeding, prolonged and frequent breast feeding at night which could result in...
accumulation of milk on the teeth. This combined with lack of oral hygiene and reduced salivary flow produces decay. In contrary to this mechanism of breastfeeding is different than drinking from a bottle. A breastfeeding child draws milk by compressing the nipple against the palate with soft peristaltic motion. In contrast, a bottle fed child uses a much more powerful sucking motion of lips and cheeks in a “piston-like” motion to compressed the bottle nipple [6]. Valitis et al. observed a moderate correlation between breastfeeding and ECC. But however the quality of studies was categorized to be poor and inconsistent.

**Content of Human Breastmilk:** Human breast milk is a complex matrix with a composition of 87% water, 3.8% fat, 1.0% protein, 7% lactose [7], casein (2.3mg/ml) [8]and lactoferrin (2.6gm/L) [9] which varies in colostrum (~7g/L) and mature milk (~1g/L) [10]. Human breastmilk is an infant’s first and foremost diet which contains highly nutritious substances essential for the growth of child. Oral health care professionals have constantly raised concern over the effect of human breastmilk on dental health. The presence bacterial biofilm which contains elevated levels of Streptococcus mutans has been associated with dental caries. The principal sugar found in human milk is lactose. The Nutritional components include whey and casein proteins, palmitic and oleic acids providing the fat. Non-nutritional components include anti-infectious and anti-inflammatory agents, growth factors, and prebiotics. Bioactive factor of human milk contains several immunologic components [11] of which IgA antibodies help in inhibiting the growth of several micro-organisms [12, 13, 14]. Another important bioactive factor is Lactoferrin which chelates with iron and making this essential nutrient inaccessible to invading microorganisms, thereby limiting its growth [15,16]. Also Lactoferrin has strong bactericidal action against Streptococcus mutans and plays a significant role in the innate defense mechanisms against pathogens [17,18,19]. Thus the bioactive components of breast milk have protective action against Streptococcus mutans. This is in concordance with the findings of Grenby et al. [20], Rose et al. [21], Aimutis et al. [22] and Allison et al. [23] who described that the components in milk namely lactoferrin, lysozyme, albumin, peroxidase have an inhibitory effect against S. mutans and S. sorbinus. Lactose present in human milk is fermentable by S.mutans, however not to the same degree as sucrose. Allison et al [23] conducted a study on various concentrations of human breast milk samples and macronutrients such as lactose, casein, lactoferrin and IgA. Human breastmilk samples demonstrated an increase in biofilm formation at dilutions of 1:10, 1:20, 1:40. Lactoferrin and IgA decreased biofilm formation significantly. Lactose had no effect at average breast milk concentration but increased biofilm formation at its lowest concentration and casein significantly increased biofilm formation at higher concentration.

**Studies on Breastfeeding and Early Childhood Caries:** Various studies have been reported to investigate the association between breastfeeding and early childhood caries. Of which Matee et al. [24,25], Wendt et al. [26], Vachiraropisanel et al. [27] have inferred is a significant association between early childhood caries and breastfeeding. However various other reports suggest that there is no association between breastfeeding and Early Childhood Caries [28-36].

**Guidelines on Breastfeeding by American Academy of Pediatrics (AAP):** American Association of Paediatrics recommends “exclusive breastfeeding for about 6 months, followed by continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for one year or longer as mutually desired by mother and infant”[38].

**Policy Statement by American Academy of Pediatric Dentistry (AAPD) for Dietary Requirements:**

**The AAPD recommends:**

- Breast-feeding of infants provide general health, nutritional, developmental, psychological, social, economic, and environmental advantages
- Also it significantly decreases the risk for a large number of acute and chronic diseases.
- Breast-feeding of infants prior to 12 months of age is recommended to ensure the best possible health and development.
- However, breast feeding greater than 7times a day has been reported to be associated with increased risk of ECC. AAPD recommends that oral hygiene measures to be initiated immediately after the eruption of first tooth [39].

**Conclusion**

Over the years enormous research has been conducted in early childhood caries and its various associated risk factors. This has enabled in devising
preventive strategies towards the same. However one factor that remains a myth is the effect of extended breastfeeding on primary teeth. Policies on breastfeeding by various academies suggest an exclusive breastfeeding for first 6 months of the infant in order to ensure complete health and development. First tooth erupts at the age of 6 months. Breastfeeding when continued after this point along with other dietary supplements has been reported to be associated with ECC.

However diet is a confounding factor when analysing the association between breast-feeding and caries”. More cohort studies to establish the association between ECC and breastfeeding are necessary.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Effect of Music on Pain and Anxiety in Pediatric Dental Patients

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Abstract

Dental anxiety and pain management in pediatric children is always challenging. Management of Pain and anxiety are the utmost concern for a paediatrician in order to achieve patient cooperation which plays an essential role in the success of the treatment. Interventions aimed at improving the health and wellbeing of children may also cause pain and anxiety. Inadequate pain control during medical procedures can have long-term detrimental effects, especially among very young children. Hence this review article aims at determining the effect of music on pain and anxiety in pediatric dental patients.

Keywords: Anxiety, Pharmacotherapy, Behaviour.

Introduction

Management of Pain and anxiety are the utmost concern for a paediatrician inorder to achieve patient cooperation which plays an essential role in the success of the treatment. Interventions aimed at improving the health and wellbeing of children may also cause pain and anxiety. The Children’s Dental Health Survey in 2013 found that 21% of 5-year-olds and 17% of 8-year-olds were reported by their parents to be anxious about visiting the dentist. In older children, dental anxiety was found to be higher with 76% of 12-year-olds and 64% of 15-year-olds reporting either moderate or severe dental anxiety when visiting the dentist (HSCIC 2015). Inadequate pain control during medical procedures can have long-term detrimental effects, especially among very young children.(1) The goal of behaviour management techniques practiced by the paediatric dentist aims to establish communication and an element of trust with the child patient. Various behaviour management techniques are proven to be successful, but attitude of parents and some dental practitioners towards these techniques have changed, and this is the reason why new non invasive techniques which are more effective and more acceptable to the parents are being used. Many parents feel that pharmacological method of managing their child are undesirable due to perceived medical risks.

Music as a Distraction: Music is an alternative treatment option which is being used in different medical fields to meet the psychological, physiological and spiritual needs of the patient. Music has the potential to obviate or decrease the need for pharmacotherapy.(2) Suitable music have proven to have a strong influence on human brain waves which leads people into state of deep relaxation. Music can ease pain and anxiety by moving conscious thought away from the symptoms. According to the gate control theory of pain, pain receptors act together to send pain signals to the brain, therefore distractors such as music can block certain pain pathways and diminish the amount of perceived pain.4 Studies have proven that musical intervention decreases surgical stress, induces relaxation, decreases blood pressure, heart rate and respiratory rate during an operation with local anesthesia. Musical distraction (MD), defined as the use of music as an adjuvant therapy in the treatment of behavioral disorders. MD leads the child to focus on the audio by listening in

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order to avoid the perception of aversive stimuli, such as the micromotor or turbine, thereby reducing levels of DA. This technique is effective, especially in patients with moderate anxiety. However, there is great heterogeneity between studies, showing much variability in clinical scenarios, forms of application, types of music and method of delivery. Based on these studies, it is suggested that MD be used with other distraction techniques for best results. There is a distinct difference between music administered by medical or healthcare professionals (passive music listening) than with those of trained music therapist (active music therapy). Brusia termed music listening as the receptive type of music experience whereby the clients listens to music and responds to the experience silently, verbally or in anathor modality and Music therapy has “a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships that develop through them as dynamic forces of change.”

**Effects of Music on the Clinical Setup:** Spintge in his review of music in operating theatres focuses extensively on the use of music to moderate stress and anxiety. He coined the term Anxioalgolytic Music (AAM) to refer to this practice, and given the individual differences of response, suggests self-chosen music as the most effective way of defining the musical material listened to, and notes that using headphones (where possible) reduces the impact of the music on staff. This does make staff-patient communication more difficult, although in noisy settings may help mask irritating or anxiety-inducing environmental sounds for the patient. Music played over loudspeakers has both positive and negative effects on operating room staff: it can disrupt effective communication, but can also produce a calm working environment. What is clear is that music is being used in perioperative settings, and despite the practical issues that arise, may be an effective intervention alongside more traditional approaches to chronic or situational anxiety when undergoing procedures.

Music’s impact on our physiological and cognitive state is far from straightforward. Reactions to music are highly individual and context dependent, varying with personality, experience, surroundings, age, taste and cultural background. Some generalities apply however, and certain pat-terns of musical structure (and associated lyrical content) may have predictable impacts on listeners, and there are conventional as well as more individual associations between styles and individual pieces of music, so it may be possible to predict and therefore prescribe music as a psychobiological treatment. Nonetheless, such predictable responses are elusive: for example, a piece of music might have a generally relaxing effect on most patients (due to its intrinsic musical structures), but the opposite effect on one patient who had first heard it in a shopping mall during an armed robbery. Visualise emotional responses to the external environment along two dimensions, one related to valence (the cognitive interpretation of the emotion from positive to negative) and the other its level of activity (high or low arousal).

**Effect of Music on Dental Anxiety:** Marwah et al. (2005) conducted a randomised controlled trial; this study included 40 children aged between 4 and 8 years old who were divided into three groups: control group (no music), instrumental music group and nursery rhymes group. Each child had a screening visit, an oral prophylaxis visit, a restorative visit and then an extraction visit. The children’s anxiety was measured using the Venham’s picture test (VPT), the Venham’s clinical anxiety rating scale (VCRS), pulse rate and oxygen saturation. The results showed that the VPT scores were not significantly different between the three groups and the pulse rate was not significantly different between the control group and the two music groups. However, the VCRS scores and pulse rate in the instrumental group were significantly less than in the nursery rhyme group. Overall the study found that instrumental music was more effective at reducing dental anxiety than nursery rhymes.

In a more recent randomised controlled trial by Jindal and Kaur (2011), 30 children aged between 4 and 8 years old were randomly divided into two groups, a control and a music group. Each child had four visits which increased in their invasiveness. The child’s anxiety levels were measured using the VPT before and immediately after each appointment. The levels of anxiety were found to be greatest in the third and fourth visits as the invasiveness of the procedures increased. Interestingly, the reported anxiety levels were significantly reduced in the music group. Similarly, Singh et al. (2014) in a randomised controlled trial found that listening to patient selected music significantly decreased intra-operative anxiety compared with the no music control group in 60 children aged between 6 and 12 years old undergoing dental extractions. Physiological anxiety measurements were recorded using a pulse oximeter and blood pressure monitor. In addition, self-reported
anxiety measurement using the VPT was also used. The study showed that systolic blood pressure, pulse rate and VPT scores were all significantly reduced in the music group. In contrast to the above studies, several others have shown that music is not an effective tool to reduce dental anxiety in paediatric patients. Aitken et al. (2002) concluded that music did not result in a reduction in pain, anxiety or uncooperative behaviour during dental procedures in children aged between 4 and 6 years old. The children were not given a choice of music to listen to which the authors’ recognised could have prevented the child from fully benefiting from the music as it was not familiar to them; however 93% of the patients who listened to the music said that they enjoyed listening to it. In addition, the patients included in the study were relatively young at 4–6 years old compared with other studies. It may be that older children are more likely to benefit from the effects of music. In another study by Gupta et al. (2017), 60 patients aged between 3 and 7 years old who required treatment under local analgesia were divided into three groups: a control group, an upbeat music group and a relaxing music group. In the first visit all the children had restorative treatment following an inferior alveolar nerve block in one quadrant. At the following visit approximately 2 weeks later, the children wore headphones; the music groups listened to music and for the control group no music was played. For both visits, anxiety was measured using the VPT pre and post-operatively, a visual analogue scale post-operatively to assess the child’s perceived pain and heart rate was measured using a pulse oximeter before treatment, during local analgesia and at subsequent 5 min intervals. The child was also filmed and their behaviour assessed using the North Carolina Behaviour Rating Scale. The study concluded that music did not significantly reduce pain, anxiety or disruptive behaviour. There was a wide variation across the studies in the type of music (folk, lullabies and classical) and how it was delivered (recoreded, live) and the mode of delivery (direct headsets, audiovisuals).

**Conclusion**

Music has been shown to influence both the biological and psychological aspects of anxiety and acts as an aid for distraction from painful experiences and there is a growing body of evidence to support its use alongside or instead of traditional interventions within the clinical setting.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**


Mixed Dentition Analysis Procedure: A Review

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Abstract

As the child's dentition changes from primary to permanent dentition there are a number of changes that happens in the oral cavity of the child. This intermediate stage of transition is known as Mixed dentition stage and lasts from 6 years to 12 years. The identification and measurement of these changes is of great importance in preventing, managing and treating future dental as well as skeletal malocclusions. Over the years several tests and analysis have been done to analyse these changes. The aim of this paper is to analyse the existing literature on various mixed dentition analysis and also to spot light on the recently developed mixed dentitions and primary dentition analysis.

Keywords: Mixed dentition analysis, Primary dentition analysis, Nance analysis, Hixon Oldfather analysis.

Introduction

Mixed dentition lasts from 6 years to 12 years of age, mixed dentition can further be divided as early mixed dentition (6 years – 9 years) and late mixed dentition (9 years – 12 years). There are a lot of changes that happens during the transition of primary to permanent dentition. Moorrees investigated; by measurements on dental casts of 184 North American children of Arch length reduces 2 mm to 3 mm from 10 years to 14 years when primary molars are replaced by premolars. [1]. Malocclusion which is in dormant condition in the deciduous or mixed dentition period usually, surfaces after the eruption of permanent successors. A majority of children will be benefited if such developing malocclusion can be diagnosed and treated early. [2] One of the first analysis was done by G.V. Black, in 1897; he determined the average mesiodistal crown widths of all primary and permanent teeth. [3].

Table 1: Average values for mesio-distal widths (in mm) of primary canine and molar teeth, and permanent canine and premolar teeth (Black, 1897)

<table>
<thead>
<tr>
<th></th>
<th>Maxillary</th>
<th>Mandibular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canine</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>First Molar</td>
<td>7.7</td>
<td>7.3</td>
</tr>
<tr>
<td>Second Molar</td>
<td>9.9</td>
<td>8.2</td>
</tr>
<tr>
<td>Permanent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canine</td>
<td>6.9</td>
<td>7.6</td>
</tr>
<tr>
<td>First Premolar</td>
<td>6.9</td>
<td>7.2</td>
</tr>
<tr>
<td>Second Premolar</td>
<td>7.1</td>
<td>6.8</td>
</tr>
</tbody>
</table>

He found that permanent incisor and canine teeth were larger than their predecessors, whereas premolar teeth were smaller. He concluded that measurement of un erupted permanent canines and premolars on radiographs was more accurate than estimation by measurement of the primary dentition.

Since then a lot of analysis has been done in various parts of world. All these analysis used three approaches to achieve the purpose. The first approach employs direct measurements of the teeth from radiographs with or without the use of prediction formula. [3,6] The second method utilizes prediction tables based on measurements of other erupted permanent teeth. The third method involves a combination of previous two method, i.e. the use of prediction tables in association with. Measurements of erupted and unerupted teeth [7]. Six generally used mixed dentition analysis is reviewed in this article, namely:

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Various types of analysis:

Hays Nance analysis: Nance in 1947 did an analysis to estimate the space required for permanent canines and premolars using erupted permanent incisors. He measured the maximum mesiodistal width of each permanent incisor (maxillary and mandibular incisors on the cast), Using a brass wire (0.010 inch) measured the arch perimeter. Measure maximum mesiodistal width of unerupted permanent canine, first and second premolar from radiograph. [4]

In 1993 Nanda revised Hays Nance procedure, he changed, added few points. Nanda advised to perform Huckabas analysis to the radiographic value of measured unerupted premolars to minimize the error. He also has asked to perform cephalometric analysis (tweeds analysis) as it allows for correction of protrusion of mandibular incisors. [8]

Advantage-Minimal error, Performed with reliability, Allows analysis of both arches. Limitation-Time consuming, Need to do cephalometric analysis

Ballard and Wylie analysis: Ballard & Wylie conducted studies to examined the casts of 441 individuals who had permanent incisors, canines, premolars and first molars fully erupted. The correlation coefficient between the sum of the mesio-distal widths of the mandibular incisors and that of the canines and premolars was +0.64. They gave the formula as

\[ x = 9.41 + 0.527y \]

In which \( x \) = sum of mesio-distal widths of canine and premolars, and \( y \) = sum of mesio-distal widths of the mandibular incisors. They found that the average error using this formula was 0.6 mm, or 2.670, and concluded that this equation was of some value in the prediction of the combined width of unerupted mandibular permanent canine and premolar teeth. [9]

Hixon and Oldfather analysis: In 1958 Hixon and Oldfather published a method for prediction of the mesiodistal widths of the mandibular canines and premolars in mixed-dentition patients. They based their prediction method on measurements taken from participants in the Iowa Facial Growth Study. They measured the maximum mesiodistal width of each permanent incisor (each quadrant on the cast). From radiograph measured maximum mesiodistal width of unerupted first and second premolar. Added the mesiodistal widths of incisors and premolars from each quadrant compare in Hixon and Oldfather predication table the corresponding value in the predication table is the value of space estimated for permanent canine, first and second premolar. Advantage-Coefficient of correlation is 0.87 or 75 percentile [10]

<table>
<thead>
<tr>
<th>Table 2: Hixon and Oldfather prediction table</th>
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<tbody>
<tr>
<td>Sum of mesio-distal widths of central and lateral incisors in a quadrant (measured on dental casts) plus sum of mesio-distal widths of first and second premolars in the same quadrant</td>
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<tr>
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<td>30</td>
</tr>
</tbody>
</table>
Staley & Kerber in 1980 undertook to revise the work of Hixon & Oldfather in an attempt to determine whether an improved equation could be found. They used the same method, measuring the mandibular central and lateral incisor in one quadrant on casts and the first and second premolar teeth in the same quadrant on radiographs. Both authors examined a sample of 57 subjects selected from the longitudinal records of the Iowa Facial Growth Study, and another sample of 53 subjects selected from the records of patients in the Department of Orthodontics at the University of Iowa.

Staley et al. found that results were improved by using separate equations for males and females, but Hixon & Oldfather made no allowance for gender in their calculations, they developed a regression equation. The equations were all similar but the correlation coefficients were higher and the standard errors lower than those reported by Hixon & Oldfather. The standard errors were in the range 0.43-0.45, and that of Hixon & Oldfather 0.57. This could be because Hixon and Oldfather utilized a smaller sample of only 41 subjects. The absolute error was approximately 0.2 mm smaller than the original of Hixon & Oldfather. Staley & Kerber used computers for their calculations, and heliosdial calipers reading to 0.05 mm instead of Boley gauges that read to 0.1 mm. From their equations a modified prediction graph was developed, as shown in Fig. 1.

**Fig. 1.** Hixon & Oldfather prediction graph, as revised by Staley & Kerber. $1 + 2 + 4 + 5 = \text{sum of mesio-distal widths of erupted mandibular central and lateral incisors, and of mandibular first and second premolar teeth in one quadrant measured on a radiograph}$

$3 + 4 + 5 = \text{predicted sum of mesio-distal widths of unerupted mandibular canine and premolar teeth in same quadrant}$

**Moyers analysis:** Moyers\textsuperscript{[11,12]} produced a table giving the predicted mesio-distal widths of maxillary and mandibular permanent canines and premolars on the basis of permanent mandibular incisor widths, using data obtained from an unspecified number of North American white children. The analysis allowed for the space required for tooth alignment and retroclination of the labial segment, if necessary. It was claimed that this analysis was accurate at the 50% probability level when used by experienced clinicians and at the 75% level by beginners. Moyers advised caution in using any analysis, as none was able to compensate for the biological variation in individuals during the transition from primary to permanent dentition. Advantage-high accuracy, most used of all analysis. Disadvantage-needs prediction chart, analysis was done in limited sample size and the exact ethnicity of the population was not mentioned.

**Tanaka and Johnston Analysis:** Tanaka & Johnston\textsuperscript{[13]} in 1974 studied dental casts of 506 orthodontic patients in Cleveland area and produced simplified equations for determining the space required for unerupted permanent canine and first and second premolar in each segment:
(i) Sum of widths of maxillary canine and premolar teeth = half sum of width of mandibular incisors + 11.0 mm.

(ii) Sum of widths of mandibular canine and premolar teeth = half sum of width of mandibular incisors + 10.5 mm.

**Huckabas radiographic method:** Huckaba in 1964 gave formula relating the measures of erupted teeth to their radiographic images in order to obtain the proportional dimensions of unerupted teeth, to reduce the radiographic error due to elongation etc., as follows:

\[
\frac{\text{X-Ray MD width of deciduous}}{\text{X-Ray MD width of the permanent}} = \frac{\text{Real MD width of deciduous}}{\text{Real MD width of the permanent}}
\]


**Boston university analysis:** A recent analysis which was presented by Gianelly in Boston university [13, 14], he used all primary erupted teeth to find out and is as follows: Mesiodistal widths of permanent mandibular canines and premolars = MDW of primary mandibular canine + 2 (MDW of primary mandibular first molar).

The main disadvantage of all this analysis is that they have been done in one particular population their reliability when used in other populations is very less.

**Discussion**

Gardner [15] compared the accuracy of four mixed dentition analyses (Nance, Tanaka & Johnston, Moyers, and Hixon & Oldfather) by examining the casts and radiographs of 41 North American children selected from the orthodontic department at the University of the Pacific, San Francisco, and from an orthodontic practice in Palo Alto, California. Casts and radiographs taken before treatment (in the mixed dentition stage) and after the eruption of permanent teeth were examined. All four method displayed high correlations between predicted and actual arch length and between predicted and actual sum of widths of mandibular canine and premolar teeth, as shown in

Table 3: Correlation coefficients between predicted and actual arch length and between predicted and actual sum of mesiodistal widths of mandibular canine and premolar teeth (from Gardner, 1979)

<table>
<thead>
<tr>
<th>Method</th>
<th>Arch length</th>
<th>Sum of widths of canine + premolars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nance</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>Tanaka &amp; Johnston</td>
<td>0.85</td>
<td>0.72</td>
</tr>
<tr>
<td>Moyers</td>
<td>0.85</td>
<td>0.72</td>
</tr>
<tr>
<td>Hixon &amp; Oldfather</td>
<td>0.93</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Bolton [16], and discovered that the values for the Indian children were very different from those of Tanaka & Johnston 0.625 Ballard & Wylie ~ Hixon & Oldfather ~ 0.648 0.64 0.69 Caucasian children, from which they concluded that there were racial discrepancies in tooth size, and therefore that data collected from one ethnic group were not transferable to another.

In a systematic review conducted in 2013 by Mariana de Aguiar [17] to see the Applicability of Moyers analysis in mixed dentition, the main clinical problem that was found to exist in the review was at 75%, the predicted values underestimate the real values, in which case there will not be enough space to properly align the teeth. When the values overestimate the real values, it means that there will be more space to accommodate the posterior teeth, which is not considered a real clinical problem. The systematic review concluded that Moyers mixed dentition analysis should be used carefully, because, in the majority of the articles examined, its accuracy regarding probability level at 75% was poor.

In a systematic review conducted in 2011 by Nghe S. Luuet al [18] analyzed the validity and reliability of mixed dentition analysis method from 39 articles they concluded that all modalities had validities correlated in the positive direction, but we found no difference in terms of overall validity between modalities. The predictions based on the combined study-model/radiographic method had the least variable overall validity. Predictions based on the radiographic method had more variable overall validity, and predictions based on the study-model method had the most variable overall validity. Polymorphisms based on ethnicity, jaw, sex or side of mouth did not appear to have any meaningful influence on the validity of MDA method. They found that any given MDA approach will lead to either over
prediction or under prediction of the combined widths of three teeth (un erupted canines and premolars) in a quadrant of less than 2 mm with correlation coefficients that tend to be greater than 0.6.

**Conclusion**

Mixed dentition analysis is of great importance in predicting is the space available is adequate or will more space be required and also how to manage the space. One should always remember that these analysis gives us information only about the dental malocclusion and not the underlying skeletal conditions (if any present). also since all of these analysis were done in specific population, to substantiate these analysis for the population throughout the world vast studies with larger sample sizes have to be conducted.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**Reference**


8. Surrender K. Nanda textbook on The Developmental Basis of Occlusion and Malocclusion


Commonly Used Oral Sedatives in Treating Pediatric Patients

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Abstract

One in seven of the population of the world is highly anxious about undergoing dental treatment and requires careful and considerate management by dental practitioners. The interaction between the dentist, dental health team and the patient can reveal the presence of anxiety, fear, and phobia. In such situations, subjective evaluation by interviews and self-reporting on fear and anxiety scales and objective assessment of blood pressure, pulse rate, pulse oximetry, finger temperature, and galvanic skin response can greatly enhance the diagnosis and enable categorization of these individuals as mildly, moderately, or highly anxious or dental phobics. Formulating acceptable evidence-based therapies for children is essential, or else they can be a considerable source of stress for the dentist.

Keywords: Sedation, Anxiety, Fear, Phobia.

Introduction

The management of acute pain and anxiety in children undergoing therapeutic and diagnostic procedures outside the operating room has developed substantially in the past few decades[1,2]. The widespread availability of noninvasive monitoring, short acting opioids and sedatives, and specific opioid and benzodiazepine antagonists has enabled clinicians to administer sedation safely for procedures in diverse settings. This paper presents a review of a number of pharmacological (oral) techniques that can be used in the dental clinic or surgery in order to assist anxious individuals obtain needed dental care.[3]

Sedation is defined as the use of a drug or combination of drugs to depress the CNS, thus reducing patient awareness of their surroundings. Depending on the degree of CNS suppression, the sedation may be conscious, deep, or general. Sedation does not control pain, and consequently does not eliminate the need for the use of local anesthetics. Sedation is a continuous process that exists from minimal to deep in a dose–response manner. This continuous process can be divided into levels with characteristics that have been used to design several subjective sedation scales.

Sedatives or Anesthesia?: Variations the use of drug combinations including propofol with potent opiates by non-anesthesiologists in the future will continue to force us to examine the question as to where deep sedation ends and general anesthesia begins. According to the ASA/JCAHO/AAP criteria[4-10], the distinguishing characteristic between these two entities is the presence or absence of a response to repeated painful stimuli. Whereas most studies involving sedation do not describe the condition of sedated patients adequately enough to determine the sedation level of the patient, there is no doubt that many of the regimens used in emergency departments and ICUs around the country are evolving into recipes for brief general anesthesia rather than sedation. In light of the fact that the difference between these two states can be subtle (patients can go in and out of a given state quite rapidly) and that there is no practical way to police this practice, any effort to limit anesthesia by non-anesthesiologists for brief procedures in children is doomed to failure. In terms of promoting
safety and generally good sedation delivery, pediatric patients will be better served by advocating for standards anesthesiologists have successfully used to improve the safety of anesthesia care by 10-fold over the last 20 yr \(^{(9,10)}\). Specifically, all providers of deep sedation should be able to rescue patients from side effects of general anesthesia, as mandated by the JCAHO. To do this, anesthesiologists need to demand that high standards are met by these individuals. These should include, but not be limited to, the following: (a) There should be defined competencies in terms of airway, and these skills should be demonstrated in clinical practice or simulation setting; (b) Knowledge of disease entities that impact sedation and anesthesia should be documented; (c) Familiarity with sedation drugs—doses, side effects, and contraindications, reversal drugs, and rescue medications should be documented; (d) Intraprocedural monitoring should be used, optimal method for monitoring ventilation as well as oxygenation (pulse oximeter); (e) All equipment required for emergency interventions such as masks, airways, suction, and ventilation bags must be present for each sedation, and they must be regularly checked and accounted for; and (f) Sedation systems must have a quality improvement program that examines its own outcomes on a continuing basis.

**Indications:** Four main considerations for oral sedation in children are anxiety, medical and behavioral, and treatment complexity. Children with special needs (mental retardation, autism, mental illness, traumatic brain injury) and clinical situations can be indicated for pharmacological management.\(^{[12, 13]}\) Factors to be considered prior to pharmacological management:

1. Risks involved with pharmacological management when compared to behavioral therapies
2. Appropriate evidence-based selection of drugs for pharmacological management
3. Extent of the patient’s dental needs and severity of anxiety
4. Patient’s cognitive and emotional needs and personality
5. Practitioner skill, training, and experience
6. Proper equipment and monitoring
7. Cost of the procedure.

According to the American Society of Anesthesiologists, patients should be classified as category ASA I (mentally and physically healthy) or ASA II (only mild systemic disease, which does not result in any functional limitation), in order to be considered a candidate for sedation

**Sedative–hypnotic agents:**

**Chloral Hydrate:** One of the oldest drugs, oral chloral hydrate has a well-established safety profile.\(^{[15-17]}\) Chloral hydrate has no analgesic properties, and its use is now mainly restricted to diagnostic imaging, particularly in children under three years of age.

**Benzodiazepines:**

**Midazolam:** Most commonly used for sedation in children and adults during procedures.\(^{[18-27]}\) This short-acting benzodiazepine can be administered by multiple routes. It provides potent sedation, loss of memory, and anxiolysis and is preferred over the longer-acting diazepam and lorazepam. Benzodiazepines provide no analgesia, and for painful procedures midazolam is commonly administered with an opioid. Caution must be exercised when using benzodiazepines and opioids together, since the risks of hypoxia and apnea are significantly greater than when either is used alone. The effects of midazolam can be reversed with the antagonist flumazenil. Barbiturates have been used for pre-induction of anesthesia for over 30 years and have an extensive safe

**Barbiturates:** Barbiturates have been used for pre-induction of anesthesia for over 30 years and have an extensive safety profile.\(^{[15,16]}\) They are widely regarded as the drugs of choice to facilitate diagnostic imaging in children three years of age or older. Though lacking analgesic properties, they provide effective immobilization and can be delivered by multiple routes. Intravenous pentobarbital and rectal methohexital and thiopental are the most extensively studied barbiturates used for procedural sedation.\(^{[31-36]}\)

**Present sedation guidelines in pediatric dentistry:**

**Reimbursement:** The continued improvement of pediatric sedation practice depends on the involvement of qualified professionals. This involvement can only be done if there is proper reimbursement. Unfortunately, reimbursement depends on economic status of the child’s family, insurance companies and state medical reimbursement schedules. In India there are not many schemes that cover these aspects of dentistry; hence this would be one area which will need analysis and improvement.
Conclusion

Providing sedation to children is an area of rapid change marked by evolving standards. This article gives brief dosage regimens which can be clinically administered by dental health team, without difficulty. Role of pedodontist and his team is little known and appreciated as far as oral sedation for dental procedure is concern. It is of importance at this time that pedodontists and dental health team use their established identity as professionals who can also provide oral sedation with a proven track record of clinical practice, training, and safety in this field is optimized. However anesthesiologists will be the ultimate experts in this field.

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Passive Immunization Against Streptococcus Mutans

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Abstract

Dental caries is an irreversible microbial disease of the calcified tissues of teeth, which is characterized by demineralization of inorganic portion and destruction of organic substance of the tooth which often leads to cavitation. It is a multifactorial disease. Among the various microorganism Streptococcus mutans considered to be chief etiological agent. Immune therapy against this microorganism to curtail this widespread disease has gained interest. Passive antibody administration has also been examined for effects on indigenous mutans streptococci. Passive immunotherapy is of interest due to its many advantages. This review briefs on passive immunotherapy.

Keywords: Dental caries, Immunotherapy, Streptococci.

Introduction

Dental caries is one of the most common and widespread disease in humans1. Dental caries is an infectious, irreversible, microbial disease of the calcified tissues of teeth, which is characterized by demineralization of inorganic portion and destruction of organic substance of the tooth which often leads to cavitation2. It is a multifactorial disease caused by interaction between four principal factors the host (saliva and teeth), the micro flora, the substrate (diet) and the time1. Various microorganism – Streptococcus mutans (S.mutans), lactobacillus sp., Actinomyces sp. are involved in caries formation. Chief etiological agent as reported by most studies was Streptococcus mutans. Caufields(1993) monitored oral cavity levels from birth up to 5 years to analyze window of infectivity2. He noted that initial acquisition of S.mutans was from 19-31 months. With age maternal dose of a child varies which leads to variation in MS level. Children exposed to modest maternal challenge have approximately 50% bacterial colonization and children exposed to high maternal levels have 90% colonization. With high maternal level and exposure to dietary sucrose, initial dental colonization with MS occurs at young age. Therefore, window of vaccine opportunity is from 12-18 months2.

Caries Vaccination: Introduced by William Bowen, 1969. Whole cell S.mutans were injected in Macacafasicularis monkeys, showed successful result against caries. Thus earlier whole cell of the bacteria was used to induce immune reaction.3 At present, antigenic components of S. mutans are used to induce immune response4. The caries vaccine targets the initial stages of dental plaque formation by acting on

a. Aggregation of bacteria before colonization
b. Inactivation of enzymes
c. Blockage of surface receptors

Antigenic Components of S. Mutans5:
• Adhesin (Antigen I/I/SAI/II/PAC)
• Glucosyl transferase
• Glucan binding proteins
• Dextranases

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Adhesin (ANTIGEN I/II/SAI/II/PAC): Adhesin are found in S.Mutan cell surface. Regions associated with adhesion are the alanine rich region is the salivary binding regions. Mechanism of action: Active immunization with AG I/II (or) Passive immunization with IGY antibodies target salivary binding domain and block adherence of S.Mutans to saliva coated hydroxyapatite [Brady etal, 1992-1993] and induce cellular aggregation [Liljemarketal, 1981].

Glucosyl Transferase: These are enzymes of S.Mutans involved in glucan production. It has a sucrose binding domain and glucan binding domain. Glucosyl transferase of S.Mutans binds with sucrose forms and forms glucans and formed glucans are released into saliva. It slowly gets incorporated into initial salivary pellicle and promote selective adherence of bacteria which then colonizes human teeth and promote plaque formation. There are 3 forms of glucosyl transferase that provides multiple binding sites for accumulation of S. Mutans, promoting plaque formation. They are as follows:

- Glucosyl transferase 1: Water insoluble glucan synthesis enzyme (2,1,6 glucose residue)
- Glucosyl transferase S: Water soluble glucan synthesis enzyme. (2,1,6 glucose residue)
- Glucosyl transferase S-1: Water soluble and water insoluble glucan synthesis enzyme

Mechanism of action: Antibodies inhibit the functional activity of enzyme (Kruger etal 2004) and affect synthesis of glucans (Taubman etal 1995)

Glucan Binding Proteins: Following are the types of glucan binding proteins:

- Glucan binding protein –A (hydrophobic, thus bond with water soluble glucan)
- Glucan binding protien-B (hydrophobic only induce protective immune response)
- Glucan binding protein- C.

Antibodies act by blocking Glucosyl binding protein type B and thus reduce sucrose dependent adherence of S.Mutan to tooth surface.

Dextranases: It is an enzyme produced by S.mutans and plays a major role in dental plaque formation. Mechanism of action of vaccine is to prevent bacterial adhesion to plaque by inhibiting the enzymes.

Types of Passive Immunization: Passive immunization involves passive or external supplementation of the antibodies. Passive immunotherapy includes 6, 7, 8:

- Bovine milk antibodies
- Monoclonal antibodies
- Plant antibodies
- Egg yolk antibodies

Though bovine milk antibodies, monoclonal antibodies, plant antibodies have been found to decrease S.mutans count in dental plaque as well as reduction in caries lesions, egg yolk antibodies, now called immunoglobulin Y antibodies has attracted attention only in the last two decades.

- Monoclonal Antibodies: Monoclonal antibodies to S. mutans cell surface antigen I/II have been investigated. The topical application in human subjects brought a marked reduction in the implanted S.mutans. Thus, by bypassing the system, less concern exists about the potential side effects.

- Bovine Milk and Whey Antibodies: Systemic immunization of cows with a vaccine using whole S. mutans led to the bovine milk and whey containing polyclonal IgG antibodies. This was then added to the diet of rat (Inoculated with S.mutans MT8148R) which showed decrease in S.mutans colonization. Antibodies Inhibit surface antigenI/II and Glucosyl transferase enzyme.

- Transgenic Plant Antibodies: The production of monoclonal antibodies in plants has been described in a number of patents. This involves the assembly of monoclonal antibodies in transgenic tobacco plants [4] and the generation of secretory antibodies in plants. Recombinant plant monoclonal antibodies were tested in human subjects for preventive immunotherapy.

- Egg Yolk Antibodies: Egg yolk antibodies, now called immunoglobulin Y (IgY) was discovered in the late 1800s, alternative possibility of producing antibodies has attracted attention only in the last two decades. Egg farming can be switched over as antibody farming for prophylactic and therapeutic applications in human and veterinary medicine, in counter bioterrorism and also for diagnostic purposes. Chicken antibody is financially viable with sustainable availability and huge quantity of
antibody is obtained from hens, approximately a total potential harvest of 20 g total IgY/year of which 1–10% is expected to be antigen specific. Eggs of avian origin may be used as an antibody source and purification procedures such as water dilution method are simple, cheap and nontoxic. There is apparently no systemic immune response with respect to orally administered antibodies. Immune complexes containing IgY do not activate the mammalian complement system and do not interact with mammalian Fc and complement receptors that could mediate inflammatory response. The use of IgY for passive immunization has been studied extensively demonstrating its effectiveness in preventing or treating infectious diseases.

Passive antibody administration has also been examined for effects on indigenous mutans streptococci. Mouthrinses containing bovine milk (Filler et al., 1991) or hen egg yolk IgY (Hatta et al., 1997) antibody to S. mutans cells led to modest short-term decreases in the numbers of indigenous mutans streptococci in saliva or dental plaque. Experimental passive immune protection could also be achieved with antibody to GTF (Hamada et al., 1991) or GbpB (Smith et al., 2001). Thus, topical or dietary administration of immune reagents with specificity for epitopes on these proteins may also have potential human application. Filler et al conducted experiments on passive immunization and showed that passive immune protection can be achieved with antibodies to GTF or GBPs mouth rinses containing bovine milk or hen egg yolk. Childers et al reported that the antibody to S. mutans cells lead to a modest, short-term decrease in the number of Streptococci mutans in saliva or dental plaque.

**Conclusion**

As most of the approaches against dental caries are of treatment in nature which is quiet expensive, the dire need for new alternative and potential preventive approaches for challenging the cariogenic bacteria has been universally accepted and now the focus is on active and passive immunotherapy. Absolute safety should be ensured with respect to immunotherapy as dental caries is not a life threatening one. Newer approaches are focused on the application of passive immunotherapy and successful passive immunization may ride over active immunization which seems to have more risk than benefits. Further advances to make immunization against caries practical will depend upon clinical trials aimed at establishing whether the findings from animal experiments can be transferred to humans.

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**Reference:**


Challenges in Shortcomings of Caries Vaccination: An Insight

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Abstract

Background: Dental caries is an infectious microbiologic disease of the teeth and is one of the most common diseases in humans. It is a multifactorial disease caused by interaction between four principal factors-the host (saliva and teeth), the microflora, the substrate (diet) and the time. Targeting the microbial factor of the disease, researchers have been developing vaccination to protect the caries prone children and adults. Immunization includes active and passive immunization. Vaccines should be safe and effective. This article gives an insight into the shortcomings and challenges of caries vaccinations.

Keywords: Caries vaccination, active immunization, passive immunization.

Introduction

Dental caries is one of the most prevalent oral disease formed by the interaction of 4 factors namely: The host (saliva and teeth), the microflora, the substrate (diet) and the time. Among the various microorganism that are responsible for caries formation and progression, the main causative agent for initiation is Streptococcus mutans.1,2 At present there are various caries prevention method of which developing vaccination against S.mutans has been of greater interest among researchers for past few decades.3,4

In late 1969, the modern era of vaccination began with intravenous immunization experiments conducted by William Bowen on animals. Earlier whole cell S. mutans were found to be used for vaccination2. At present virulent factors of bacteria are used to induce immune response.5

Routes of Immunization Include Passive and Active Immunization1,2,3

<table>
<thead>
<tr>
<th>Types</th>
<th>Common Mucosal routes</th>
<th>Systemic route</th>
<th>Active gingivo salivary route</th>
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<tr>
<td>Active</td>
<td>Oral</td>
<td>Subcutaneous route</td>
<td>Active immunity acquired by induction of salivary antibody production and memory formation</td>
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<td></td>
<td>Intranasal</td>
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<td></td>
<td>Tonsillar</td>
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<tr>
<td>Passive</td>
<td>Egg yolk Antibodies</td>
<td>Bovine Milk antibodies</td>
<td>Passive immunity obtained by external supplementation of antibodies through the above mentioned types</td>
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<td></td>
<td>Bovine Milk antibodies</td>
<td>Monoclonal Antibodies</td>
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<td>Transgenic Plant Antibodies</td>
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Methodology

Articles from the year 2000-2015 were searched from the online databases (PUBMED, Cochrane, Science direct, Google scholar) and by hand search. Search terms used were disadvantages, shortcoming, drawback, caries vaccine, dental caries vaccine, dental vaccine, vaccination, oral microflora, oral microorganism. Out of 25 articles, 11 articles that gave description of the drawbacks of various vaccination against oral microflora were included.

Shortcomings of Caries Vaccine: All vaccines, even if properly manufactured and administered, seem to have risks. Active immunization has shortcomings
due to reasons stated below. The most serious is that sera of some patients with rheumatic fever who show serological cross-reactivity between heart tissue antigens and certain antigens from haemolytic Streptococci. Experiments from antisera from rabbits immunized with whole cells of S. mutans and with a high molecular weight protein antigen of S. mutans were reported to cross react with normal rabbit and human heart tissues. Polypeptides (62-67 KDA) immunologically cross-reactive with human heart tissue and rabbit skeleton muscles myosin are found in the cell membrane of S. mutans and Streptococcus rattii. On the other hand, demonstrations showed that rabbit antiserum to high molecular weight, Todd-Hewitt broth components reacted with monkey cardiac muscle with S. mutans coated with medium components. Heartcross-reactive antibodies do not develop in rhesus monkeys or rabbits immunized with purified Ag I/II from S. mutans. It is possible that increased production of heart-reactive antibody in rabbits immunized with mutans streptococci results in injury of heart tissue as a consequence of binding of this low molecular weight Streptococcal polypeptide. Because of the potential of Streptococcal whole cells to induce heart reactive antibodies, the development of an sub-unit vaccine for controlling dental caries has been of intense research interest. Glucosyltransferase was also tested for cross-reactivity with human heart tissue and the results were negative. Further research showed that the C-terminal part of Ag I/II contains an epitope, which is cross-reactive with human IgG. Although the clinical significance of this observation is unknown, it appears that this potentially harmful epitope should be excluded from a caries vaccine. The human IgG cross-reactive region is also present in other mutans streptococci such as Streptococcus sanguinis as well as in non mutans streptococci. Also usage of animal has been a concern for animal welfare teams. Bulk production of vaccination is not efficient and was costly.

Passive immunotherapy overcame many of the disadvantages of active immunization. Few other risks of this immunization are stated below. Transgenic plant antibodies due to its nicotine content may cross react and is harmful. Also passive immunity is obtained only for a shorter period of time and hence places the need for repeated vaccination and these booster doses also needs patient compliance.

**Conclusion**

Active and passive immunization strategies, which target key elements in the molecular pathogenesis of mutans Streptococci, hold promise. Integrating these approaches into broad-based public health programs may yet forestall dental caries disease in many of the world’s children, among whom those of high risk might derive the greatest benefit.

Along with established method of caries prevention, caries vaccines have the potential of making a highly valuable contribution to disease control. In the meantime, basic research on the mode of action of caries vaccine and the search for new, economical, efficient bulk production. Procedure of Active and Passive Immunization to work against pathogenesis of S. mutans in oral cavity holds promise. In order to make it feasible on human, more of clinical trials are required primarily on experimental animals. The main aim of vaccine should be long term prevention from dental caries, as the disease is gradual developing process. The vaccine should be safe and effective. Caries vaccine if successful tested on humans could be a valuable immunomodulator as compared to other caries preventive measures.

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Turner’s Syndrome Manifestation with Generalized Periodontitis: A Case Report

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Abstract

The knowledge of these syndromes is essential as they can influence the prognosis and management of periodontal disease. Syndromes associated with periodontium are a rare entity. Hence clinical diagnosis is very important. This case report is about turners syndromes with generalized aggressive periodontitis.

Keywords: Turner’s Syndromes, Systemic conditions, periodontitis.

Introduction

Henry Turner was the author who described seven young girls with the triad; sexual infantilism, webbing of the skin of the neck and elbow deformity\(^1\). Additional features also found by Turner were retarded growth and low hairline. He believed the underlying reason for the clinical symptoms being a result from a defect in the anterior pituitary gland called it has Turner Syndrome (TS).

Turner syndrome is caused by complete or partial X monosomy. The incidence of Turner syndrome is approximately 1 in 2000 among live female infants. Different karyotypes are associated with varying phenotypic expression. The most prevalent karyotype in patients with Turner syndrome is 45, X monosomy. The Xq isochromosome is associated with autoimmune disorders but not congenital abnormalities. Women with the ring X chromosome are less likely to display congenital abnormalities but are more likely to have spontaneous menses and cognitive disability. Women with Turner syndrome also can have a mosaic pattern with additional Y chromosome material (45,X/46,XY).\(^1,2,3\)

Many studies have reported systemic disorders and their relationship with periodontal disease. There are many underlying factors related to immune, endocrine and connective tissue. These alterations are associated with different pathogenesis and syndromes that cause periodontal disease either as a primary manifestation or by aggravating a preexisting condition to local factors\(^4,5\).

Case Report: A 19 yr old came to our department with a complaint of mobile teeth for the past one year. On clinical examination her records revealed karyotyping was done revealed it’s a case of trisomy 21 [Turners syndrome], patient is short stature, Amenorrhea, hypogonadism.

On intra oral examination pocket depth of 7mm is recorded in right & left upper molars, grade III mobility in upper 11, 12, 21, 22, high arch palate, deposits are minimal. Radiograph revealed extensive bone loss in all the quadrants. RCT was done in 11.

A full mouth flap surgery was planned, patient was put under regular oral prophylaxis, scaling and root planning was done and patient was under doxy cycline & metronidazole treatment.

After non-surgical phase, a full mouth flap surgery was done. Patient was reviewed after a month, 3 month & 6 months. Prosthesis was restored in 12, 11, 12, 22.
Case Report:

Preoperative:

Fig: Post Operative

Discussion

Periodontitis is a chronic bacterial infection of the supporting structures of the teeth. The host response to infection is an important factor in determining the extent and severity of periodontal disease. Systemic factors modify periodontitis principally through their effects on the normal immune and inflammatory mechanisms. Several conditions may give rise to an increased prevalence, incidence or severity of gingivitis and periodontitis. In many cases the literature is insufficient to make definite statements on links between certain syndromes and periodontitis and for several conditions only case reports exist.[5,6,7] Microbial dental plaque is the initiator of periodontal disease but whether it affects a particular subject, what form the disease takes, and how it progresses, are all dependent on the host defenses to this challenge. It is important to be familiar with the special management required for these patients, in which the dental treatment can affect the underlying cause of the disease.

Down’s syndrome is characterized by the appearance and behavior of the patients, oral manifestations are, gingival hyperplasia can occur secondarily due to mouth breathing, poor hygiene, and local irritating factors. The gingivitis which progresses to generalized periodontitis, which starts in the deciduous dentition and affects the permanent dentition.[8,9].

Conclusion

It is well established that many systemic conditions and their effects on the periodontium. Future studies are needed to assess the role of systemic conditions and its affect in periodontal disease, and mechanical factors which play a role in increasing susceptibility to periodontal disease.

Ethical Clearance: Not required since it is a case report.

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Conflict of Interest: Nil

Reference

Evolution of Mechanical Debridement and its Concepts

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Abstract

The field of periodontics has evolved over the period of years in classification, etiology and management of the periodontal disease. Biofilms are spatially and functionally organized, and environmentally heterogenous, enabling organisms to co-exist that appear incompatible with one another. Dental plaque is a classic example of both biofilm and microbial community. As the concepts of the etiology of the disease kept evolved, so did the management strategies.

Keywords: Periodontics, Dental plaque, Biofilm.

Introduction

Historical perspective- etiology of periodontal disease: During 1880-1930 researches found that four distinct groups of microorganisms as possible etiologic agents - amoeba, spirochetes, fusiforms and streptococci.

In mid 1930s there was a decline in the interest in microorganisms. Some constitutional defect like trauma from occlusion was considered as etiology and bacteria were believed to be secondary invaders.

In late 1950s, once again bacteria were considered as possible etiology in tissue destruction. Per nonspecific plaque hypothesis more the plaque, more the periodontal disease.

As per specific plaque hypothesis only certain type of plaque containing specific bacteria are particularly pathogenic ¹.

Current concepts of pathogenesis of periodontal disease: Biofilms are spatially and functionally organized, and environmentally heterogenous, enabling organisms to co-exist that appear incompatible with one another. Dental plaque is a classic example of both biofilm and microbial community ³.

As per Ecologic plaque hypothesis ⁴, in health, biofilm composition is relatively stable in a state of dynamic equilibrium and in balance with steady state low level immune/inflammatory response. Presence of red complex species (P.gingivalis, T. forsythia and T.denticola) were commonly found in advanced periodontitis associated with deep pocketing ⁵. Periodontitis is an inflammatory disease initiated by the oral microbial biofilm it is the host response to the biofilm that destroys the periodontium ⁶.

The objective of periodontal debridement ²:

- Disruption and removal of the subgingival biofilm. Treatment should aim to disrupt the biofilm and removal as much of it as possible.
- Creation of biologically acceptable root surface that is smooth and free of plaque retentive factors
- Resolution of inflammation.

Mechanical Professional Cleaning-Definitions ⁸:

SCALING is instrumentation to remove dental plaque and calculus from the surface of a tooth, from the surface of a tooth apical to the gingival margin accumulated in periodontal pockets, or from the surface coronal to the gingival margin (MeSH, introduced 1991).

Root Planing: It is a technique of using hand instruments to remove the softened cementum, to achieve hard and smooth root surface, usually carried out by quadrant, around 45-60 minutes per quadrant ⁷ and using Local anesthesia, referred to as scaling and root planing (SRP) or quadrant scaling and root planing (QSRP).

ROOT SURFACE DEBRIDEMENT (RSD) is the removal or disruption of dental deposits and plaque...
retentive dental calculus from tooth surfaces and within the periodontal pockets space without deliberate removal of cementum (MeSH, introduced 2011).

**Full Mouth Disinfection** is a specific technique that was proposed by a group of researchers who compared full mouth instrumentation within a 24-hour period and quadrant by quadrant instrumentation utilizing chlorhexidine gluconate extensively.\(^9\)-\(^{10-11}\)

**Full Mouth Ultrasonic Debridement (FMUD)** is a full mouth treatment carried out at one session, utilizing ultrasonic instrumentation alone and a debridement (conserving tooth structure) technique.

How the changes in concepts of etiology changed the treatment modalities?

**Scaling and Root Planing—Hand instrumentation:**
As calculus was considered as irritant, the goal of the periodontal treatment was to completely get rid of calculus.

In 1953 edition of Glickman’s Clinical periodontology textbook, the use of scalers is described to remove calculus deposits and to smooth the tooth surface by the removal of softened necrotic cementum.\(^12\)

In 1980s studies identified that endotoxin was present in the outer surface of cementum in teeth affected by periodontal disease.\(^13\) Removal of the endotoxin creates a root surface that is more biologically acceptable and compatible with wound healing. Usage of curettage was reduced as pain was associated in the procedure and studies eventually proved that the outcome of SRP with curettage is the same as that of SRP alone.\(^14\) During 1985-90 studies identified that endotoxin did not penetrate significantly into the cementum.\(^15\) During 1990-1991 further studies concluded that the therapeutic benefits of periodontal instrumentation are derived from the removal of the plaque rather than cementum or calculus.\(^16-17\)

Deliberate removal of cementum by SRP is no longer warranted or justified, and more gentle and conservative approach of RSD should be implemented in daily periodontal practice.\(^18\)

**Ultrasonic instrumentation—Root Surface Debridement:** Ultrasonic scaler facilitates biofilm disruption and endotoxin flushing, but with preservation of cementum. Ultrasonic scalers have vibrating tips which operate at frequencies of between 18 and 45kHz by using the conversion of electrical energy to mechanical energy.

Ultrasonic instrumentation is an effective method of treating periodontitis and provides similar clinical improvements compared to the other method of periodontal therapy.\(^19\)

Kieser’s research group introduced the term RSD which is a light touch, gentler form of instrumentation to promote plaque removal, yet with preservation of cementum.\(^22-23\) He proposed that periodontal therapy should be performed in a pragmatic, staged approach adopting RSD.

**Daily oral health care routine—commitment from the Patient:** Maintenance of periodontal health following therapy includes a lifelong supportive care consisting of daily removal of the microbial plaque by the patient, supplemented by professional care in an individually designed programme. The patient should be advised to use appropriate aids and technique. A soft brush, an interspace brush, interdental tooth brushes or tooth picks are recommended in periodontal patients.\(^25\)

In periodontal treatment, the importance of self-performed plaque control is frequently acknowledged but often underestimated.\(^26\)

**Discussion**

Early days plaque, calculus, endotoxin, and endotoxin impregnated cementum are considered to be the etiological factor in periodontal disease which lead to the management strategies involved scaling and root planing. The use of manual instrument to remove the epithelial lining of pocket wall, and cementum removal under Local anaesthesia and by quadrants, had unwanted side effects like dentine sensitivity, patient discomfort, and toxic effects of LA.

Studies then revealed the role of plaque as biofilm and microbial community and the host response releasing anti-inflammatory mediators which played major role in the tissue destruction in periodontal disease. This modified the treatment strategies which concentrated more on biofilm disruption rather than aggressive removal of cementum.

Studies proved that full mouth ultrasonic debridement without LA over an hour duration produced the result comparable to manual instruments under LA over 4 visits each an hour duration (QSRP). Self-
performed plaque control measures plays a vital role in maintaining the health of the periodontium. Educating and motivating the patient forms an important part of the treatment plan as this is the crucial factor influencing the outcome of the periodontal therapy.

**Conclusion**

As the concepts regarding the etiopathogenesis of periodontitis changed, its treatment modalities to remove plaque and calculus also evolved to reach the contemporary concepts.

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**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**

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Study Outcome of Bone Regeneration Using Bone Grafts: A Case

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Abstract

Bone grafts play a major role in the regeneration of bone. So they are a very important factor in the regeneration of bone particles. Bone molecules have been impacted in those bone substitutes which play a major role in the formation of bone. Bone loss is a common problem in dental field due to increased compressive forces on the tooth structure which causes distortion and tension. Dentistry today is more towards regeneration and access towards regaining lost structures and tissues.

Keywords: Bonegrafts, Substitutes, Alloplasts, Autografts.

Introduction

Bone loss is one of the most common problem seen in the field of Periodontics. So the advent of artificial bone substitutes have made bone repair more eventful and easy. Bone loss is a common problem in dental field due to increased compressive forces on the tooth structure which causes distortion and tension. Dentistry today is more towards regeneration and access towards regaining lost structures and tissues.

Case History: The aim of this case report was to enhance the bone level by the substitution of bone grafts.

Materials and Method

A patient named Mr. Yoganand aged 40 years had come to the Department of Periodontics, Sree Balaji Dental College, for getting his infected gums treated. On X-ray it was found that there was loss of bone in the mesial aspect of 21. Pt was given medications and advised scaling and root planning initially. Later he was advised for a flap surgery and bone grafting.

Pre-op Probing

The patient is checked with all the periodontal indices and then taken up for further management and surgery. The case history is taken and the patient is further proceeded for surgical treatment.
Discussion

Whether bone grafts need to be placed was debatable but later it was confirmed that bone grafts need to be placed\(^4\). Bone grafts play a major role in the regeneration of bone materials and they are placed in the mesial aspect of 21. These grafts are placed and sutured with simple interrupted sutures. After that patient is given medications and recalled after a week for review\(^5,6\).

Conclusion

Flap surgery with bone grafting has been recommended as treatment of choice for gum infection and bone loss in the mesial aspect of 21.

Ethical Clearance: Not required since it is a case report.

Source of Funding: Nil

Conflict of Interest: Nil

References


Chronic Periodontitis and Hypertension: A Systematic Review

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Abstract

Aim: To conduct a systematic review evaluating associations between periodontal disease and hypertension.

Method: A MEDLINE literature search of papers published between 2000 and March 2016 was conducted. Cross-sectional studies, prospective studies and nested case-control studies that studied the association between periodontitis and hypertension formed the mainstay of this literature review. This systematic review was conducted on the guidelines of the Cochrane Systematic Reviews and the conclusive evidence was based on the Canadian task force on preventive health care guidelines.

Results: A total of 21 articles were searched for relevancy, determined by article title, abstract and full copy, resulting in a yield of 17 studies that met our inclusion criteria. 1) There is a fair evidence (II-2 Grade B recommendation) for an association between chronic periodontitis and blood pressure with OR of 2.93 (95% CI:1.25-6.84) but the association becomes stronger when restricted with those with hypertension or taking anti-hypertensive medications: OR = 4.20(95% CI:1.28-13.80). 2) A good evidence (I, Grade A recommendation) that intensive periodontal therapy decrease cardiovascular risk scores (Framingham) at 296 mm (1.53% F 1.20% (95% CI 1.05-2.24, P = .0290) and 2.00% F 1.42% (95% CI 0.98-4.09, P = .0568).

Conclusions: With the available literature we conclude that,

1. There is a fair evidence for an association between chronic periodontitis and hypertension.

2. Intensive periodontal therapy reduces the systemic inflammatory markers and systolic blood pressure imminently at 6 months after the end of periodontal treatment.

Keywords: Chronic periodontitis; Hypertension; Reactive oxygen species.

Introduction

Inflammation is now proved to be associated with all stages of coronary artery disease, from atheroma up to thrombus formation. Chronic periodontitis is a constant source of inflammation, with pro inflammatory cytokines being released from host bacterial interaction. This systematic review highlights how periodontal intervention can possibly reduce morbid outcomes of untreated and uncontrolled hypertension like acute myocardial infarction.

Background: Hypertension is the most prevalent cardiovascular disease affecting over 30% of the adult population globally. Untreated or uncontrolled hypertension is a fore-runner for morbid cardiovascular fatalities like atherosclerosis and myocardial infarction. It may also lead to target organ damage such as left ventricular hypertrophy and disruption of renal functions⁴⁰.

Periodontitis is a chronic inflammatory disease of the supporting structures of the teeth, caused by a plethora of gram-negative anaerobes⁶. The progressive attachment and bone loss eventually leads to loss of the tooth when untreated. The disease is associated with an abundance of host and bacteria-derived pro inflammatory cytokines such as IL-1 β, Tumor Necrosis Factor α and C Reactive Proteins²⁴,³¹.

Possible mechanisms linking chronic periodontitis and hypertension

1. Inflammation: The systemic inflammatory response
that may accompany periodontal disease has been proposed as one link between periodontal disease, hypertension and its cardiovascular ill-effects.\textsuperscript{25,26} A direct bacteraemia with far-reaching systemic effects is another possible mechanism\textsuperscript{12}.

Recent pathogenetic models suggest inflammatory mechanisms and endogenous related vasoactive substances to be responsible for hypertension.\textsuperscript{5,30} (Fig 1). Activation of endothelial cells by inflammatory cytokines promotes a proatherogenic phenotype with increased expression of proinflammatory factors and loss of the antithrombotic, growth-inhibitory, and vasodilator properties of the endothelium, including a decrease in the biological activity of nitric oxide.\textsuperscript{9}

2. **Oxidative Stress:** Periodontitis is associated with endothelial dysfunction in subjects without cardiovascular risk factors, as well as hypertensive patients, through a decrease in Nitric Oxide bioavailability.\textsuperscript{14} Oxidative stress in turn is implicated in the development of hypertension, since reactive oxygen species may be regarded as mediators of vasoconstriction and vascular inflammation, and bioavailability of nitric oxide is strongly related to the redox state.\textsuperscript{12}

3. **Obesity:** A well-known risk factor for developing cardiovascular disease is obesity, which is also associated with chronic periodontal disease.\textsuperscript{8} A high cholesterol diet increases the proliferation of junctional epithelium and alveolar bone resorption exacerbating periodontitis and periodontitis causing impaired glucose tolerance resulting in diabetes, obesity and cardiovascular disease. Thus periodontitis is a dual risk factor for hypertension.

4. **Periodontal disease and hypertension:** Data derived from the 3rd National Health and Nutrition Examination Survey (NHANES III) on almost 12,000 adult dentate participants to examine associations between periodontal disease measures and BP levels showed that a positive linear relationship between systolic BP and increased severity of periodontitis was identified in middle-aged subjects.\textsuperscript{10} This hypothetical association has been termed as Dental hypertension\textsuperscript{15} by Tsioufs et al. The severity of target organ damage due to hypertension such as left ventricular hypertrophy has also been associated with severity of periodontitis.\textsuperscript{34} Periodontal disease and its effect on the risk of pre-eclampsia\textsuperscript{6,7,8,23} and stroke\textsuperscript{3,13,17} have been studied extensively with varying results. Serological evidence by Pussinen et al.,\textsuperscript{27} and a case-control study by Grau\textsuperscript{13} pointed towards chronic periodontitis being an independent risk factor for ischemic stroke.

### Method

**Objectives:** This systematic review sought to answer the following questions:

a. Are healthy patients with chronic periodontitis at a higher risk of developing hypertension?

b. Does periodontal intervention in hypertensive patients improve blood pressure levels?

**Study Eligibility Criteria:** Longitudinal studies, randomized control trials, nested case control, case-control studies and cross-sectional studies that studied the association between chronic periodontitis and hypertension, and randomized interventional cohort studies, which assessed hypertension control in chronic periodontitis patients.

**Data Sources:** All abstracts in English language with hypertension as the outcome and periodontal disease as the predictor variable were searched in Google scholar and PubMed. Indexed specialty Journals were also hand-searched. The entire search period extended from January 2000 to March 2014.

Patient population included volunteers attending dental clinics and pregnant women attending obstetric clinics. Other subjects were those were formed part of various health projects like the NHANES III, Health Professionals Follow-up Studies, Oral Conditions, And Pregnancy study, The OralInfections and Vascular Disease Epidemiology Study (INVEST) and Puerto Rican Elderly Dental Health Study studies, Oral Conditions And Pregnancy study.

Patient population comprises of males and females in the age range of 45 to 60 years. There were 3 classes of patients, Patients with generalized chronic periodontitis, Patients with severe, primary, non-responsive (refractory) arterial hypertension or enrolled for treatment of hypertension and Healthy individuals without hypertension or chronic periodontitis.

**Study Selection:** Two reviewers assessed studies for inclusion in the review. Data were abstracted by one reviewer and reviewed for accuracy by another author. To rate the quality of the studies, levels of bias were
assessed using Cochrane’s risk of bias assessment tool. At the end, the articles that had a high risk of bias were eliminated.

**Stage I:** Independent electronic search by 2 reviewers yielded 50 article abstracts.

Application of exclusion criteria and discussion led to the exclusion of 8 titles.

**Stage II:** Independent analysis of abstracts of the 40 selected titles by the investigators. Application of exclusion criteria and discussion led to exclusion of 23 abstracts.

**Stage III:** Independent analysis of full text of the 21 selected abstracts by the investigators. Using the Risk of Bias Assessment tool by Cochrane, we eliminated 4 articles, which had a high risk of bias. Final number of articles included for analysis were 17. The details of the 17 studies selected

Characteristics of study participants, study size, PICOS variables, were noted on a chart by one reviewer and crosschecked

**Data Extraction:** Both reviewers did data extraction from the selected articles. One reviewer extracted the data and the other checked the extracted data.

**The Data Included:**

- Characteristics of trial participants (such as age, type and severity of periodontitis)
- Objective of the study
- Variables used in periodontal assessment
- Controlling for confounding factors.
- Type of intervention (where applicable)
- Outcome values
- Odds Ratio

**Validity Assessment:**

**Risk of Bias in Individual Studies:** This was performed based on Cochrane Risk of Bias Assessment tool. Sequence generation, allocation, blinding of participants, personnel and incomplete outcome data were assessed for each study. It was done at the study and outcome level of each study.

**Results**

Study selection: All English articles with the key words, periodontitis, hypertension, oral hygiene and tooth loss from Google scholar, PubMed and hand searching of indexed period ontology journals were searched independently by both reviewers.

Confounders for the study contributing to bias have also been tabulated for each study.

Risk of bias of each study and, if available, any outcome-level assessment was done.

Summary of evidence based on periodontal parameters, periodontal intervention, pre eclampsia, stroke and sub gingival microflora are tabulated in Table 4. All the selected studies were short-listed only after risk of bias assessment using the Cochrane ROB assessment tool.

**Discussion**

In this systematic review, the evidence for an association between chronic periodontitis and hypertension has been searched from cross-sectional data, cohort studies and a few interventional studies. The association was assessed also by secondary outcomes such as pre- eclampsia and stroke susceptibility.

Associative studies showed conflicting results ranging from no association to stronger association in known hypertensives. Clinical findings associated with periodontitis were studied, such as deep periodontal pockets and gingival bleeding were significantly associated with high blood pressure. Secondary outcomes of hypertension showed positive associations with chronic periodontitis too. Periodontal bacterial burden as assessed by the sub gingival micro flora have also been proved to have an impact on the risk of development of hypertension and pre-eclampsia. Pre-eclampsia and stroke were associated with chronic periodontitis than in those with a healthy periodontium. Non-surgical periodontal therapy, along with Oral Hygiene Instructions significantly reduces the cardiovascular risk evident after 16 months of intervention. In a cross-sectional study periodontal disease informs of pathological periodontal pocket is found associated with the raised diastolic blood pressure.

Interventional periodontal therapy has shown a reduction in blood pressure levels. The number of
interventional studies is limited and more RCTs with good study design are needed to conclude on any interventional effect. Table 4 shows the summary of evidence in the selected studies.

The available literature evidence has input from cross-sectional, case-control, nested case-control, cohort, and prospective interventional cohort studies. These drawbacks indicate the dire need for more longitudinal randomized control trials with intervention in clearly defined populations with uniform case definitions.

Studies designed on the following lines will considerably fill in the lacunae in the available literature:

- Well-defined and uniform case definitions of periodontitis, including the influence of the severity of the disease on hypertension.
- Longitudinal studies in healthy individuals with periodontitis and the absence of other risk factors.
- Randomized controlled interventional trials addressing the impact of chronic periodontitis on hypertension.

Conclusions

The quality of evidence and grades of recommendations were done based on the Canadian task force on preventive health care. Based on that we have made the following conclusions: 1) There is a fair evidence (II-2 Grade B recommendation) for an association between chronic periodontitis and blood pressure with OR of 2.93 (95% CI: 1.25-6.84) but the association becomes stronger when restricted with those with hypertension or taking anti-hypertensive medications: OR=4.20(95% CI: 1.28-13.80). 2) A good evidence (I, Grade A recommendation) that intensive periodontal therapy decrease cardiovascular risk scores (Framingham) at 296mm (1.53% F 1.20% (95% CI 1.05-2.24, P = .0290) and 2.00% F 1.42% (95% CI 0.98-4.09, P = .0568). 3) There is a fair evidence to support the Canadian Recommendation of PHE (Periodic Health Examination) in our study to improve’s people general health and longevity.

Ethical Clearance: Not required since it is a review article.

Source of Funding: Nil

Conflict of Interest: Nil

References


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1161


Clinical Efficacy and Anti-Inflammatory Property of Curcumin in Periodontal Disease: A Systematic Review

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Abstract

Periodontitis is a chronic inflammatory condition, caused by bacteria, that leads to the destruction of supporting tissues around teeth, resulting ultimately in significant morbidity as a result of infection, pain and tooth loss. Curcumin, from the root of the turmeric plant Curcuma longa, is an extended pseudo symmetric polyphenol. In recent years, in vitro and in vivo research has suggested that curcumin has anticarcinogenic, antiviral, antioxidant and anti-inflammatory effects. The aim of this review is to systematically evaluate the clinical efficacy and anti-inflammatory property of curcumin in periodontal disease. An electronic search was carried out using the keywords ‘curcumin’, ‘periodontal’ and ‘periodontitis’ via the PubMed/Medline, ISI Web of Science and Google Scholar databases for relevant articles published from 2009 to February 2019.

Keywords: Curcumin, Periodontal, Periodontitis, Inflammation.

Introduction

Periodontal disease is considered as an infection that involves both inflammatory and immune responses, which leads to increased pocket depth, clinical attachment loss, as well as destruction of alveolar bone and cementum.¹ Treatment modalities to resolve periodontal inflammation can be surgical or nonsurgical periodontal therapy based on the severity of periodontal destruction. Nonsurgical therapy includes both mechanical and chemotherapeutic method to minimize or eliminate microbial biofilm which is the prime etiological factor of gingivitis and periodontitis. Systemic use of antibiotics can interfere with normal body systems and may cause several side effects. The local administration of antibiotics or antimicrobials appears to be an effective means of eliminating these adverse reactions.² Hence the aim of this review is to systematically evaluate the therapeutic potential of curcumin in periodontal therapy.

Curcumin is a plant-derived dietary spice with various biological activities, including anticarcinogenic and anti-inflammatory effects.³⁴ Its therapeutic applications have been studied in a variety of conditions, including rheumatoid arthritis, colon cancer and depression. The anti-inflammatory properties of curcumin seem to be mediated by modulation of the activity of signaling pathways and transcription factors, especially nuclear factor-jB (NF-jB), activating protein-1 (AP-1) and MAPKs⁵. Besides its anti-inflammatory properties, curcumin has also been shown to improve wound healing by increasing collagen deposition, angiogenesis and the density of fibroblasts, reducing the radiation-induced delay in wound repair. Natural curcumin (diferuloylmethane) is a hydrophobic polyphenol composed of a mixture of three curcuminoids: curcumin, demethoxycurcumin and bisdemethoxycurcumin with various biological activities reported.⁶⁷

Primary Objective Question: To review current literature, analyze the efficacy, anti-inflammatory properties of curcumin in periodontal disease.
Criteria for Selection of Studies: The inclusion criteria for this study were:

1. articles published from 2010-2019,
2. original studies published in English language,
3. animal and human studies,
4. cell culture studies,
5. interventional studies

The exclusion criteria for the study were:

1. historic reviews,
2. letter to the editor,
3. case series and reports,
4. non clinical trials.

Search Methodology: An electronic database was carried out using the keywords ‘curcumin’ and ‘periodontal therapy’ via the Pubmed/Medline and Cochrane databases for relevant articles published from 2009 to 2019.

Results

Search Results: Following the removal of the duplicate search results, the primary search results resulted in 13 articles in total. Articles were excluded based on title and abstract. Hence remaining 11 articles were read completely for eligibility. Two studies were human studies and remaining were animal trials as listed in table.

Human Studies: The number of subjects ranged from 20-30. In one study, curcumin and chlorhexidine gel was applied in the contra lateral disease sites at baseline and 15 day and clinical parameters like CAL, PPD, gingival index and plaque index were recorded and CFU were assessed microbiologically (Maha MA. Nasra et al 2017). In another study, the clinical efficacy of Cur in-situ gel and the effect for 3 months in refrigerator was investigated through the determination of probing depth, plaque index, and bleeding index at baseline and 1 month after application (Anitha V Rajesh et al in 2019). The general characteristics of human studies are given in table.

Animal Studies: All the animal studies done were in vivo prospective studies (ref). The number of animals used as subjects ranged from 10-60. In one study (Guimaraes et al in 2011) periodontal disease was induced by placing cotton ligatures around both lower first molars. In study done by Correa MG et al in 2016 periodontitis was induced by tying a silk suture as a ligature around first molars. In all other animal studies (Morgana R Guimaraes et al in 2010, Muna S Elburki et al in 2014, Elburki MS et al in 2016, Fabiana Almeida et al in 2018) periodontal disease was induced by injecting LPS into gingival tissues. The followup period ranged from 15-25 days. The general characteristic features of animal studies are provided in table.

Assessment of Parameters: In animal studies (Guimaraes MR et al in 2011., Morgana R Guimaraes et al in 2011., Correa MG et al in 2011., Elburki MS et al in 2016., Fabiana Almeida et al in 2018., Munalburki et al in 2014). In first study, Guimaraes MR et al in 2011 Micro CT analysis, stereometric analysis were assessed. In second study, Morgana R Guimaraes et al in 2011 Micro CT analysis, stereometric analysis were assessed. In third study, Correa MG et al in 2016 Immunoenzymatic assay was assessed. In fourth study, Fabiana Almeida et al in 2018 Micro CT analysis, stereometric analysis were assessed. In fifth study, Elburki MS et al in 2016 ELISA, Western blot were assessed. In sixth study, Munalburki et al in 2014 Micro CT analysis, ELISA, Immunoblotting were done.

In human studies (Maha MA. Nasra et al 2017, Anitha V Rajesh et al in 2019). In first study, Maha MA. Nasra et al 2017 parameters like clinical attachment level, pocket probing depth, plaque index and bleeding index were assessed at baseline and after 1 month of surgery. In second study, Anitha V Rajesh et al in 2019 plaque index, bleeding index, clinical attachment level and pocket probing depth were assessed at baseline, 15 days and after 1 month of surgery.

Outcomes of the Selected Studies: Results from all 6 studies show that using MF is effective in reducing bone loss and improving outcomes of periodontal treatment (ref).

In Animal studies (Maha MA. Nasra et al 2017, Anitha V Rajesh et al in 2019), the results indicated the efficacy of 1% curcumin in reducing both clinical parameters and microbial load in patients with chronic periodontitis. Curcumin treated wounds had increased TGF-B1 which enhances wound healing which may be responsible in the gain in attachment following its use in periodontal therapy. It possess similar mode of action as non steroidal anti-inflammatory drugs like aspirin, but...
also has an advantage that it selectively inhibits the synthesis of prostaglandins and thromboxane while not affecting the synthesis of prostacyclin.

**Discussion**

**Human Studies:** All the human studies reviewed showed a reduction in the clinical parameters which is due to the anti-inflammatory effect of curcumin. In a study conducted by Maha M.A et al in 2017, the reduction in bleeding might be due to the resolution of gingival inflammation after scaling and root planning. Another study conducted by Anitha V et al in 2019 showed a significant difference at 30 days for curcumin over chlorhexidine in reducing the microbial and clinical parameters evaluated. This shows that curcumin could be a viable alternative to chlorhexidine in adjunctive use in periodontal therapy.

The human studies show that curcumin reduces the inflammatory mediators and causes shrinkage by reducing inflammatory edema and vascular engorgement of connective tissues (Rastogi et al., 2012). Other properties of curcumin such as anti-inflammatory, antioxidant, anti microbial, hepatoprotective, immunostimulant, antimutagenic properties may also help in the improvement in clinical and microbiologic parameters following use as an adjunct in periodontal therapy. Another mechanism by which curcumin reduces inflammatory changes is by promoting the migration of epithelial cells to aid in re-epithelialization.

**Animal Studies:** All the animal studies reviewed showed that Curcumin produced a significant reduction on the inflammatory infiltrate and increased collagen content and fibroblastic cell numbers. Curcumin potently inhibits innate immune responses associated with periodontal disease, suggesting a therapeutic potential in this chronic inflammatory condition.

In the **first study** conducted by Morgana R Guimaraes et al in 2011 investigated the effect of curcumin on the expression of pro-inflammatory mediators and host response in an LPS model of periodontal disease. It was found that administration of curcumin by oral gavage completely blocked PGE2 expression and produced a dose-dependent inhibition of IL-6 and TNF-a levels in the gingival tissues. The suppression of pro-inflammatory cytokines by curcumin was accompanied by a marked reduction of the inflammatory process verified by the stereometric analysis. These changes may be due, at least partially, to the dose-independent inhibition of NF-kB activation in the gingival tissues of curcumin treated animals LPS-induced activation of NF-kB in the gingival tissues was inhibited only with the lower dose of curcumin and also curcumin produced a significant reduction on the inflammatory infiltrate and increased collagen content and fibroblastic cell numbers. In the **second study** conducted by Guimaraes MR et al in 2011 demonstrated that intragastrically administered curcumin effectively reduces inflammation and connective tissue breakdown in this experimental periodontitis model. This effect has been explained, at least in part, by the inhibition of IL-6, PGE2 and TNF-a expression, as a result of the modulation of NF-jB activation.

In the **third study** conducted by Correa MG et al in 2016, The administration of resveratrol and curcumin, alone or in combination, appeared to enhance the levels of IL-4, whereas resveratrol alone, and not curcumin, reduced the levels of IFN-c. It is noteworthy that although no significant difference was found in the amounts of IL-1b when resveratrol and curcumin were used alone, a trend toward lower levels of IL-1b in these groups was observed when compared with the control group. Resveratrol administered alone led to reduced loss of alveolar bone in experimental periodontitis when compared with placebo. The administration of curcumin alone lead to reductions in bone loss when compared with placebo. It also caused significant reduction in inflammation-mediated destruction of periodontal soft tissues and bone. In the **fourth study** conducted by Fabiana Almeida et al in 2018, oral administration of CMC 2.24, but not curcumin, significantly reduced inflammatory bone resorption and the number of osteoclasts in the proximity of the alveolar bone. On the other hand, curcumin, but not CMC 2.24, significantly inhibited apoptosis in the gingival tissue and also of osteocytes, both in the presence or absence of inflammation. In the **fifth and sixth studies** conducted by Muna S Elburki et al in 2014 & Elburki MS et al in 2016, showed that the administration of CMC 2.24 to diabetic rats with endotoxin-induced periodontitis: (i) significantly suppressed local/alveolar bone loss and also tended to reduce the severity of systemic bone loss (diabetes associated osteoporosis); (ii) attenuated the severity of local and systemic inflammation by reducing cytokine levels (IL-6 and IL-1b); and (iii) reduced pathologically elevated levels of MMPs (MMP-2, MMP-8 and MMP-9), and their activation, both locally in the gingiva and systemically in the circulation and in skin.
Curcumin increased the levels of newly synthesized (salt-soluble) collagen and decreased the proportion of the older (insoluble) collagen in skin of diabetic rats.

In general, chemically modified curcumin (CMC2.24) is more soluble than curcumin in water-based vehicles and this compound has three zinc-binding moieties that are able to inhibit matrix metalloproteinases, which are essential in the degradation of connective tissue, including bone tissue. The increased bioavailability of CMC2.24 may be at least partly responsible for the attenuation of bone resorption; however the decrease on the osteoclast numbers observed in CMC2.24-treated animals suggest an effect on osteoclast differentiation. Moreover the chemically modified curcumin appears to have additional benefits by reducing the impact of this local inflammatory disease on systemic biomarkers of the host without (apparently) negatively affecting the mediators of constitutive connective tissue turnover.

**Conclusion**

Curcumin has a long history as a traditional herbal medicine and has established anti-inflammatory properties in animals following systemic administration. This compound is particularly interesting for therapeutic applications because its anti-inflammatory and antiproliferative effects are potent, occurring at micromolar concentrations. However longer term studies in models of experimental periodontitis might be required to elucidate their effects more clearly. This could lead to the development of more effective prevention approaches for periodontitis in humans.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**

Periodontal Status among Residents of Dhideer Kuppam Slum in Chennai

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Abstract

Oral health is an integral component of general health and is essential for a person’s comprehensive well-being. The current outlook towards oral health has broadened beyond the concept of just good teeth and has evolved to encompass freedom from chronic pain, the absence of oral and throat carcinoma, oral sores and birth defects such as cleft lip and palate, freedom from periodontal diseases, tooth decay, tooth loss and many other diseases and disorders that affect the mouth and oral cavity.

Keywords: Oral health, cleft lip and palate, Oral sores.

Introduction

Every person is entitled to live a healthy life irrespective of socioeconomic status, caste, religion or ethnicity¹. A quarter of Chennai’s 4.5 million population lives in the slums ²,³. The inhabitants work as fishermen, auto drivers, daily wage labourers, painters, electricians, house keepers and most of the womenfolk work as house maids⁴. As per the Government of India, a slum is “a compact area of at least 300 in population or about 60 – 70 households of poorly built, congested tenements in an unhygienic environment usually with inadequate infrastructure and lacking proper sanitary and drinking water facilities”⁵. If these were to be the material defects, repercussions lie in the form of poor health often leading to slum epidemics.

A wide health disparity exists between populations in upper and lower socioeconomic status. Primary and preventive health care is the most important means whereby the health sector with intersectorial coordination, can close the health gap and improve the health status of the population⁶. This in the dental context implies early detection and prompt intervention of oral diseases.

Keeping in mind the paucity of data on periodontal status of slum dwellers in Chennai, an attempt has been made to determine the periodontal status among residents of Dhideer Kuppam slum in Chennai.

Aim: To determine the periodontal status among residents of Dhideer Kuppam slum in Chennai.

Materials and Method

Chennai is the capital city of Tamil Nadu. It has an estimated population of over 8.05 million (2009) making it one of the largest urban agglomerates in India³. A cross-sectional descriptive study was conducted in Dhideer Kuppam, a slum in Chennai for assessing oral health status and treatment needs.

Inclusion criteria and exclusion criteria: Only those subjects who are permanent residents of Dhideer Kuppam were eligible to participate in the study.

Those who were unavailable at home for enrolment in the study even after three consecutive visits to their homes and those who were not willing to participate were excluded from the study.

Approval and informed consent: Ethical approval was obtained from the Institutional Review Board. Informed consent was obtained from all the participants and minors were examined only after obtaining consent from their parents or guardian.

Sample size estimation: The sample size was calculated on the basis of the prevalence (P) of dental caries (57%) among residents of an urban slum in West Bengal¹⁰. The Q value (100-P) was 43% (100-57) and
allowable error (L) was set at 10% of P [10% of 57 = 5.7]. The required sample size (N) was 290. As a cluster sampling technique was employed, final sample size = 290 \times 1.4 (Design effect) = 406 subjects.

**Survey methodology:** After a brief introduction on the purpose and intent of the study, examination was conducted by a single examiner who had been trained through a series of clinical training sessions at the Department of Public Health Dentistry, Sree Balaji Dental College, Chennai. Demographic information was collected followed by clinical examination. All instruments were sterilized by autoclaving. Only completely filled forms were considered for analysis.

**Clinical examination:** Dental examinations were conducted under natural light by means of mouth mirror and a periodontal probe which conform to World Health Organization (WHO) specifications. Data were recorded according to the WHO assessment form 1997.

**Statistical analysis:** Data were entered in Microsoft Excel spreadsheet and analyzed using SPSS software. Pearson’s chi-square was used to test if the differences for various parameters between males and females were statistically significant. Trend Chi-square was used to test the relationship between periodontal condition, loss of attachment and prosthetic needs with age.

**Results**

Table 1 depicts the distribution of study subjects by age and gender. The study sample consisted of 531 individuals of which 218 (41.1%) of the respondents were males and 313 (58.9%) were females. The study subjects were between the age group of 5 and 76 years.

Table 2 represents the prevalence of periodontal condition among the study subjects. The prevalence of periodontal disease among the study subjects was 75.1%. The change in periodontal condition across the age groups was very highly significant p=0.000. Periodontal disease increased in prevalence with increasing age. Difference in the prevalence of calculus among the gender was found to be statistically significant (p=0.024), with a higher prevalence among the females. The prevalence of shallow and deep pockets among the gender was found to be statistically significant, p=0.031 and p=0.000 respectively, with higher prevalence among the males.

Table 3 depicts the sextant wise prevalence of periodontal condition among the study subjects expressed as mean number of sextants per person. Mean number of healthy sextants per person was maximum in the 20 – 24 year old males (3.2). Gingival bleeding,

<table>
<thead>
<tr>
<th>Age (Years)</th>
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<th>No. Examined</th>
<th>No. of dentate persons</th>
<th>Periodontal Condition</th>
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<td>20</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>37</td>
<td>37</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 1: Distribution of the study subjects

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>15 – 19</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>20 – 24</td>
<td>24</td>
<td>31</td>
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<tr>
<td>25 – 29</td>
<td>20</td>
<td>37</td>
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<tr>
<td>30 – 34</td>
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<td>34</td>
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<tr>
<td>35 – 44</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>45 – 54</td>
<td>33</td>
<td>49</td>
</tr>
<tr>
<td>55 – 64</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>65 +</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>313</td>
</tr>
</tbody>
</table>
In the present study, prevalence rate of periodontal disease among the study population was 75.1%. This was found to be higher than that observed by Doifode VV et al\(^\text{13}\) (2000, Nagpur) where the prevalence rate was 34.8%. This difference in the prevalence rates may be because of the broad categorisation of socioeconomic status and the various components which may differ in different geographic areas. Attached with it are habits and behaviour which affects the prevalence of oro-dental diseases. Usually, higher prevalence of dental disorders is reported in lower socioeconomic strata\(^\text{24}\). That may be due to lower educational status, primitive idea about oral hygiene and non availability of preventive and curative facilities.
In a study conducted by Meghshyam Bhat et al\textsuperscript{21} (2008, Karnataka) the maximum number of subjects scoring healthy periodontal status as per CPI was found to be in the younger age groups and the number gradually decreased as age increased. This is in agreement with the findings of the present study.

In the present study, none of the 15-19 year age group subjects had shallow pockets. Deep pockets were most prevalent in the 65+ age group females (55.6%). However, Arvidson et al\textsuperscript{8} (1990, Bangladesh) found that the prevalence of shallow pocket among 18 year old urban slum dwellers was 34% and that deep pockets were most prevalent (42%) among the 35-44 years age group. This difference in prevalence rate could be because of differences in the study setting.

**Conclusion**

In conclusion, the present study highlights the fact that the prevalence of oral diseases among the residents of Dhideer Kuppam slum is high. A comprehensive understanding of the magnitude of the public health problem would enable effective planning of interventional measures.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/ TN/2015)

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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Oral Hygiene Status, Dental Caries Experience and Treatment Needs among Psychiatric Outpatients in Chennai, India

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Abstract

Objective: To assess the oral hygiene status, dental caries experience and treatment needs among psychiatric outpatients in Chennai.

Basic Research Design: A cross-sectional descriptive study was carried out on patients receiving care at the Outpatient Wing of The Department of Psychiatry, Stanley Medical College and Hospital, Chennai. A cluster sampling technique was employed.

Participants: The study sample consisted of 159 male and 145 female psychiatric patients.

Main Outcome Measures: Oral hygiene status, Dental caries experience and Treatment needs.

Results: Among the male subjects; 9 (5.6%), 75(47.2%) and 75(47.2%) had good, fair and poor oral hygiene, respectively. Among the female subjects; 9(6.2%), 87(60%) and 49(33.8%) had good, fair and poor oral hygiene, respectively. The overall mean DMFT among males and females was 7.8±0.52 and 8.01±0.50, respectively.

Association between age and DMFT score was found to be statistically very highly significant \(X^2 = 54.64, \text{df} = 4, \ p = 0.000\). The association between gender and DMFT score was found to be statistically not significant \(X^2 = 3.73, \text{df} = 1, \ p = 0.053\). Prevalence of dental caries in the study population was 83.55%.

Conclusion: The oral hygiene status of psychiatric outpatients is poor. Dental caries experience and treatment needs are high.

Keywords: Oral hygiene status, Dental caries experience, Psychiatric outpatients.

Introduction

Illness, whether physical or mental may lead to deterioration in self care and have an adverse effect on the holistic wellbeing of the individual. Among the unique population groups, people with psychiatric disorders deserve special attention. The term psychiatric illness is used to describe clinically recognizable patterns of psychological symptoms or behavior causing acute or chronic ill health, personal distress or distress to others.ⁱ⁶

Psychiatric illness is a continuum ranging from minor distress to severe disorder of the mind or behavior.³,¹³

Routine dental health care for institutionalized psychiatric patients are provided within many of the large institutions, but only a small portion (2.35%) of psychiatric patients are users of mental health services.¹⁰ A vast majority of adults with mental illness live in the community.¹⁴

About 2-5% of India’s population suffers some form of mental or behavioural disorder. 10-15% of those attending general health facilities have a common mental disorder. Among the states of India, Tamil Nadu has the maximum number of mental health institutions. Yet, the population is so vast and diverse that majority of mentally ill patients are still treated as community dwelling outpatients.⁶
Materials and Method

Study Design: A cross-sectional descriptive study

Study Area: Four government administrated facilities cater to the treatment needs of community dwelling psychiatric outpatients in Chennai. This study was conducted at Stanley Medical College and Hospitals, which is one of the four facilities.

Inclusion criteria:
- Subjects who had been diagnosed with psychiatric illness at least 5 years ago.
- The patient must be currently receiving treatment for the psychiatric illness.

Exclusion criteria:
- Those who are not stable to give informed consent.
- Those who are not willing to participate in the study.

Approval and informed consent: Ethical approval was obtained from the Institutional Review Boards of Stanley Medical College and Hospital.

Informed consent was obtained from all the participants and minors were examined only after obtaining consent from their parents or guardian.

Sample size estimation: The sample size was calculated on the basis of the prevalence (P) of periodontal disease (98.1%) among psychiatric patients in Davangere. The required sample size was 128 subjects.

Sampling methodology: A cluster sampling technique was employed. A list of Government administrated psychiatric outpatient facilities in Chennai was obtained from the Department of Health and Family welfare, Government of Tamil Nadu. One hospital was selected from the aforementioned list by simple random sampling using lottery method.

The study sample consisted of 159 males and 145 females. Among the study population; 87, 78, 75 and 64 subjects were diagnosed with schizophrenia, mood disorder, organic brain damage and other psychiatric illness respectively. All willing, eligible participants within the cluster were enrolled into the study, yielding a total sample of 304 individuals.

Survey instrument: An operator administered pre-tested questionnaire, specially designed for this purpose was used. Demographic information, information about diagnosis and duration of psychiatric illness and current medications were obtained from the hospital medical records. Information about oral hygiene practices and frequency of brushing teeth were obtained by interviewing the patient. Oral hygiene index-simplified and dentition status and treatment needs index were recorded.

Clinical examination: Dental examinations were conducted by a single examiner who had been trained through a series of clinical training sessions at the Department of Public Health Dentistry, Sree Balaji Dental College and Hospital, Chennai. After recording the questionnaire, dental examinations were conducted in supine position under natural light by means of mouth mirror and a CPI probe. Instruments were sterilized using standard protocol. Only completely filled forms were considered for analysis. The intra examiner reliability was calculated using the data obtained by re-examination of first and eleventh subject of each day after scheduled number of subjects were examined for the day (K=0.81).

Statistical analysis: Data was entered in Microsoft Excel spreadsheet and analyzed using SPSS (Version 15) software. Chi-square test, Trend Chi-square test, Linear regression analysis and Post Hoc Tukey test were employed.

Results

The study sample consisted of 304 psychiatric outpatients. 159 (52.3%) of the respondents were males and 145 (47.7%) were females. The study subjects were between the age group of 18 and 71 years. Among males; 57 (36%), 12 (7%), 54 (34%) and 36 (23%) were diagnosed with schizophrenia, mood disorder, organic brain damage and others, respectively. Among females; 30 (21%), 66 (46%), 21 (14%) and 28 (19%) were diagnosed with schizophrenia, mood disorder, organic brain damage and others, respectively.

Among the 304 study subjects, 89% cleaned their teeth by themselves and 11% cleaned their teeth with the help of an assistant. All the subjects who cleaned their teeth with the help of an assistant did so once a day. Among the study subjects who cleaned their teeth themselves,
86% cleaned the teeth once a day, 10% cleaned twice a day and 4% were irregular in cleaning teeth.

Linear regression analysis showed that DMFT scores were significantly higher in those who brushed their teeth with assistance, than in patients who brushed their teeth themselves (t = 2.78, p = 0.006).

Table 1 describes the distribution of study subjects based on oral hygiene status. Among 159 male subjects; 9 (5.6%), 75 (47.2%) and 75 (47.2%) had good, fair and poor oral hygiene, respectively. Out of 145 female subjects; 9(6.2%), 87(60%) and 49(33.8%) had good, fair and poor oral hygiene, respectively.

Among males, the maximum number of subjects having good, fair and poor oral hygiene were found in the 20-29, < 19 and > 50 years age group, respectively. Among females, the maximum number of subjects having good, fair and poor oral hygiene were found in the < 19, 20-29 and > 50 years age group, respectively.

Trend Chi-square test was performed to determine the pattern of OHI-S score variation across the age groups. It was found that as age increases, OHI-S score also increased [X² = 5.352, p = 0.021]. The association between age and OHI-S score was found to be statistically significant [X² = 2.561, p = 0.015].

ANOVA test performed to test the relationship between age groups and DI-S score [F = 32.260, p = 0.000], CI-S score [F = 24.428, p = 0.000] and OHI-S score [F = 37.560, p = 0.000] was found to be statistically very highly significant.

Table 2 depicts the distribution of study subjects based on oral hygiene status. Among the study subjects, 13(8.17%) males and 12(8.27%) females were caries free. In both males and females, the maximum number of caries free subjects were found among the 30-39 year age group. Highest mean DT was found among the 40-49 year age groups with males and females having a mean ± SD of 7.29±3.27 and 7.50±1.91, respectively. Highest mean MT was found among the > 50 year age groups with males and females having a mean ± SD of 6.91±5.57 and 7.46±6.82, respectively. Highest mean FT was found among the < 19 year age group among females (2.00±0.50) and in the 20-29 year age group among males (1.09±1.01). The overall mean DMFT among males and females was 7.8±0.52 and 8.01±0.50, respectively.

Association between age and DMFT score was found to be statistically very highly significant [ X²= 54.64, df = 4, p = 0.000]. The association between gender and DMFT score was found to be statistically not significant [ X²= 3.73, df = 1, p = 0.053]. Prevalence of dental caries in the study population was 83.55%

Table 3 illustrates the distribution of study subjects based on diagnosis and caries experience. Post Hoc Tukey test performed to test the association between the diagnostic subdivisions of psychiatric illness and DMFT score revealed that Schizophrenia was significantly more strongly associated with dental caries experience (p= 0.015) than mood disorder, organic brain damage and others. Mood disorder was more strongly associated with dental caries (p = 0.023) than organic brain damage and others but to a lesser degree than Schizophrenia.

Table 4 depicts the age wise treatment needs among the study subjects. Highest requirement for one surface fillings, two surface fillings and crown were in the 40-49 year age group with the mean ± SD being 3.99±0.48, 2.03±1.00 and 0.99±0.35, respectively. Pulp therapy was most needed in the 30-39 year olds with the mean ± SD being 0.96±0.20. Maximum number of extractions were required in the >50 year age group with the mean ± SD being 5.72±3.57.

<table>
<thead>
<tr>
<th>Age (Years)*</th>
<th>Gender</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>&lt;19</td>
<td>M</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>3</td>
<td>33.3</td>
<td>6</td>
</tr>
<tr>
<td>20 - 29</td>
<td>M</td>
<td>6</td>
<td>18.2</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>3</td>
<td>9.1</td>
<td>30</td>
</tr>
<tr>
<td>30 - 39</td>
<td>M</td>
<td>0</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>3</td>
<td>5.9</td>
<td>36</td>
</tr>
</tbody>
</table>
### Table 2: Dental caries experience among the study subjects.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Caries free</th>
<th>DT</th>
<th>MT</th>
<th>FT</th>
<th>DMFT*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 19</td>
<td>M</td>
<td>1</td>
<td>7.7</td>
<td>2.33±1.50</td>
<td>0.67±0.32</td>
<td>0.33±0.23</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0</td>
<td>0.00±1.73</td>
<td>0.67±0.59</td>
<td>2.00±0.50</td>
</tr>
<tr>
<td>20 - 29</td>
<td>M</td>
<td>3</td>
<td>23.1</td>
<td>4.45±3.47</td>
<td>0.45±0.39</td>
<td>1.09±1.01</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>2</td>
<td>16.7</td>
<td>4.82±2.96</td>
<td>0.45±0.22</td>
<td>0.55±0.34</td>
</tr>
<tr>
<td>30 - 39</td>
<td>M</td>
<td>4</td>
<td>30.8</td>
<td>5.64±3.45</td>
<td>1.36±1.06</td>
<td>0.57±0.22</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>6</td>
<td>50.0</td>
<td>6.06±2.38</td>
<td>1.47±1.02</td>
<td>0.65±0.19</td>
</tr>
<tr>
<td>40 - 49</td>
<td>M</td>
<td>2</td>
<td>15.4</td>
<td>7.29±3.27</td>
<td>1.50±0.74</td>
<td>0.79±0.15</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>4</td>
<td>33.3</td>
<td>7.50±1.91</td>
<td>0.50±0.22</td>
<td>0.25±0.11</td>
</tr>
<tr>
<td>&gt;50</td>
<td>M</td>
<td>3</td>
<td>23.1</td>
<td>5.45±2.67</td>
<td>6.91±5.57</td>
<td>0.18±0.08</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0</td>
<td>0.00±0.00</td>
<td>7.46±6.82</td>
<td>0.75±1.23</td>
</tr>
<tr>
<td>Total</td>
<td>M</td>
<td>13</td>
<td>8.17</td>
<td>5.03±1.30</td>
<td>2.11±0.63</td>
<td>0.84±0.41</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>12</td>
<td>8.27</td>
<td>5.05±1.30</td>
<td>2.11±0.63</td>
<td>0.84±0.41</td>
</tr>
</tbody>
</table>

* P = 0.000

### Table 3: Distribution of study subjects based on diagnosis and caries experience.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Caries experience n (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>3 (3.4%)</td>
<td>84 (96.6%)</td>
</tr>
<tr>
<td>Mood disorder</td>
<td>4 (5.1%)</td>
<td>74 (94.9%)</td>
</tr>
<tr>
<td>Organic brain damage</td>
<td>7 (9.3%)</td>
<td>68 (90.7%)</td>
</tr>
<tr>
<td>Others</td>
<td>11 (17.2%)</td>
<td>53 (82.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (8.2%)</td>
<td>279 (91.8%)</td>
</tr>
</tbody>
</table>

### Table 4: Age wise treatment needs among study subjects

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Caries free subjects</th>
<th>One surface filling</th>
<th>Two surface filling</th>
<th>Crown</th>
<th>Pulp Therapy</th>
<th>Extraction</th>
<th>Replacement of missing teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>mean±SD</td>
<td>mean±SD</td>
<td>mean±SD</td>
<td>mean±SD</td>
<td>mean±SD</td>
</tr>
<tr>
<td>&lt;19</td>
<td>1</td>
<td>7.7</td>
<td>1.63±1.05</td>
<td>0.84±0.11</td>
<td>0.13±0.07</td>
<td>0.01±0.63</td>
<td>0.71±0.20</td>
</tr>
<tr>
<td>20 – 29</td>
<td>5</td>
<td>20.0</td>
<td>3.66±1.89</td>
<td>0.95±0.48</td>
<td>0±0</td>
<td>0.13±0.56</td>
<td>0.41±0.39</td>
</tr>
<tr>
<td>30 – 39</td>
<td>10</td>
<td>40.0</td>
<td>3.33±1.69</td>
<td>1.39±0.23</td>
<td>0±0</td>
<td>0.96±0.20</td>
<td>1.66±0.07</td>
</tr>
<tr>
<td>40 – 49</td>
<td>6</td>
<td>24.0</td>
<td>3.99±0.48</td>
<td>2.03±1.00</td>
<td>0.99±0.35</td>
<td>0.22±0.15</td>
<td>1.19±0.73</td>
</tr>
<tr>
<td>&gt;50</td>
<td>3</td>
<td>23.1</td>
<td>2.23±1.01</td>
<td>1.83±0.02</td>
<td>0±0</td>
<td>2.98±0.44</td>
<td>5.72±3.57</td>
</tr>
</tbody>
</table>
Discussion

Apathetic nature, poor diet and xerostomia inducing medications predispose psychiatric patients to significantly higher risk of dental diseases. Routine dental health care is provided to institutionalized psychiatric patients. However, only 2.35% of psychiatric patients are users of mental health services.10.

Age of the participants in this study ranged from 18 years to 71 years. The inclusion of a wide array of ages facilitated the assessment of disease trends across the age groups. Among the study subjects; 87, 78, 75 and 64 were diagnosed with schizophrenia, mood disorder, organic brain damage and other psychiatric illnesses respectively. These diagnostic subdivisions were considered in this study because they are most commonly associated with the occurrence of dental caries.5,7,9,10.

Mean OHI-S score in our study was 3.05±1.17. This is similar to the findings of Manish Kumar et al (2006)9 where the mean OHI-S score was 3.3. However, it was found to be lower than the mean OHI-S score (4.2) obtained by Angelillo et al (1995)1 in Italy. In our study, Trend Chi-square test showed that as age increases OHI-S score increases. Similar findings have been reported by Angelillo et al (1995)1, Kenkre et al(2000)5 and Manish Kumar et al (2006)9.

DMFT scores were significantly higher in partly helpless patients than in patients who brushed their teeth without assistance. A similar observation was made by Angelillo et al (1995)1. Mean DT in our study (5.05) is higher than the findings of Lucchese C et al (1998)8 and Ramon T et al (2003)11 where the mean DT was 2.1 and 2.3 respectively. DMFT scores increased with increasing age which is in accordance with many other studies (Angelillo IF et al, 1995; Kenkre AM et al, 2000; Lewis S et al, 2001; Lucchese C et al, 1998; Manish Kumar et al, 2006; Ramon T et al, 2003)7,8,9,11. Mean DMFT score in our study is 7.91. This is lower than that observed by Lewis S et al (2001)7 in South Wales (19.1) and Ramon T et al (2003)11 in Israel (26.74). However, in the study by Manish Kumar et al (2006)9 in Davangere, the mean DMFT score was 0.92. This vast discrepancy may be because the water source of Davangere has a fluoride concentration of 1.5 to 2 ppm.

The percentage of caries free subjects in our study (8.3%) is lower than that reported by Kenkre AM et al (12%)5 and Manish Kumar et al (67.8%)9.

In this study, caries experience was maximum among those diagnosed with schizophrenia followed by those with mood disorder. This is in agreement with other studies (BorgeHede, 1988; Persson K et al, 2009)2,10. Reasons for this may be the level of disability these illnesses cause and the medications given. Highest requirement for one surface fillings, two surface fillings and crown were in the 40-49 year age group, which is in accordance with other studies (Lewis S et al, 2001; Lucchese C et al, 1998; Manish Kumar et al, 2006)7,8,9.

Conclusion

Thus, results of this study show that psychiatric patients have extensive dental diseases, many of them requiring complex treatment. However, prevention should be the main objective because patients with advanced psychiatric illness are often anxious and uncooperative for extensive curative therapy.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/ TN/2015)

Source of Funding: Nil

Conflict of Interest: Nil

References

6. Lalitha Sridhar. The banyan model for mental


A Survey of Teething Beliefs and Related Practices among Child Healthcare Workers in Chennai City, India

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Abstract

Purpose: To determine the perceptions and related practices among the dentists and doctors regarding teething and its associated symptoms in Chennai.

Materials and Method: This was a cross sectional study which consisted of 140 child healthcare workers which included dentists and doctors in the hospitals and clinics in Chennai.

Results: Out of the 140 dentists and doctors, a total of 134 dentists and doctors believed in the systemic signs and symptoms of teething in children. Among which 66(49.3%) doctors and 68(50.7%) dentists believed in teething problems. The source of teething beliefs included 22(15.7%) on books, 55(39.3%) on local myths, 58(41.4%) on personal experience and 5(3.6%) on other sources (school and workshop acquaintances). The teething symptoms which were manifested by the children were vomiting 69(49.3%) ranked first in the third column, fever 65(46.4%) which ranked second in the first column is believed to be associated with teething, Irritability 62(44.3%) ranked second in the second column and followed by Gum redness 52(37.1%). The most common drugs which were prescribed by the doctors and dentists were, paracetamol 133(95%) and antibiotics 96(68.5%).

Conclusions: Most of the dentists and doctors do believe in the signs and symptoms caused during the eruption of teeth in children. They also prescribe drugs for those symptoms.

Keywords: Tooth eruption, teething symptoms, teething beliefs.

Introduction

Is there really a relation between teething and symptoms like fever, diarrhoea, etc.? If symptoms are present are drugs required for it?

Right from Adam and Eve or, more precisely, from Cain and Abel, infants have been teething, and for almost a long time, teething has been a myth and medical opinion. But, despite extensive discussion of teething, very less evidence-based medical information is available. And so, even today, debate continues in the medical literature about the association with teething of specific symptoms, such as fever, diarrhea, etc.

Teething is associated with increased biting, drooling, gum rubbing, sucking, irritability, wakefulness, ear rubbing, facial rash, decreased appetite for solid foods, and mild temperature elevation. But some other researchers like do not agree to this belief of teething and its symptoms. They found no association between teething and temperature or other symptoms, including drooling, sleep disturbance, diarrhea, or rashes. “There can be no excuse for ascribing fever, fits, diarrhoea, bronchitis, or rashes to teething,” wrote the BMJ in 1975.

Pediatricians often contribute to the mythology of teething. Swan reported in 1979 on 50 infants who had been admitted to the hospital with a chief complaint by
the parents of “teething” and whose presenting symptoms included fever, irritability, diarrhea, respiratory distress, poor feeding, and convulsions(1).

The local and systemic manifestations in children ages 0 to 3 years seen in the baby clinic of the Araçtuba Dental School, UNESP, São Paulo, Brazil, gave data as responded by parents on primary tooth eruption and the predominant manifestation was gingival irritation (85%), while the least frequent symptom (26%) was a runny nose(3).

Carlos Alberto Feldens, investigated the occurrence and management of teething symptoms during the first year of life and associated factors. The results showed Teething symptoms reported in 73% of the children analyzed (273/375). The symptoms most frequently reported were irritability (40.5%), fever (38.9%), diarrhoea (36.0%) and itching (33.6%). Dentists had little influence on the management of symptoms and self-medication to relieve them was a common practice. The risk of reporting teething symptoms was higher for children from nuclear families (p=0.040) and for children from families with higher income (p=0.040)(4).

Tooth eruption has been held responsible for a variety of systemic manifestations in infants. The association between teething and irritability, increased salivation, sleep disturbance, fever, diarrhea, and loss of appetite remains unclear because the onset of these disorders may simply coincide with the teething. Moreover, some of these signs and symptoms may imply more serious conditions. Thus, the aim of this prospective longitudinal study was to investigate the association between tooth eruption in infants and a range of signs and symptoms of teething while minimizing the limitations found in previous studies.

**Materials and Method**

The study was cross sectional, where a total of 140 questionnaires were given to child healthcare workers including dentists and doctors in Chennai. The questionnaires were filled by the professionals and returned to the author at the same day.

The biographical data of the child healthcare worker was elicited in the first part of the questionnaire which included name, age, gender, address, profession, number of years in practice.

The following information like the perception of teething by the healthcare professional, source of teething belief, signs and symptoms related to teething and drugs prescribed for teething were given in the second half of the questionnaire. The teething symptoms were given in a tabulated form in which the order of symptoms was ranked as 1, 2, and 3.

The data were analyzed using STATA for windows. The analysis included frequencies and cross tabulations.

**Results**

The study consisted of 140 child healthcare workers in Chennai who returned their questionnaires on the same day. 89 were male and 51 were female.

Table 1 shows that there were 71 doctors and 69 dentists in which 66 (49.3%) of the doctors and 68 (50.7%) of the dentists believed in teething problems.

Table 2 shows that of 66 (49.3%) dentists and 68 (50.7%) doctors who believed in teething problems, 23 (44.2) doctors and 29 (55.8%) dentists and believed that all children had teething problems. Whereas 45 (54.9%) doctors and 37 (45.1%) dentists believed that only some children had teething symptoms.

Table 3 shows that the source of teething beliefs included 22 (15.7%) on books, 55 (39.3%) on local myths, 58 (41.4%) on personal experience and 5 (3.6%) on other sources (school and workshop acquaintances).

Table 4 shows that out of the 140 respondents 28 (46.7%) doctors and 32 (53.3%) dentists = stated that they prescribed drugs for teething in children.

Table 5 shows vomiting (69 (49.3%) ranked first in the third column, fever 65 (46.4%) which ranked second in the first column is believed to be associated with teething. Irritability 62 (44.3%) ranked second in the second column followed by Gum redness 52 (37.1%).

Table 6 shows that the most common drugs which were prescribed by the doctors and dentists were, paracetamol 133 (95%) and antibiotics 96 (68.5%).

**Discussion**

Teething has long been the subject of superstition, speculation, and opinion, but little research. It is important for the healthcare professional as well as the parents to know about teething and its beliefs whether it is true or not. In Nigeria most of the parents believe in teething symptoms and 82 children died after the administration of a teething mixture “Mr. pikin”(5).
There is a wide knowledge about the beliefs which parents have on teething symptoms which their children have but there is less study on whether the healthcare workers also agree to it and prescribe drugs.

There is an interesting possibility that may be related to teething symptoms which is a result from undiagnosed herpetic gingivostomatitis. Herpes infections often occur in the second six months of life when infants are losing maternal antibody and at the same time they often present with the same symptoms ascribed to teething. But the signs and symptoms were significant on the day of eruption and 1 day after eruption. Therefore, it is not possible to predict eruption through the observation of signs and symptoms because there were no associations with the day before eruption. Thus, health professionals involved in the care of infants should seek other causes before attributing severe signs and symptoms to teething. Australian health professionals, on the whole, believe that many systemic symptoms can be attributed to teething, although pediatricians were less likely than other health-care professionals to subscribe to that belief.

An article in the consumer magazine Working Mother in September 1993 quoted a pediatrician as saying, “When a tooth is pushing through the gum, it leaves an opening through which viruses can enter the body. Also, during teething, youngsters tend to put fingers and toys into their mouths. This increases their chances of getting a virus that might cause fever or diarrhea.”

A study done in Royal Children’s Hospital, Parkville, Australia did not confirm the expected strong associations between tooth eruption and a range of teething symptoms in children 6 to 30 months old. Such beliefs may preclude optimal management of common patterns of illness and behavior in young children. Almost all parents, the majority of nurses, and many physicians believe that teething is associated with the appearance of symptoms, most of which are minor and relate to discomfort rather than physical illness, but a substantial minority still ascribes potentially serious symptoms to teething.

Normal developmental phenomena make interpretation of research on teething more challenging. Between 2 and 3 months of age, the salivary glands of infants begin functioning and contribute to constant drooling, which parents may misinterpret as a manifestation of teething. Moreover, infants of this age can put their hands in their mouths, which also is subject to parental misinterpretation. Another normal developmental event that parents may assume erroneously is a symptom of teething is the night waking that occurs around 8 or 9 months of age, when infants develop a sense of object permanence and call out to their parents at night. Irritability and fussiness, another symptom often ascribed to teething, can result from a variety of medical or behavioral issues. If the parent or physician quickly attributes irritable behavior to teething, medical illness or behavioral-development issues may not be appropriately acknowledged or addressed.

In this article most dentists and doctors believed in teething signs and symptoms and they also prescribed drugs according to the symptom. Most of the dentists and doctors had believed in teething symptoms from their personal experience however, some are due to local myths too.

Therefore from all the previous studies and this study, there is no accurate proof for the relation between tooth eruption and the symptoms which the child has at that time. There may be an underlying infection for the appearance of the symptoms. Normally at the age of 6 months the first tooth erupts and at the same time the child’s maternal antibodies decrease. At this period the some children also starts crawling and they become more susceptible to all the microorganisms and infections. So most of the parents correlate teething with the infections caused due to other reasons as do the healthcare workers. The use of drugs for the symptoms of the infection can be given. But some kind of teething mixtures can also cause morbidity.

### Conclusion

This study shows that most of the dentists and doctors do believe in the signs and symptoms caused during the eruption of teeth in children. Their beliefs were not based on any medical evidence but on their personal experience. The drugs should be prescribed for the symptoms of the underlying infection and not for teething.

### Table 1: Belief in teething signs and symptoms according to profession

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Belief in teething signs and symptoms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (%)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Doctor</td>
<td>66 (49.3%)</td>
<td>5 (83.3)</td>
</tr>
<tr>
<td>Dentist</td>
<td>68 (50.7%)</td>
<td>1 (16.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>134 (100%)</td>
<td>6 (100%)</td>
</tr>
</tbody>
</table>
Table 2: Professional’s opinion on which children have teething signs and symptoms

<table>
<thead>
<tr>
<th>Occupation</th>
<th>All Children</th>
<th>Some Children</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists</td>
<td>29(55.8%)</td>
<td>37(45.1%)</td>
<td>5(83.3%)</td>
<td>71(50.7%)</td>
</tr>
<tr>
<td>Doctors</td>
<td>23(44.2%)</td>
<td>45(54.9%)</td>
<td>1(16.7%)</td>
<td>69(49.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>52(100%)</td>
<td>82(100%)</td>
<td>6(100%)</td>
<td>140(100%)</td>
</tr>
</tbody>
</table>

Table 3: Source of belief according to child healthcare workers:

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Doctors</th>
<th>Dentists</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Myths</td>
<td>6(8.5%)</td>
<td>16(23.2%)</td>
<td>22(15.7%)</td>
</tr>
<tr>
<td>Books</td>
<td>29(40.8%)</td>
<td>26(37.7%)</td>
<td>55(39.3%)</td>
</tr>
<tr>
<td>Personal Experience</td>
<td>33(46.5%)</td>
<td>25(36.2%)</td>
<td>58(41.4%)</td>
</tr>
<tr>
<td>Others</td>
<td>3(4.2%)</td>
<td>2(2.9%)</td>
<td>5(3.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>71(100%)</td>
<td>69(100%)</td>
<td>140(100%)</td>
</tr>
</tbody>
</table>

Table 4: Prescription of drugs for teething according to child healthcare workers:

<table>
<thead>
<tr>
<th>Profession</th>
<th>Number who Prescribed Drugs for Teething</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists</td>
<td>32(53.3%)</td>
</tr>
<tr>
<td>Doctors</td>
<td>28(46.7%)</td>
</tr>
</tbody>
</table>

Table 5: Child healthcare worker’s perception of teething:

<table>
<thead>
<tr>
<th>Perceptions</th>
<th>First Rank</th>
<th>Second Rank</th>
<th>Third Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>65(46.4%)</td>
<td>24(17.1%)</td>
<td>51(36.4%)</td>
</tr>
<tr>
<td>Irritability</td>
<td>33(23.6%)</td>
<td>62(44.3%)</td>
<td>45(32.1%)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>50(35.7%)</td>
<td>37(26.4%)</td>
<td>53(37.9%)</td>
</tr>
<tr>
<td>Crying</td>
<td>45(32.1%)</td>
<td>55(39.3%)</td>
<td>40(28.6%)</td>
</tr>
<tr>
<td>Itching gums</td>
<td>31(22.1%)</td>
<td>56(40.0%)</td>
<td>53(37.9%)</td>
</tr>
<tr>
<td>Gums swelling</td>
<td>41(29.3%)</td>
<td>44(31.4%)</td>
<td>55(39.3%)</td>
</tr>
<tr>
<td>Pain</td>
<td>21(15.0%)</td>
<td>52(37.1%)</td>
<td>67(47.9%)</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>40(28.6%)</td>
<td>50(35.7%)</td>
<td>50(35.7%)</td>
</tr>
<tr>
<td>Cough</td>
<td>51(36.4%)</td>
<td>49(35.5%)</td>
<td>40(28.6%)</td>
</tr>
<tr>
<td>Eye discharge</td>
<td>33(23.6%)</td>
<td>70(50.0%)</td>
<td>37(26.4%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>22(15.7%)</td>
<td>49(35.0%)</td>
<td>69(49.3%)</td>
</tr>
<tr>
<td>Gum redness</td>
<td>52(37.1%)</td>
<td>47(33.6%)</td>
<td>41(29.3%)</td>
</tr>
</tbody>
</table>

Table 6: Drugs prescribed by child healthcare workers for teething signs and symptoms:

<table>
<thead>
<tr>
<th>Drugs Prescribed</th>
<th>First rank</th>
<th>Second rank</th>
<th>Third rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol</td>
<td>126(90%)</td>
<td>133(95%)</td>
<td>115(82.1%)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>84(60%)</td>
<td>96(68.5%)</td>
<td>60(42.8%)</td>
</tr>
<tr>
<td>Anti-inflammatory</td>
<td>25(17.8%)</td>
<td>20(14.2%)</td>
<td>15(10.7%)</td>
</tr>
<tr>
<td>Multivitamins</td>
<td>6(4.2%)</td>
<td>8(5.7%)</td>
<td>11(7.8%)</td>
</tr>
</tbody>
</table>

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015).

Source of Funding: Nil

Conflict of Interest: Nil
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A Comparative Study to Determine the Wettability of Different Impression Materials

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Abstract

Background: Wettability of impression materials is essential to obtain a void-free cast. The purpose of this study was to evaluate the wettability of the impression materials immediately after setting and also to determine the change in wettability after 24 hours.

Materials and Method: Four impression materials were selected among which two were hydrocolloids and two were elastomers. Fifteen samples of each were experimentally tested immediately and 24 hours after sample preparation. Data obtained were subjected to t-test and analysis of variance for statistical comparisons at a 5% level of significance.

Results: The contact angle values were recorded immediately and 24 hours after setting. Lesser the contact angle value more the wettability of the impression material. The changes in wettability with respect to time were statistically analysed and it showed a statistically significant difference between the materials both immediately and after 24 hours.

Conclusion: Within the limitations of the study, Elastomers showed better wettability when compared to the hydrocolloids at both time interval and they have negligible time dependant change. Newly introduced cream alginate showed better wettability at both time intervals equivalent to the elastomers and can be considered for usage.

Keywords: Wettability, Elastomers, Gypsum.

Introduction

Dental impression materials are used to generate a negative replica of the dental hard and soft tissues. They are an essential part of many dental procedures including the creation of crowns, bridges, and dentures. Typically, the impression is used to create a model of the dental tissues, for example, in the Plaster of Paris or dental stone, thus creating a long-lasting, stable, direct 3D replica of a patient’s oral tissues.

The interaction of impression material and the gypsum slurry is important in the fabrication of a void-free die. The interaction is determined in part by the hydrophilic or hydrophobic nature of the impression material. The hydrophilicity of the impression materials is critically crucial to wet the hard and soft tissues in the mouth and to create accurate impressions and casts.

During making the impression, the material needs to flow and adhere to the tooth structure and periodontal tissues that may be wetted by blood, saliva, and water. Only when the impression material is hydrophilic, can water be displaced and can the material ideally adhere to these surfaces.

Besides being dimensionally and chemically stable in the presence of gypsum, an impression material
should possess surface properties that allow it to be easily wet by a standard mix of gypsum. Inadequate wetting of an impression results in the incorporation of air bubbles and voids in the casts. These voids are often located in critical areas of preparation, such as margins and retentive grooves, which makes the die stone cast unacceptable for further use.

Considering the impact of hydrophilicity on accurate die casting\(^3\), inadequate wetting results in gypsum casts and dies producing pits and voids\(^4\) located in critical areas such as margins, pinholes, and retentive grooves\(^5\). Hydrophilic materials have 2 major aims:

1. To enhance wetting and spreading on moist oral tissues, and
2. To ensure better wettability by water containing slurries of dental stone

Wettability, the ability of a liquid to spread over the surface of a solid. The wettability of a surface is usually determined by measuring the magnitude of the contact angle formed between a drop of liquid and the surface in question. The contact angle is the angle between the surface of wetted solid and a tangent to the curved surface of a drop at the point of contact.

The contact angle between a solid substance and a liquid depends on the nature of the solid surface and the energy of the liquid surface commonly called the surface tension (units mN/m = dynes/cm)\(^6\). Most importantly, contact angle measurements can be used to examine the surface reactivity of the surface interface between a solid and a liquid\(^7\,^8\).

**Materials and Method**

**A. Selection and Manipulation of Materials:** Four different dental impression materials that are commonly used were selected and used for the study.

- Alginate
- Cream alginate
- Polyvinyl siloxane
- Polyether

**B. Die Preparation:** A square-shaped acrylic block of dimension 3×3 cm was prepared using cold cure acrylic resin and was used as the die to determine the wettability. The die has uniform thickness and dimension with a polished surface above which a glass slab is used to press the impression materials to obtain a uniformly flat surface on all sides.

**C. Sample Size:** Four impression materials were selected among which two were hydrocolloids and two were elastomers. Alginate and cream alginate from hydrocolloids and light body vinyl polysiloxane and polyether from elastomers were used for the study. Fifteen samples of each material were experimentally tested immediately and 24 hours after sample preparation.

**D. Sample Preparation:** Each material was manipulated as per manufacturer’s instruction and evenly spread over the die and a glass slab is placed over the impression material for an even polished surface. The whole assembly was kept undisturbed for the setting time suggested by the manufacturer.

After the adequate setting time, the material was separated from the die. Thus, prepared samples were measuring 3×3cm in dimension. Similarly, all 60 void-free samples, 15 samples of each impression material were obtained. In between the time of observation, the samples were stored at normal room temperature.

**Figure 1: Impression material samples (15) to determine wettability A. Alginate; B. Cream Alginate; C. Vinyl PolySiloxane Light body; D. Polyether**

**E. Contact Angle Measurement:** Wettability of impression materials was evaluated by determining the contact angle formed between the drop of an aqueous solution of calcium sulfate dihydrate and the impression surface. Contact angle values were obtained using a horizontal profile projector. The sample was placed over the horizontal profile projector above which a drop containing 0.4ml of an aqueous solution of calcium sulfate dihydrate
was placed on the flat surface of the sample using a micropipette. The profile projector is adjusted accordingly to measure the angle formed between the droplet and the impression surface.

The measurements were recorded immediately after sample preparation and the same procedure was repeated exactly after 24hrs of sample preparation. Both the readings were statistically analyzed and the change in wettability with time was evaluated.

**Figure 2: Determining wettability of impression material using horizontal profile projector**

**Experimental Findings:**

**Wettability-Immediate:** The wettability values taken immediately after sample preparation showed that cream alginate is the most easily wettable when compared to the other impression materials studied. Contact angle value that is least shows better wettability and highest shows least wettability.

**Figure 3: Comparing wettability of impression materials immediately after sample preparation**
Wettability–After 24 Hours: The wettability values taken 24 hours after sample preparation showed that cream alginate is the most easily wettable when compared to the other impression materials studied. Contact angle value that is least shows better wettability and highest shows least wettability. Poly ether showed an increase in values which indicated that there is a decrease in wettability after 24 hours.

**Figure 4: Comparing wettability of impression materials 24 hours after sample preparation**

**Wettability Comparison:** The wettability changes evaluated showed that cream alginate and polyether showed wettability changes which increased by time at later stages, whereas alginate and polyvinyl siloxane showed changes that decreased by time.

**Figure 5: Comparing wettability changes of impression materials**

The mean value of all the four impression material taken for wettability is provided in the table given below.

**Statistical Analysis:** The readings were recorded, tabulated and subjected to analysis of variance for comparisons at a 95% probability accuracy level with 0.05 as the level of significance.
Results and Interpretation

The t-test results comparing the immediate results after sample preparation of hydrocolloids showed that there is a statistically significant difference between the materials but with the time difference of about 24 hours, there is no statistically significant difference between the materials. The t-test results comparing the results of both immediate and 24 hours after sample preparation of elastomers showed that there is a statistically significant difference between the materials.

The ANOVA results comparing the results of both immediate and 24 hours after sample preparation of all four impression materials showed that there is a statistically significant difference between the materials.

The contact angle value that is least shows better wettability and highest shows the least wettability. The wettability values taken immediately after sample preparation showed that cream alginate is the most easily wettable when compared to the other impression materials studied. The wettability values taken 24 hours after sample preparation showed that cream alginate is the most easily wettable when compared to the other impression materials studied. Polyether showed an increase in values which indicated that there is a decrease in wettability after 24 hours. The wettability changes evaluated showed that cream alginate and polyether showed wettability changes which increased by time at later stages, whereas alginate and polyvinyl siloxane showed changes that decreased by time.

Discussion

There are many rigid, thermoplastic or elastic materials available for recording impressions in dentistry. Hydrocolloids are commonly used for removable prosthesis and elastomers for fixed prosthesis. The study was planned to compare the properties of materials available in the market so that it will provide a fair idea about any improvements in relation to its wettability.

Surface tension is the contractile force within the liquid that causes the formation of drops and resists spreading over a solid surface.

Wetting of a surface is the degree of spread of a drop over the solid surface. The advancing contact angle is a measure of the wettability of a surface by a particular liquid. The greater the angle, the greater the risk of entrapment of air on the surface that may result in voids in the impression or dies. Wetting the impression surface by die stone is important because the contact angle of water placed on the impression material has been shown to be related to the number of bubbles formed in the dies poured from the material.

The contact angle is the angle formed between the surface of the wetted solid and a line tangent to the curved surface of the drop of a liquid at the point of three-phase contact. When water is the contacting liquid, solids with contact angles less than 90° are called hydrophilic and solids with contact angles more than 90° are called hydrophobic. Contact angles of liquids on impression materials have been measured by many investigators using water, gypsum and aqueous solutions of CaSO₄.

The hydrophobicity can be explained by the material’s chemical structure, which consists of hydrophobic, aliphatic hydrocarbon which does not mediate with water molecules surrounding the material. In contrast, few materials are hydrophilic in nature because of their chemical structures containing a functional group that attracts and interacts with water molecules through hydrogen bonding.

Actual contact angle values variations resulted due to a number of factors from sample preparation to measurement techniques. When die stone slurries were used to wet specimens for contact angle measurements, the size of the slurry drop (water/powder ratio) presumably affects the rheology of the slurry and causes variations in the contact angle analysis. Therefore, to eliminate the effect of these variables equal-sized droplet of 0.4ml of an aqueous solution of calcium sulfate dihydrate was used for the study.

There are three method to measure the contact angle (in vitro): Sessile drop, captive bubble, and Wilhelmy balance method. All three method give different measurements for the same material tested. The nature of the liquid drop (water/slurry of gypsum) also makes the difference because the contact angle formed at the solid-liquid interface is a result of the interfacial tension, which changes depending on the attractive forces between the molecules in the liquid and the solid. In this study, we have used the SESSILE DROP method to determine the contact angle formed with the impression surface and it is the most commonly used method to determine the contact angle.

The wettability of the impression materials evaluated during the study showed that the new material cream alginate exhibited the least contact angle values
thereby indicating better wettability compared to the other materials including elastomers. This also proved that the casts obtained from cream alginate would have more chances of being void free compared to the other materials.

Many studies indicated that immersion in disinfectant solution altered the wettability of impression materials. Direct comparison with studies in the literature was not possible because of the variations in the technique of measuring contact angle, type of material tested and concentration of the disinfectant used\textsuperscript{12}

It has been proposed that the disinfectant treatments are found to alter the surface chemistry of an impression material that may change the hydrophilicity of the impression material. The disinfection of dental impression particularly the hydrophilic ones such as polyether is a concern. However, iodophor holds promise as an effective disinfectant for Impregum soft without affecting its wettability property\textsuperscript{13}.

**Limitations of the Study:** The results of this in-vitro investigation should be viewed cautiously because laboratory testing cannot exactly replicate clinical situations. Wetting of impression material depended on surface energy of the impressed surface. Proteinaceous surfaces of prepared teeth and oral soft tissues had lesser surface energy than the surface free energy of the die.

**Clinical Significance:** To obtain an impression with accurate details of the teeth and oral structures, the property of the impression material to be used is important. The contact angle is one of the factors, which plays a significant role in determining the nature of the impression material and to obtain an accurate cast. Void free cast is essential for a perfectly fitting prosthesis.

**Conclusion**

**Within the limitations of the study:** Wettability of hydrocolloids and elastomers were analyzed by placing a 0.4ml drop of an aqueous solution of calcium sulfate dihydrate over the prepared sample and placed under the horizontal profile projector. Contact angle values were determined and statistically analyzed. The Contact angle value that is least shows better wettability and highest shows least wettability.

Elastomers showed better wettability when compared to the hydrocolloids at both time interval and they have negligible time dependant change. Newly introduced cream alginate showed better wettability at both time intervals equivalent to the elastomers and can be considered for usage.

**Ethical Clearance:** Not required since it is a review article.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**References**


4. ORIGINAL RESEARCH A Comparative Study to Determine the Wettability and Castability of Different Elastomeric Impression Materials.:356-63.


Comparative Evaluation of Four Factors in Gingival Retraction Using Three Different Gingival Retraction Techniques: In Vivo Study

R. Gururaj1, S.R. Jayesh2, Sanjana Nayar3

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Abstract:

Aim: To evaluate and compare four factors in gingival retraction using three different gingival retraction method (Retraction Cord, Magic foam retraction Cord and Laser gingival troughing). Vertical and horizontal gingival displacement, hemorrhage control and time taken for performing each method were evaluated.

Materials and Method: 30 patients requiring fixed partial denture with two abutments were selected for the study. Following tooth preparation, three gingival retraction systems were used on the prepared abutments randomly, such that each combination was repeated ten times with overall n value being 60. Williams probe was used to measure sulcus depth before and after retraction. The horizontal sulcular width was measured indirectly by making impressions and measuring them under stereomicroscope. Hemorrhage scores were recorded immediately after removal of the retraction system. The time taken for each method was recorded in seconds. All results were recorded, tabulated statistically, analysed and interpreted.

Conclusion: From the results of the present study, following conclusions were drawn; 1) The depth and width or lateral displacement were more with retraction cord than with the other two method. 2) Hemorrhage control was best with magic foam, followed by laser with cord retraction having more haemorrhage. 3) Least time taken for gingival retraction was with Laser method, followed by magic foam, while retraction cord method consumed maximum time.

Keywords: Gingival retraction, retraction cord, magic foam, LASER.

Introduction

Tooth-supported fixed dental prostheses are routinely used in prosthetic dentistry to replace missing or decayed teeth for aesthetic as well as functional purposes.

Several factors affect the success and durability of restorations. Marginal integrity is one of the important factors, which contribute to the success of cast restorations. The restoration can survive in the biological environment of the oral cavity, only if the margins are closely adapted to the finish line of the preparation. In general, the type of impression making, setting characteristics, material flow, temperature, humidity, mixing, disinfection and pouring time have effects on the final accuracy of the indirect restorations. Supra-gingival margins are contributory in periodontal health maintenance, but do not provide ideal aesthetics.

So in most cases in aesthetic zone, margin of restoration is placed sub-gingivally. In tooth supported and implant supported fixed prosthesis, impression making requires accurate record of the prepared finish line area, especially in cases where the prepared finish line is located at same level as gingiva or sub-gingivally.

The gingival finish line should be clean and accessible during impression making, allowing adequate flow of the impression material over it. Gingival sulcus must also be wide enough. Accurate impression is usually achieved with the sulcular width of 0.15 to 0.20 mm.1 If the sulcus width is less than this value, the resultant thickness of the impression in this area will be too less so, impression material will not be able to resist against the rupture and deformation, thereupon the impression’s marginal accuracy is reduced. The primary factor in defective recording of marginal details is compromised gingival displacement technique.
A survey of literature revealed that there are divergent opinions regarding different techniques for gingival displacement. So, the present study is proposed to evaluate four factors of three gingival retraction techniques namely retraction cord, magic foam and LASER.

**Materials and Method**

**Inclusion Criteria**

1. Age limit 18-55 yrs
2. Patients willing for fixed partial denture
3. Patients having optimal gingival health
4. Patients with sound systemic health

**Exclusion Criteria:**

1. Patients with gingivitis
2. Patients with periodontitis
3. Patients with any systemic disease

Partially edentulous patients seeking fixed partial denture treatment visiting our department were screened, examined and evaluated.

Out of them those with minimum two abutments (posterior abutment and anterior abutment) which were periodontally sound and near ideally placed in the arch were selected for the study. Patients with missing first molar and second premolar were selected for the study.

A thorough scaling and polishing was done to enhance the gingival condition in indicated cases.

**Tooth preparation was made on chosen abutments:** Following tooth preparation, three gingival retraction systems were used on the prepared abutments randomly, such that each combination was repeated ten times with overall n value = 60. For example, in the first subject, retraction cord and magic foam cord were used for two prepared abutments, in the second subject magic foam and Laser were used and in the third subject laser and retraction cord was used for gingival retraction. The same order was followed for all the thirty subjects, so that all the three retraction systems were compared with each other in group of two for ten times.

The time taken for placement of each retraction system was recorded in seconds.

Smooth rounded measuring tip was used to measure sulcus depth before and after retraction. The horizontal sulcular width was measured indirectly using elastomeric impression material made before the retraction procedure and after the retraction procedure and then was examined under stereomicroscope.

Hemorrhage scores were recorded immediately after removal of the retraction system. The hemorrhage scores were as follows: Shoulder finish lines were prepared at the gingival crest level. Pre displacement impression was made with addition silicone material using two stage double mix technique to measure the initial sulcus width. The impressions were examined under magnification, void free and streak free impressions alone were included in the study. Upon removal, the impressions were rinsed under running tap water and disinfected by immersing in 5.25% sodium hypochlorite solution for 10 minutes.

The retraction cord of adequate size/width and length was cut and looped around the prepared tooth. Cord packing was started from the mesial interproximal area by gently pushing the cord into the sulcus. After 5 min the cord was removed.

The magic foam cord cartridge was attached to the auto mixing gun and then the mixing syringe with intraoral tip was placed into the gingival sulcus and gingival retraction material was applied all around the tooth. After injecting the retraction material the corresponding comprecap was placed on to the abutment to push the material deep into the gingival sulcus. After 5 min, the comprecap with the set retraction material attached to it was removed from the patient’s mouth.

Zolar Diodelaser (810nm) with the initiated fiber tip having a diameter of 400 microns was programmed for...
gingival retraction at 0.8 watt power with a frequency of 25 kHz in continuous mode. The retraction area was cleansed with 3% hydrogen peroxide and rinsed with light spray of water and dried with air, then the initiated fiber tip was placed into the sulcus just inside the crest of gingiva with very light pressure and moved around the tooth in small paint brush stroke.

All the results were recorded, tabulated, statistically analysed and interpreted.

**Results**

The mean values of time taken in performing the procedure using Retraction cord, Magic foam and LASER were 252.15 secs, 85.75 secs and 56.20 secs respectively. The mean values of width of the gingival sulcus obtained using retraction cord, magic foam and LASER were 0.33mm, 0.19mm and 0.31mm respectively. The mean values of depth of gingival sulcus obtained using retraction cord, magic foam and LASER were 1.43mm, 0.815mm and 1.245mm respectively. There was statistically significant association (chi square test) between depth, width, time and hemorrhage with the method employed in the study. There was a negative correlation between the hemorrhage score and the method of retraction. There was positive correlation between depth and time with respect to method of retraction. (Spearman rank Ratio.) There was a statistically significant association between the method and all variables including duration, hemorrhage, width and depth based on Kruskal-Wallis test.

Time taken for application of LASER and Magic foam retraction system was significantly (P<0.05) less compared to time taken with retraction cord. The amount of vertical gingival retraction obtained by using retraction cord and Laser retraction systems was significantly (P<0.05) higher than magic foam cord retraction system. The hemorrhage control with the magic foam system was found to be better than hemorrhage control with the other two retraction systems used in the study.

Laser and magic foam cord retraction systems were found easier in placement compared to retraction cord. Laser gingival troughing can be considered more effective among the three retraction systems used in this study, as it has taken less time and was easier in placement, obtained good amount of retraction and induced minimal bleeding on removal compared to retraction cord.

Line Diagram 1

![Line Diagram 1](image1)

Line Diagram 2

![Line Diagram 2](image2)
Discussion

Clinical success of fixed prosthodontic restorations depends, to a large extent, on the accuracy of final impression. A good quality impression is influenced by appropriate location of the finish lines, abutment’s periodontal health and a dry field, in addition to the inherent accuracy of the final impression material. Modern impression materials used in Prosthodontics
possess high accuracy of recording tissue details. Nevertheless, treatment protocol necessitates displacement of gingival tissues to expose and record the gingival finish lines on the prepared tooth surface. Thus, gingiva must be displaced temporarily to make an acceptable impression.²

The aim of gingival retraction is to allow access atraumatically for the impression material beyond the finish line margin and to create space for adequate thickness of impression material in gingival sulcus region so that it can better withstand the tearing forces encountered during removal of impressions.³

The present study has been designed to evaluate three different systems of gingival retraction i.e. 1) retraction cord soaked - a conventional technique 2) Magic foam cord and 3) Laser gingival troughing.

Results revealed that the depth and width or lateral displacement were more with retraction cord than with the other two method. Hemorrhage control was best with magic foam, followed by laser with cord retraction having more haemorrhage. Least time taken for gingival retraction was with Laser method, followed by magic foam, while retraction cord method consumed maximum time. The results were statistically significant.

The maximum depth and width achieved with retraction cord in the present study is similar to the studies of Ankit gupta⁴ et al(2013) and Phatale⁵ et al. Similarly, results of haemorrhage control are also in conformity with the results of Ankit gupta⁴ et al in 2013 and Phatale⁵, et al. Time taken for the procedure of the gingival retraction was least with Laser. This is in conformity with the results of study of Manjeet Dawani⁶ et al (2016). Abdel Gabbar⁷ and Aboulazm compared mechanochemical method with laser tissue displacement. They found that the laser resulted in less hemorrhage and less inflammation with a faster and painless gingival healing. The present study is also in agreement with the study conducted by Vamsi Krishna CH⁸, Gupta N, Reddy KM in which diode laser was used for lateral displacement of gingiva on 20 abutment teeth at three specific sites where they found gingival retraction which ranged from 230µm – 670µm, closer to the thickness of sulcular epithelium and which was greater than the limit of minimum retraction of 200µm. The procedures were carried out within less time and a considerable improvement in patient comfort was reported⁹,¹⁰.

The present study reveals that all three retraction systems are reasonably acceptable as per the results, as all three provide retraction more than the minimum amount of retraction (0.22 mm) required for any fixed partial denture impressions¹¹,¹²,¹³.

Clinical implications of the study: The results of the present study suggest that for adequate lateral and vertical displacement. The retraction by cord method can be used. For best hemorrhage control Magic foam cord can be used. When clinician has less time for chair side work, using laser for gingival retraction will be beneficial. These corollaries can be extrapolated from the results of the present study.

Limitations of the study: Though all possible care was taken to standardize all aspects of the study, every patient’s physiology may have differed and hence the response of the gingiva to the retraction material could have varied from patient to patient. Different gingival biotypes (thick and thin) and different age groups might have contributed to variations¹⁴.

Scope for further studies: A larger sample size with more n value in different areas of maxillary and mandibular dental arches can be undertaken and more data could be utilised for evaluation. Also there is a need for histological analysis of the effect of gingival retraction materials on the soft tissue.

Conclusion;

Marginal integrity of the fixed dental prosthesis requires accurate impression of the prepared finish line. If the prepared finish line is adjacent to the gingival sulcus, gingival retraction techniques should be used to decrease the marginal discrepancy between the restoration and the prepared abutment. Accurate marginal fit of the restoration in the prepared finish line of the abutment is required for therapeutic, preventive and aesthetic purposes. Impression materials by themselves do not contribute to gingival retraction. If the finish line of a tooth preparation is located sub-gingivally or epi-gingivally, a temporary gingival deflection is needed before impression is made. This is a critical step in order to obtain a precise duplication of the prepared tooth for the technician to fabricate the prosthesis.

Hence forth, from the results of the present study, following conclusions were drawn;1) The depth and width or lateral displacement were more with retraction cord than with the other two method. 2) Hemorrhage
control was best with magic foam, followed by laser with cord retraction having more haemorrhage. 3) Least time taken for gingival retraction was with Laser method, followed by magic foam, while retraction cord method consumed maximum time. LASER gingival retraction could be considered more effective among the three retraction systems used in this study, as it has taken less time and was easier in performing, attained good amount of retraction and induced minimal bleeding compared to stay-put retraction cord.

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Disinfection Techniques for Dental Impressions: A Review Article

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Abstract

Statement of Problem: Dental impressions are infected with various types of micro-organisms e.g. Hepatitis B, C, HIV, Mycobacterium, Herpes simplex, Ebola etc. In order to prevent their spread through dental impression it is important to sterilize the impression just after removal from patient’s mouth. Numerous method to disinfect impressions have been described in literature having their own advantages, disadvantages and effects on impression material. To enhance the knowledge of a dental health care workers about impression disinfection, a structured literature review of the current disinfection techniques has been carried out.

Material and Method: One electronic database (PubMed) was searched through in November 2019. The term “dental impression disinfection” was chosen. The titles and abstracts were screened and the studies which performed “disinfection techniques in dentistry” were selected.

Conclusions: Cross infection control is very important aspect of clinician and patient safety. It is the responsibility of the dentist to make appropriate choice of disinfection method for different impression materials.

Keywords: Disinfectants, disinfection techniques, dental impressions, sterilization, cross-infection.

Introduction

The importance of cross-infection control cannot be overemphasized. Disinfection and sterilization method are used to achieve disinfection and sterility of the medical and surgical instruments. In order to avoid the spread of pathogens from patients to patient, patient to health care personnel and health care personnel to patient, it is the duty of the health care policies makers to allocate the appropriate method of cleaning, disinfection and sterilization for various surfaces and instruments.¹ Cleaning is the removal of all foreign material (e.g. blood, saliva, debris) from objects while decontamination is the removal of pathogenic micro-organisms from objects. Disinfection is the process that eliminates many to all pathogenic microorganisms on inanimate objects except bacterial endospores. While sterilization is the complete elimination of all micro-organisms including spores.

Disinfection can be divided into three categories according to their efficacy. High level disinfection involves bacterial spore inactivity along with other microbial forms. Intermediate level disinfection involves destruction of microorganisms like tubercle bacilli but not able to kill spore. Low level disinfection possesses narrow antimicrobial activity.

(Dental impressions are categorized under semi-critical objects in dental practice and require high level disinfection or sterilization. Twenty years before sterilization in an autoclave will compromise the dimensional accuracy of the impression hence it is not feasible. Until 1991, the recommended procedure for disinfection of impression was rinsing under running water with which only 40% of...
bacteria, viruses and fungi were removed and potential for transmission of microorganisms remains there.\textsuperscript{3,8,9} In recent times, a pre wash of the impression with running water is advocated first to cast off all particles, blood and saliva prior to active disinfection procedure.\textsuperscript{10}

Disinfecting dental impressions should be routinely followed in the dental office and dental laboratory. However, many of the dental professionals in private clinics, hospitals, dental schools and prosthetic laboratories are not following the required protocols for impression disinfection.\textsuperscript{11,12}

Hence, it is of utmost importance to create awareness in dental professionals who are involved in any process of handling, transportation, processing and storage of the dental impressions. The objective of this literature review is to provide knowledge about various techniques of impression disinfection along with their mechanism of action and necessary guidelines for their usage.

**Disinfectant Solutions:**

**Sodium hypochlorite:** It provides intermediate level disinfection and has a broad-spectrum antimicrobial activity. It is very useful disinfectant with advantages including fast bactericidal activity, ease of use as it is soluble in water, relatively stable, nontoxic at use concentrations, low cost, non-staining, nonflammable and colorless. Disadvantages include irritation of mucous membrane, less efficient in organic environment and metal corrosive.\textsuperscript{13} According to one study, alginate impression disinfected with spray method using 1% NaOCl did not show any severe dimensional changes or surface roughness of stone model that were fabricated from that impression.\textsuperscript{18} However, in another study impression disinfection by immersion method with 0.5% NaOCl for 15 min exhibited small dimensional change.\textsuperscript{19}

**Glutaraldehyde:** A high-level disinfectant and is available in alkaline, neutral and acidic forms.\textsuperscript{5} It is a broad-spectrum chemical agent with fast killing capability. It is also called chemo sterilizer. If it is used in proper concentration and specialized equipment, it can destroy all types of micro-organisms including bacterial and fungal spores, tubercle bacilli and viruses.\textsuperscript{16} It is a colorless liquid with pungent odor. Although it is considered as the best disinfectant for cold sterilization of medical equipment, it also has many health hazards including irritation to skin, eyes and respiratory tract. It is a sensitizer of skin and respiratory tract, so special precautions are needed while using it e.g. wearing butyl or nitrile gloves, closed system for solution handling, exhaust ventilation of the places of handling and keeping the temperature of the solution low as it will reduce the airborne concentration of the solution.\textsuperscript{17}

**Iodophors:** These halogens provide low to intermediate level disinfection. These are bactericidal, mycobactericidal and virucidal. It is also fungicidal but requires more contact time. These are mainly used as antiseptics rather than disinfectants. These are not sporicidal and cause staining of fabrics. They are not flammable. They have irritating effect on mucous membrane.\textsuperscript{20,21}

Disinfectant capability of iodine is neutralized due to presence of organic material on any surface.

Hence, more frequent application of disinfectant is required for complete disinfection.\textsuperscript{3} According to one study, 30 min exposure to 0.1% povidone-iodine did not cause remarkable distortion of polysulfide and polysiloxane impression material.\textsuperscript{5}

**Alcohols:** These provide intermediate level disinfection and include isopropyl alcohol and ethyl alcohol. Isopropyl alcohol is normally used as antiseptic. Medical surfaces can also be disinfected with isopropyl alcohol. Ethyl alcohol is more potent in bactericidal than bacteriostatic activity. It is also tuberculocidal, fungicidal and virucidal for enveloped viruses as well.\textsuperscript{14,20,22,23} Alcohols are contraindicated for impression disinfection because they can cause surface changes of impressions.\textsuperscript{3} They are also not suitable for disinfection of denture bases consisting of non-cross-linked resins.\textsuperscript{24}

**Phenols:** Complex phenols are classified as intermediate level disinfectants. These are also known as protoplasmic poisons. At low concentration, they cause lysis of rapidly growing e.coli, staphylococci and streptococci. They possess antifungal and antiviral properties as well.\textsuperscript{23} These are commonly used in mouthwashes, scrub soaps and surface disinfectants. Ideally not recommended for impression disinfection as simple phenols are low level disinfectants. They are incompatible with latex, acrylic, rubber and cause acute toxicity as well.\textsuperscript{3,4}

**Chlorhexidine:** It is an intermediate level disinfectant and antiseptic. It has broad spectrum of activity and also used as preservative. It is commonly used in hand washes and oral products. It is bactericidal,
virucidal and mycobacteriostatic. Its activity depends on specific pH, hence presence of organic matter declines its action.\(^{23}\)

2% chlorhexidine has shown activity against S. aureus, E. coli, B. subtilis, but no antifungal activity was seen in agar diffusion test at low concentration. 0.2% chlorhexidine disinfectant solution can be used as water substitute in alginate mixing. Impression can also be immersed in chlorhexidine solution and it causes effective disinfection.\(^{25}\) According to one study, 1.0 g/L chlorhexidine solution can be used to produce self-disinfecting alginate impression material for clinical use. In this way, it has shown antimicrobial activity and did not cause any changes in dimensional accuracy, flow ability and setting time of irreversible hydrocolloid impression material.\(^{26,27}\)

**Ozonated water:** Ozone is an inorganic gaseous molecule. Its chemical formula is O\(_3\). It is less stable than O\(_2\) in lower atmosphere.\(^{3}\) It has antimicrobial, anti-hypoxic, analgesic and immunostimulatory activities.\(^{28}\) It is used for disinfection of water lines, oral cavity and dentures. It is also used as prophylactic agent before etching for the placement of restorations.\(^{29}\) Ozonated water can also be used as impression disinfectant. According to one study, aqueous ozone is more biocompatible than other disinfectant solutions e.g. chlorhexidine, NaOCl, H\(_2\)O\(_2\). Ozonated water can reduce the number of microorganisms on the surface of irreversible hydrocolloid impression materials and by increasing time of immersion more effective disinfection can be achieved.\(^{28}\)

**Other Techniques:**

**Microwave irradiation:** Microwaves cause disruption of cell membrane integrity and cell metabolism which ultimately leads to microbial death.\(^{3}\) Microwaves are simple to use, low in cost and provide good disinfection. Dentures are being disinfected with microwaves and are found better disinfected than NaOCl. Impression disinfection can be done by microwave irradiation. With no changes in physical properties of impression material, Polyvinyl siloxane impression material can be disinfected with microwaves.\(^{30}\)

**Cast disinfection:** Microorganisms are found on dental cast as well. These dental casts can be a medium of cross infection between patients and dental health care workers. Therefore, it’s necessary to disinfect dental casts.\(^{7}\) The American Dental Association recommends various method for cast disinfection. These include use of disinfectant spray, immersion in disinfectant solution, and incorporation of disinfectant in stone at the time of mixing.\(^{31}\) Immersion in 0.525% NaOCl did not cause any changes in dimensional accuracy, surface detail quality and compressive strength.\(^{32}\) Microwave irradiation can also be used for cast disinfection. Dental cast can also be sterilized.\(^{3}\)

**Sterilization of impression:** Various method are available for sterilization of impressions e.g. exposure to UV light, steam autoclave, ethylene oxide gas autoclave, and radiofrequency flow discharge etc.\(^{3}\)

**Discussion**

In dental practice, cross-infection control is of utmost importance but impression disinfection is still widely neglected.

**The proper criteria for impression disinfection involve:**

- The most suitable method (spray or immersion).
- Appropriate application (time of contact).
- Periodic check for efficacy.\(^{33}\)

The factors to be considered for any disinfection protocol for dental impression are effectiveness, chemical stability and efficacy of the disinfectant solution. The disinfection procedure should not alter the dimensions and surface details of the impression and resultant cast.\(^{32,34}\) It has been proven that the most effective method of reducing the burden of micro-organisms from impression surface is chemical disinfection. Spray disinfection and immersion disinfection are the two method of impression disinfection. However, immersion is the most reliable method because all surfaces of impression and tray come in contact with disinfectant solution. But immersion is not the method of choice for hydrocolloids material as they are extremely hydrophilic.\(^{3,34}\)

UV rays can be used for disinfection of water supplies, laboratory equipment, dental headpieces, dental impression and implants. In one study, while comparing UV ray’s disinfection with Glutaraldehyde and NaOCl, UV rays exhibited maximum efficacy.\(^{36}\)

The factors affecting the efficacy of NaOCl include concentration and life of solution, pH, temperature and contact time with the impression surface. According to
Fahimeh et al, the compatibility of disinfectant solution with impression material should be assessed prior to disinfection procedure. Any compatible disinfectant solution should not cause any alteration on the surface detail reproduction.37

Although some chemical disinfectants cause dimensional changes in impression surface, these changes are not expected to alter the clinical performance. This is why, chemical disinfection is considered the most harmless form of impression disinfection. 2% glutaraldehyde had exhibited more dimensional changes than 5.25% NaOCl in immersion disinfection procedure.38

The American Dental Association’s revised guidelines recommend chemical agents that are virucidal, bactericidal and sporicidal. These chemical agents are chlorine compounds, phenols, iodophors, formaldehyde and glutaraldehyde. Immersion in NaOCl at concentration of 1:10 (0.525%) is advised for 10 minutes. Samra and Neiman investigated the effects of glutaraldehyde, phenol, iodophors and chlorine compound immersion disinfection procedure on set stone cast. The results of this study showed that a 0.525% NaOCl least affected the cast with regard to compressive strength, surface changes, surface hardness and chemical reactivity.32

The Japan Prosthodontic Society has recommended the alginate impression in either 0.1-1% NaOCl solution for 15-30 min or 2-3.5% glutaraldehyde solution for 30-60 minutes. But immersion in glutaraldehyde for more than 30 min has shown dimensional changes and altered surface quality of the resultant cast.19

Ethylene oxide gas autoclaving has shown significant structural changes of heavy and light body addition silicone impression material. Sterilization of dental stone cast has shown improved mechanical properties but decreased compressive strength. Addition or condensation silicone impression materials can be sterilized in steam autoclave without remarkable changes in dimensional accuracy.3

**Conclusion**

Cross infection control is very important aspect of clinician and patient safety.

It is the responsibility of the dentist to make appropriate choice of disinfection method for different impression materials.40

Impression disinfection can prevent spread of infection from dental clinic to dental laboratory technicians, patients and dental auxiliaries.

**Ethical Clearance:** Not required since it is a review article.

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**Conflict of Interest:** Nil

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Impression Materials: A Comparative Review of Impression Materials Most Commonly Used in Prosthodontics

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Abstract

Impression materials are used to record intraoral structures for the fabrication of definitive restorations. Accurate impressions are necessary for construction of any dental prosthesis. The relationship between static and mobile oral structures must be reproduced accurately for an optimum cast. Making a cast in gypsum materials from an impression of dental anatomy aids dentists in designing and constructing removable and fixed prostheses. The accuracy of these final restorations depends greatly on the impression materials and techniques. Accurate impressions depend on identifying the applications that do or do not fit each material’s characteristics. Materials used without adequate knowledge of their characteristics can impair a successful outcome. Often, the choice of impression materials depends on the subjective choice of the operator based on personal preferences and past experience with particular materials.

Keywords: Impression materials, Gypsum, Hydrocolloids.

Introduction

Ideal Characteristics of Impression Materials:
An ideal impression material should exhibit certain characteristics in the clinical and laboratory environment. Clinically, it should produce an accurate impression secondary to its adaptability to oral structures, have a consistency that is dimensionally stable to resist tearing but results in an atraumatic removal, set within a reasonable amount of time, demonstrate biocompatibility to include a hypoallergenic nature, and have a reasonable cost per use. In a laboratory setting, it should be dimensionally stable for accurate pouring of multiple casts and should not affect dimensional accuracy upon disinfection [¹–⁴]

Common Impression Materials Used in Restorative Dentistry: Impression materials that are currently popular include hydrocolloids, addition silicones, polyethers, and polysulfides. Some of the older impression materials (eg, zinc oxide eugenol impression paste, impression plaster, and impression compound) are still used in certain applications but are limited in use because they cannot be removed past undercuts without distorting or fracturing the impression [³].

Depending on the manufacturer, many of the materials are available in cartridges for automixing and tubes or containers for hand spatulation. The automixing products require no mixing pads or spatulation, and training in their use is less time consuming. There may be less waste of material associated with automixing and providing a more bubble-free mix resulting in more accurate casts. Accessories such as intraoral tips, mixing tips, and various types of tray systems are also important when weighing the advantages and disadvantages of the delivery systems of impression materials.

Criteria used in evaluating impression materials:

Properties and handling characteristics: The hydrophilic versus hydrophobic nature of materials is discussed as it relates to flow characteristics, which result in more bubble-free impressions. In recent years, dentists have turned toward using polyvinyl siloxanes and polyethers because of their improved physical and
mechanical properties\textsuperscript{[1,5–7]}. These properties include improved dimensional accuracy, stability, wettability, excellent elastic recovery, flexibility, ease of handling, tear strength, ability to produce multiple casts from one impression, and superior ability to reproduce detail.

**Dimensional Accuracy:** Elastomeric impression materials such as polyvinyl siloxane, polyether, and polysulfide, the dimensional accuracy is usually time dependent, with greater dimensional accuracy occurring immediately after polymerization is complete but declining as the impression is stored for extended periods of time \textsuperscript{[5,7–9]}. Polyvinyl siloxane and polyether impression materials remain dimensionally accurate for 1 to 2 weeks \textsuperscript{[5,7,8]}. Poly- sulfide impression material is dimensionally accurate if poured within 1 to 2 hours of making the impression \textsuperscript{[5,7]}. Practitioners should take this characteristic into consideration when selecting impression materials given the time available to the practitioner to pour casts during office hours.

Presence of moisture results in impressions with voids or pitted surfaces, and the detail reproduced is inferior. This result has been reported even with the new “hydrophilic” polyvinyl siloxane impression materials. These hydrophilic polyvinyl siloxanes have improved wettability \textsuperscript{[1,4,19,20]}, and they are only clinically acceptable under dry conditions \textsuperscript{[17]}. The hydrophilization of polyvinyl siloxanes is enhanced with the incorporation of nonionic surfactants. They have a hydrophilic part and a silicone-compatible hydrophobic part. These surfactants act through a diffusion transfer of surfactant molecules from the polyvinyl siloxane into the aqueous phase. The surface tension of the liquid is changed, and increased wettability results \textsuperscript{[2]}. When using polyvinyl siloxanes, moisture control is critical to ensure success for predictable clinical impression making. Because of their hydrophilic nature, using polyether and polysulfide impression materials is more compatible with the inherent moisture present in mucosal tissues \textsuperscript{[1–3,9]}.

**Dimensional Stability:** The dimensional stability of an impression material reflects its ability to maintain the accuracy of the impression over time \textsuperscript{[2]}. These materials should have low shrinkage upon polymerizing and remain stable, which allows them to be poured days after making the impression. High impression dimensional stability materials usually can be poured within 1 to 2 weeks after the impression is made and still produce an accurate cast \textsuperscript{[2,3,5,8]}. Materials with high dimensional stability are the polyethers and polyvinyl siloxanes, in contrast to alginate, which has a low dimensional stability. The polysulfides distort over time \textsuperscript{[14]}. Because many dentists send their impressions to a laboratory to be poured, this characteristic should be considered when choosing an impression material \textsuperscript{[2,8]}.

Rigid impression materials require less support from trays. They distort less on pouring and make good bite registration materials \textsuperscript{[2,8]}. They work well for implant impressions, in which posts must be transferred accurately \textsuperscript{[8]}. They would be detrimental in making full arch impressions of periodontally compromised or mobile teeth. Polyethers and some polyvinyl siloxanes fall into this category.

**Wettability (or flow characteristics):** Wettability of an impression material relates to the ability of the material to flow into small areas \textsuperscript{[2]}. Impressions that wet the teeth well displace moisture and result in fewer voids. Materials with a high wetting angle do not flow easily into small crevices and are poor candidates for use in fixed prosthodontics. Materials with a low wetting angle flow extensively. Water is the ideal example of a material with a low wetting angle. Wettability results in fewer voids and less entrapment of oral fluids, providing more accurate impressions \textsuperscript{[2,4]}.

**Elastic Recovery:** A set impression must be sufficiently elastic so that it will return to its original dimensions without significant distortion upon removal from the mouth \textsuperscript{[2]}. Polyvinyl siloxane has the best elastic recovery, followed by polyether and polysulfide \textsuperscript{[2,8]}.

**Flexibility:** Flexible impressions are easier to remove from the mouth when set. Polyethers tend to be the most rigid impression materials \textsuperscript{[2]}. Polyvinyl siloxanes are fairly stiff, and depending on the viscosity of the material, they flow readily to capture areas of detail \textsuperscript{[8]}. Clinical studies have shown that the viscosity of the impression material is the most important factor in producing impressions and dies with minimal bubbles and maximum detail \textsuperscript{[2]}. Accuracy of the impression is also affected when the percentage of deformation and the time involved in removing the impression are increased. In these instances, permanent deformation occurs relative to the type of elastomeric impression material used \textsuperscript{[2,8,14]}. Alginate would be considered the most flexible of the impression materials, whereas polyethers would be considered the least flexible.

**Ease of Handling:** Working times can be varied
with respect to standard-set versus quick-set impression materials as prepared by various manufacturers [8]. Various viscosities and flow characteristics are also made available per individual manufacturer formulations.

**Tear Strength:** The tear strength of an impression material relates to how resistant a particular material is to tearing after setting [11,12]. Polyethers are considered to have the highest tear strengths, whereas hydrocolloids have relatively low tear strengths [2,3]. Polysulfide impression materials have a high resistance to tearing but stretch and do not recover completely elastically [2,14].

**Contact angle (and ability to reproduce detail):** Impression materials with low contact angle enable dental stone to flow easily, and relatively bubble-free casts are produced. Materials with high contact angle require more careful pour technique and attention to produce accurate casts [2]. Polyvinyl siloxane materials may require surfactants to lower the contact angle before pouring casts. Hydrocolloids, polyethers, and polysulfides have relatively low contact angles.

**Miscellaneous:** In addition to these criteria, the following criteria should be considered: how well a material is tolerated by patients, obtaining the best results for the least amount of expense, and occurrence of minimal changes when in contact with disinfection chemicals. Materials such as hydrocolloids, polyethers, and methacrylates may require specific disinfection protocols to prevent distortion of the material after setting [2,11–13].

**Summary:** Dentists have relied on impression materials for various uses, including fabricating dental prostheses, serving as temporary liners, and serving as bite registration materials. The materials that have received a lot of attention because of their physical and handling properties include the irreversible hydrocolloids, polyethers, and polysulfides.

The polyvinyls (addition silicones) and the polyethers account for a major portion of the market used as impression materials in fabricating fixed partial dentures, removable appliances, and implant prostheses. The hydrophilic addition silicones and polyethers flow easily, result in fewer retakes, and produce more bubble-free casts when used under appropriate guidelines. The polyvinyl siloxane materials are intrinsically hydrophobic (water repellent) by nature, so they must be made hydrophilic by adding surfactants. When these surfactants come into contact with moisture, it has to migrate to the surface, which prevents the hydrophilicity from fully developing during working and setting times and can result in voids and inaccurate impressions. A dry field is critical for their use. Polyether is hydrophilic by nature of its chemical makeup, and moisture does not interfere as much with achieving void-free impressions.

The condensation silicones, polysulfides, and irreversible hydrocolloids have qualities that make them more sensitive with respect to handling considerations and mix-and-pour techniques because they exhibit more changes over time after setting, which may affect accuracy in detail reproduction. The polyvinyls and polyethers are more stable to deformation after setting has occurred. All have specific protocols for disinfecting that must be followed to prevent distortion of the material before pouring casts; however, the polyvinyls seem to be most impervious to different disinfection protocols.

**Ethical Clearance:** Not required since it is a review article.

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**Conflict of Interest:** Nil

**References**


Management of Xerostomia and its Impact on Dental Caries: A Review

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Abstract

Many elder groups have been studied to determine their frequency of dry mouth complaints and their salivary flow rates. To appreciate these it is first necessary to understand two related concepts. First, complaints of dry mouth (or xerostomia) may not reflect reduced salivary function may instead reflect dehydration or other systemic conditions. Therefore studies that only examine the complaints of dry mouth will not reflect the true risk for oral diseases in the population. Second, it is very difficult to determine values for normal salivary function. Other studies suggest that salivary flow rates in elders are related to the number of medications they take on a regular basis, time number of systemic disorders they report, and the length of time for which they consume the drugs.

Keywords: Dry mouth, radiation therapy, saliva, xerostomia.

Introduction

Xerostomia (dry mouth, oral dryness, and mouth dryness) is considered a complex condition that affects several stomatological functions and can be caused by hyposalivation with consequences such as oral lesions, alterations of taste, feeling of thick saliva, chewing problems, dental caries, dental demineralization, periodontal disease, salivary gland infection, cervical caries, fungal infections, and others. Etiology seems to be multifactorial where both local and systemic factors would participate. Although xerostomia may occur frequently in the general population, proper diagnosis and treatment planning has to be done.

Based on the etiology, the xerostomia can be classified as true xerostomia (xerostomia vera, primaria), caused by the malfunction of the salivary glands and pseudo xerostomia or symptomatic xerostomia (xerostomia spuria, symptomatica), which is described as the subjective sensation of oral dryness, despite normal secretory function of the salivary glands. The xerostomia, as a symptom, is more common in older populations, but its causes are not related to aging. It has been shown it is related to some specific diseases, drugs, or therapies associated. The dry mouth (xerostomia) sensation has a higher incidence on individuals over 60 years old up to three times higher than on younger adults.

The most severe conditions with effect on the salivary flow are SS and radiotherapy in the head and neck area, with the prevalence of xerostomia in almost 100% in these cases. These conditions are characterized by a progressive loss of secretory cells, and thus a progressive decline in saliva production. Less severe conditions may be dehydration, smoking, and inflammation or infection of the salivary glands. In older people, the most common cause of xerostomia is the use of medications because the vast majority of the elderly are being treated with at least one drug that causes salivary hypofunction.

Drugs most commonly associated with xerostomia are: - antidepressants (particularly tricyclic antidepressants); - Selective Serotonin Reuptake Inhibitors (SSRIs), particularly when combined with...
benzodiazepines; - Diuretics, antihypertensive drugs and angiotensinconverting enzyme inhibitors (ACE inhibitors), - oral hypoglycemiant, - acetylsalicylic acid (ASA), -iron supplements. Let us not forget that drugs with the most intense xerostomizing effect are also the most widely and frequently used (treatment of metal disorders and cardiovascular diseases).

Many medicines can cause dry mouth, including drugs used to treat obesity, epilepsy, hypertension (diuretics), diarrhea, urinary incontinence, asthma, and Parkinson’s disease.

**Treatment:** Treatment design to alleviate dry-mouth symptoms should be personalized to the individual patient, based on available treatment. The treatments of xerostomia can be classified into the following categories: (1) patient education, (2) prevention, (3) symptomatic treatment, (4) systemic and topical salivary stimulants, and (5) regenerative and gene therapies. Patient education Patients should receive detailed information about the potential causes of dry mouth and the potential sequelae of impaired salivary secretion, such as dental caries, candidiasis, and mucosal complications. Therefore, patients should be encouraged to have preventive oral health care such as dental hygiene habits and regular dental visits. Another palliative action to minimizing symptoms and preventing oral complications is water intake, drinking water frequently, and remaining hydrated is an important treatment for symptoms of dry mouth.

Preventive therapies Pharmacological interventions for the prevention of radiation-induced salivary gland dysfunction have been studied. The use of chemical radioprotectors represents an obvious strategy to improve the therapeutic index in radiotherapy. However, the vast majority of these are either too weak in terms of radioprotection, too toxic, or without any apparent mechanisms to ensure selective normal tissue protection. The sulphydryl compound amifostine (WR2721; 2-[3-(aminopropyl) amino] ethylphosphorothioic acid), is an oxygen scavenger that may protect salivary glands from free-radical damage during radiation therapy without attenuation of the anti-tumor effects in many experiments performed. Amifostine has been approved for prevention of xerostomia, in head and neck squamous cell carcinoma patients undergoing radiotherapy.

**Discussion**

Bakke et al, have reported that xerostomia was higher in women than in men in all age groups. There was higher prevalence of xerostomia with increasing age in both sexes and it was more frequent at night than during daytime. They concluded that the dramatic increase of xerostomia between age 50 and 75, especially amongst 620 women, needs to be considered in the management of this age group.

A recent systematic review that included randomized controlled trials suggested that the drug amifostine prevents the feeling of dry mouth in people receiving radiotherapy to head and neck (with or without chemotherapy) in the short- (end of radiotherapy) to medium-term (3 months after radiotherapy). However, amifostine has adverse effects such as nausea, vomiting, hypotension, transient, hypocalcemia, and allergic reactions. Then, the benefits of amifostine should be weighed against its high cost and side effects. Another cytoprotective compound described in literature is the bioactive factor Keratinocyte growth factor18.

Gambon et al, reported that the application of citric acid might be increased risk of caries, as a consequence of the erosive action of these agents over the dentin.

Anneroth et al, reported that the use of chewing gums can cause similar bad effects. In order to avoid demineralising effect on the human dentin, the use of spray format allows a direct contact with the oral mucosa, and combined with a suitable concentration (as the stimulant effect on saliva production), could reduce the demineralising potential of chewable products.

Da Mata et al, indicated that Gustatory stimulants of salivary secretion with fluoride, xylitol and lower acid content maintain similar salivary stimulation capacity while reducing significantly the dental erosion predictive potential.

**Conclusion**

The dental practioners have difficulty in diagnosis and treatment of dry mouth. Diagnosis of xerostomia may be based on evidence obtained from the patient’s history, an examination of the oral cavity and/or sialometry, a procedure that measures the flow rate of saliva. Xerostomia should be considered if the patient complains of dry mouth, particularly at night, or of difficulty eating dry foods such as crackers.

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Conflict of Interest: Nil

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Osseodensification in Dental Implants: A Review

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Abstract

Background: Primary Implant Stability of dental implants is an essential factor for achieving successful osseointegration. The quality of bone is one of the most crucial factors that affects primary implant stability. Sufficient bone to implant contact [BIC] is an essential criterion for biomechanically stable dental implant.

Osseodensification, a recently developed technique has been at the forefront of evolutionary changes in osteotomy site preparation in implantology. This technique involves low plastic deformation of bone that is created by rolling and sliding contact using a densifying bur that is fluted such that it densifies the bone with minimal heat elevation. This technique has been proposed to help in better osteotomy preparation, bone density and increases primary implant stability.

Method: A literature review was done to analyse the osseodensification procedure, its advantages over conventional osteotomy on bone density and primary implant stability.

Conclusion: Densifying drills [Densah] for bone osseodensification resulted in undersized osteotomy compared to conventional drills. It also resulted in improved bone density and increase in percentage bone volume and bone to implant contact, thereby improving implant stability.

Keywords: Implant Stability, Bone Density, Osseointegration, Osseodensification, Osteotomy.

Introduction

Osseointegration is the formation of a direct interface between living bone and the surface of a load-bearing prosthetic implant. Osseointegration is crucial for implant stability which determines the long-term success of dental implants.1 Primary stability is achieved when there is no micro movement of implant in its completely seated position.2

Standard drills used during osteotomies are made to remove bone to create space for implant placement. A new concept for osteotomy called osseodensification has been at the forefront of changes in surgical site preparation in implantology, developed by HuwaisS.3 Osseodensification does not excavate bone tissue. It is carried out with densifying burs to increase bone density as they expand osteotomy site.4

Primary Stability: Bone density, surgical protocol, implant thread type, and geometry are the factors involved in improving primary stability of dental implants. The maintenance and preservation of bone during osteotomy preparation leads to enhanced primary mechanical stability enhanced Bone to Implant Contact, thereby enhancing the implant secondary stability.2

Method to Increase Primary Stability: Many surgical techniques were developed to increase the implant primary stability in bone with low density. A method to increase the primary stability that is widely used is the under-preparation of the implant bed, which is achieved by using a one or more size smaller as the last drill than selected implant diameter.

In the presence of poor bone quality, 10% undersized implant bed preparation is sufficient to enhance primary stability whereas, additional decrease does not improve primary stability values.5,6

Studies on stepped osteotomy of implant bed, which is another variant of the under-preparation method, have reported greater implant stability in terms of insertional torque than conventional osteotomy in soft bone.2
Summers RB described the use of osteotomes to condense bone in case of low bone density. Stavropoulos A et al., reported good primary stability of implants using bone condensation technique.

Osseodensification is a newer technique of preparation of the implant bed, to develop a condensed autograft surrounding the implant, which enhances implant stability.

Rationale of Osseodensification:
Osseodensification involves the usage of proprietary densifying burs (Densah burs) that allows allow bone preservation and condensation through compaction autografting during osteotomy preparation thereby increasing the peri-implant bone density, and the implant mechanical stability.

Higher degrees of primary stability due to physical interlocking between the bone and the device, faster new bone growth formation due to osteoblasts nucleating on instrumented bone that is in close proximity with the implant.

Bur Technology: Specially designed Densah burs runs at a speed of 800-1500 rpm, precisely cut bone in the clockwise direction and densify bone in a non-cutting counter clockwise direction combined with copious irrigation which aids the surgical procedure during implant placement.

They have lands along with negative rake angle that work in a non-cutting action. They have a cutting chisel edge and a tapered shank so that when entering deep into the bone, they expand the osteotomy preparation smoothly compacting the bone in the peripheral area.

Advantages:
Compaction auto grafting: Osseodensification maintains the bulk of bone by condensation and compaction which results in higher bone to implant contact.

Enhances bone density: Osseodensification burs allow preservation of bone and condensation through compaction autografting, thereby increasing the peri-implant bone density, and the implant mechanical stability.

A study conducted by Huwais S and Meyer EG confirmed that the osseodensification technique increase primary stability, the percentage of bone at the implant surface and bone mineral density. They also concluded that, by reserving bulk bone, healing process would be accelerated due to bone matrix, cells and biochemicals maintained and autografted along the osteotomy surface site.

Residual ridge expansion: Studies shown that narrow bone expands along with osseodensification thus facilitating for placement of implants with larger diameter and also avoiding fenestration and dehiscence.

Increase in residual strain: The bouncing motion helps to create a rate dependent stress to produce a rate dependent strain, and allows saline irrigation to gently pressurise the bone walls. These together facilitate increased bone plasticity and bone expansion.

Increase in Implant Stability: Huwais S concluded that, the densah™ bur technology facilitates ridge expansion with maintained alveolar ridge. He also concluded that, despite compromised bone anatomy, osseodensification preserved bone bulk and promoted a shorter waiting period to the restoration.

Contra Indications: Osseodensification does not work with cortical bone as cortical bone is a non-dynamic tissue which lacks plasticity. Densification of xenografts should be avoided because they behave biomechanically different than the bone tissue, as they have only inorganic content and they just provide the bulk without any viscoelasticity.

Discussion
Lahen B et al., in their study examined the effect of osseodensification on the primary stability and early osseointegration of implants. They concluded that drill design positively influence the osseointegration when utilised in both clockwise and counter clockwise directions is a result of densification of autologous bone debris at the bone walls.

Trisi P et al., in his animal study concluded that the osseodensification technique demonstrated the ability to enhance implant primary stability and maintained implant secondary stability, and increased the bone-volume percent around dental implants inserted in low density bone in respect with conventional implant drilling procedures.

Lopez CD et al., in their study assessed the biomechanical and histological effects of osseodensification surgical instrumentation in a spine
model animal study and concluded that this technique can potentially improve the safety and success rates of bony drilling at all sites of low bone density and limited bone volume.\(^8\)

**Conclusion**

With the introduction of densah burs, making osseodensification possible, not only reduces treatment time but, also gives a successful implant outcome. Osseodensification is a promising concept which creates an autograft layer of condensed bone at the periphery of the implant bed with the use of densah burs that rotate both in clockwise and counter-clockwise direction, thereby enhancing implant stability and success.

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**References**

Peek a Polymer Material Feasible for Dental Implant Body/Implant Fixture: A Systematic Review

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Abstract

Based on the available research on PEEK materials, to find that whether PEEK material has favourable properties and can enhance Osseointegration, so that they can be utilize as dental implant body/fixture.

Appropriate selection of the implant biomaterial is a key factor for long term success of implants. The biologic environment does not accept completely any material so to optimize biological performance, implants should be selected to reduce the negative biologic response while maintaining adequate function. This review makes an effort to summarize peek implant bio material.


Results: Initially, the search resulted in 106 papers out of which 19 articles were excluded due to irrelevant titles and abstracts. Independent screenings of the abstracts were done to identify the articles related to the question in focus Eighty Seven studies were selected out of which 31 articles were further excluded due to Articles and studies related to PEEK as implant abutments, or implant restoration were excluded. Finally, 21 articles were included in the review.

Keywords: PEEK, Osseo integration, Ceramics, Polymer.

Introduction

Dental implants are today a viable and mainstream alternative to the conventional removable and fixed dental prostheses. In line with the growth and mainstreaming of this treatment form, the science of biomaterials, specifically implant materials is also evolving rapidly.¹,²,³ Among various dental materials and their successful applications, a dental implant is a good example of the integrated system of science and technology involved in multiple disciplines including surface chemistry and physics, biomechanics from macro-scale to Nano scale manufacturing technologies, and surface engineering⁴,⁵.

Materials Used for Dental Implants: In the long history of dental implants, several materials have been tested such as metals, alloys, ceramics, polymer based materials, glasses, and carbon⁶,⁷,⁸, the characteristics required for the manufacturing of dental implants are biocompatibility, bio functionality, availability, together with the capacity to Osseo integrate, as defined in the previous paragraph. Availability refers to the handiness of the fabrication and sterilization techniques of the implants⁹.
Ancient Era (through AD 1000): Implants are traceable to ancient Egyptian and South American civilization. There is a skull form pre Columbian era in which artificial tooth is carved with dark stone. Albucasis de condue Arabian surgeon, credited with a written paper of transplants as a means of replacing missing teeth10.

Foundational period (1800-1910): This era is the beginning of End osseous oral implantology. Maggiolo in 1809 used gold in the shape of the tooth root. In 1887 Harris reported the use of teeth made of porcelain into which lead coated platinum posts were fitted. In 1890, Zamenski reported the implantation of teeth made of porcelain, gutta-percha, and rubber and in 1898 R.E payne places silver capsule in the tooth socket. In the early 1900’s lambotte fabricated implants of aluminium, silver, brass, red copper, magnesium, gold and soft steel plated with gold and nickel11.

Dawn of the modern era (1935-1978): In this era, synthetic polymers, ceramics and metal alloys started replacing the naturally derived materials because they have better performance and more predictable results than the natural ones.

Strock anchored a vitallium screw within bone and immediately mounted it with a porcelain crown. He was the first one to achieve an implant survival for 15 years11,12.

Types of Prosthetic Implant Biomaterials:
Materials used in dental implantology can be broadly categorized in two different ways13, 17

1. Based on the chemical composition of the material; and
2. Based on the biological response of the material.

From a chemical composition standpoint, the relevant materials may be classified as:

- **Metals** are elements that are crystalline when solid; many metals are characterized by opacity, ductility, conductivity, and a unique luster.
- **Ceramics** are hard, brittle, and heat and corrosion resistant materials made typically of metallic elements combined with oxygen or with carbon, nitrogen, or sulphur.
- **Polymers** are compounds of high molecular weight derived either by the addition of many smaller molecules or by the condensation of many smaller molecules with the elimination of water, alcohol, or the like. These materials are relatively inert to biodegradation and have certain properties that are similar to soft tissues.

From a biological response standpoint, the relevant materials may be classified as:

- **Bio tolerant** materials are those that are not necessarily rejected when implants are placed into living tissues but are surrounded by a fibrous layer in the form of a capsule.
- **Bioinert** materials allow apposition of bone on their surface leading to contact osteogenesis.
- **Bioactive** materials also allow the formation of new bone onto their surface but ion exchange with host tissues leads to the formation of a chemical bond, along with the interface (bonding osteogenesis). A recent development is the development of “biomimetic” materials, which are new tissue engineered materials designed to mimic specific biologic processes and help optimize the healing or regenerative responses of the host microenvironment. These materials can be any combination of the chemical and biodynamic activity categories, depending on the therapeutic strategy and the type of host tissues.12

This systematic review was undertaken to evaluate the experimental, animal, and clinical studies done on PEEK materials to find that whether PEEK material has favourable properties and can enhance osseo integration, so that they can be used for dental implants.

Eligibility Criteria:

Types of Studies: The review included laboratory research studies, in vitro studies that using cells from human or animals and in vivo studies on animals. Studies published on English language between 2014 and 2019 with various evaluation method for osseo integration and osteoblasts proliferation. Letters, reviews and abstracts were excluded.

Study selection

Inclusion criteria for the selection were:

- Articles included related to PEEK materials and their applications in dental implants as implant body/implant fixture.
- All clinical, experimental, and animal studies and were included in the review.
Exclusion criteria for the selection were:

- Articles not related to PEEK and their applications in implants were excluded.
- Articles and studies related to PEEK as Implant abutments, or implant restoration were excluded.
- Articles not available in abstract form.

Discussion

PEEK is a high performance semi-crystalline thermoplastic polymer, which combines its very good strength and stiffness with an outstanding thermal and chemical resistance—e.g., against oils and acids. Being colourless and endowed with an elastic modulus close to that of the bone, PEEK is a viable option for dental implant manufacturing. However, PEEK alone is generally bio inert and is not conductive to cell adhesion\(^{13}\). Ti is the main material for use in dental implants. During mastication there may be overloading of the jaw bone because of remarkable difference in the modulus of elasticity of bone (≈1-30 GPa) and Ti (110 GPa), which causes major problem to the associated implants. In such situation, PEEK (elastic modulus 3-4 GPa) can be contemplate extremely encouraging because of their aesthetic and functional properties. When compared to Ti, PEEK possessed compound structure, which allows optimizing the dispensation of masticatory forces surrounding the implant\(^{14,15}\).

PEEK has been applied as an implant material in the implant body, abutment, and superstructure. Applications in the implant body have been limited to bench tests, and there is no report on its application to the mandible as the implant body. Lee et al. reported, if PEEK is used as a dental implant body, it may exhibit lower stress shielding than Ti due to the closer compatibility of the mechanical properties of PEEK and bone\(^{16,17}\).

Rust-Dawicki et al. compared the in vivo mechanical strength of the bone interface of titanium-coated and uncoated PEEK dental implants. There was no significant difference in bone contact or new bone growth between 4 and 8 weeks in the two groups. At 4 and 8 weeks, the coated specimens had significantly higher percentages of bone contact\(^{18}\).

Xu et al. developed CFR-PEEK-Nano hydroxyapatite with micro-/Nano-topographical structures by modifying them with oxygen plasma and sandblasting the surface. The aim was to enhance osteogenesis as a potential bioactive material for bone grafting and bone tissue engineering applications with enhanced biocompatibility and osseointegration\(^{19,20,21}\).

According to Sano H et al. and Sandler J et al. the tensile properties of PEEK are also analogous to that of bone, enamel, and dentin. Thus, this material can exhibit less stress shielding effect compared to titanium, and it can be considered as a good substitute material\(^{22}\).

Kurtz et al. For example, incorporation of carbon fibres to increase the elastic modulus up to 18 GPa and thus the elasticity of this material might reduce the distal torque and the stress on the abutment teeth. When reinforced with fibre, PEEK can reduce stress shielding when compared with traditional metallic implants\(^{23,24}\).

Guyer et al. reported PEEK implants appear to be limited in Osseo integration potential because of the fibrous soft tissue forming along the implant-bone interface\(^{25}\).

Results showed that in vitro initial cell adhesion and proliferation on the Nano-FHA reinforced PEEK composite were improved. In addition, higher alkaline phosphatase activity and cell mineralization were also detected in cells cultured on PEEK/Nano-FHA bio composites, especially for rough PEEK/Nano-FHA surfaces. For in vivo test, the newly formed bone volume of PEEK/Nano-FHA group was higher than that of bare PEEK group based on 3D micro computed tomography and 2D histomorphometric analysis\(^{26,28,29}\).

Johansson et al. reported a significant improvement of early bone integration for PEEK implants coated with Nano sized HA. The results may be of clinical interest for early loading applications, but further studies are required to statistically verify the results and to improve the extended effect of the coating. The finding of a BIC advantage for HA-coated PEEK was similar to this study, which also showed a significantly higher BA for HA-coated PEEK after 3 weeks\(^{30,31,32}\).

A special effect of n-TiO\(_2\) on the composite surface was also observed. Bioactivity evaluation of the Nano composites revealed that pseudopods of osteoblasts preferred to anchor at areas where n-TiO\(_2\) presented at the surface. This study also showed that the surface roughness of n-TiO\(_2\)/PEEK composites played a prominent role in promoting cell attachment and regeneration of new bones. Our study suggests that n-TiO\(_2\)/PEEK composites utilize the attractive bioactivity of n-TiO\(_2\) as well as the outstanding mechanical properties of PEEK, and could
be a potential substitute for metal implant material in orthopaedic and dental applications.

Bioactivity evaluation of the Nano composites revealed that pseudopods of osteoblasts preferred to anchor at areas where n-TiO$_2$ was present on the surface. In in vivo studies, the bone volume value of n-TiO$_2$/PEEK was approximately twice as large as that of PEEK ($P < 0.05$). Vivid three-dimensional and histologic images of the newly generated bone on the implants further supported our test results. The main limitation is Very limited clinical trials have been done using PEEK as dental implant.

**Conclusion**

Surface modification of PEEK seems to enhance the cell adhesion, proliferation, biocompatibility, and osteogenic properties of PEEK implant materials. PEEK had also influence the biofilms structure and reduces the chances of peri implant inflammation. Very limited clinical trials have been done using PEEK as dental implant, so it is too early to conclude that PEEK can replace Ti implants in future. Although PEEK and its derived are currently being evaluated in vivo and in vitro, further investigations and definitive clinical evidence on their safety are necessary. Since the Osseo integration of PEEK and its derived are not always a straightforward biological process, experimental modulations of the surface are mandatory to achieve the highest possible grade of Osseo integration. Further research and more number of controlled clinical trials on PEEK implant is required in near future long-term studies in animal models will be pursued to evaluate in vivo effects.

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**References**

and the resulting enhanced biological properties. Biomaterials 31:3465–3470


The Effect of Using the McCarthy and Merle Instructional Models on Some Physical Abilities and Skills in Basketball and Football

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Abstract

The research included the introduction, the importance of the research and the aim of the research to

1. Preparation and implementation of special educational units using the McCarthy and Merle model in improving some physical abilities and offensive skills of basketball and football.

2. Recognize the effect of using the McCarthy and Merle models in some physical abilities and offensive skills in basketball and football.

The sample was chosen by the deliberate method of students of the Faculty of Physical Education and Sports Sciences University of Mustansiriyah for the academic year 2018-2019, the number of (58) students and the sample was divided into two experimental groups. The first experimental group uses (McCarthy model) and the second experimental group uses (Merle model) And conduct the application of the implementation of the model McCarthy and Merle and applied educational units and the number (6) educational units for each mathematical Valley and then conduct the tests after.

The most important conclusions is the effectiveness of educational units prepared by researchers using the models McCarthy and Merle in some physical abilities and offensive skills of basketball and football.

Keywords: McCarthy, Merle instructional models and physical abilities.

Introduction

In light of the great scientific and cognitive advancement in the fields of life, information is now being published at the time of its birth. In this scene, all teachers should take advantage of this reality to advance the educational process at all levels of its educational institutions has become obligatory for the teacher of physical education in various stages of study from kindergarten to university care and development towards the correct performance of sports skills as much as given to take care of the level of achievement and development and use Modern method and learning models based on the basic learning theories, is still the dominant characteristic of teaching and up to the present time is the use of teachers to method and method of teaching based on memorizing the matter and memorization of scientific material and The process, which is poor pre-planning of the method used in the teaching of a particular concept by the teacher, which makes teaching follow a similar pattern in most lessons intended to provide students with the largest amount of information and concepts, at the same time shows the lack of interest in linking them in a way that creates a state of integration and balance Among them in the structure of the learner and therefore these concepts and ideas remain dispersed in the minds of students and his exposure to forgetfulness as well as misunderstanding them.
The view of the teacher as a suitable teaching environment that achieves good learning is that the teaching model is a mini-embodiment of a field of teaching to produce a quantity of outputs. The model includes relationships between the collection of elements in the form of steps and classroom practices and is based on theories. Many modern teaching models have been designed in the developed world because of their impact on the capabilities of the human mind. Organized efforts have begun to teach and employ these models of designing programs that meet the learner’s needs and seek to correlate between educational attitudes, characteristics, needs, and abilities. Each learner, and through technological development in general, and technology of teaching and learning in particular has become the pairing of technology and educational models a necessity for learners and practitioners of all educational processes at all stages of university education to raise the level of efficiency of the process and products. 2

This model in the McCarthy educational model. This model in the quartet learning cycle is continuous with some constant, that all students should be taught in accordance with the patterns of this model and that it fits all stages of education and model (Merle) educational, which was presented as a result of their great effort and built on basic assumptions Subject to testing and application within the classroom or outside the classroom and found that the goal of teaching is to help students to collect positive examples of the concept and respond to it by symbol or reference or name, and that the acquisition of concepts is to classify the characteristics of the concept and attributes in the same way that the tide Through the introduction of the definition and then provide evidence until the learner conduct taxonomic behavior. 3

Research Objectives:
1. Preparation and implementation of special educational units using the McCarthy and Merle model in improving some physical abilities and offensive skills of basketball and football.
2. Recognize the impact of the use of typical McCarthy and Merle in some physical abilities and offensive skills of basketball and football.
3. Identify which model is best at improving some physical abilities and learn offensive skills in basketball and football.

Research methodology and field procedures:

Research Methodology: Use the experimental method: The sample was (122) male and female students and distributed to (5) people. The sample was chosen in a deliberate way (58) students from the original community. The sample was divided into two experimental groups, the first experimental group (29) using (McCarthy model) Division (b) and the second experimental group (29) using (Merle model) Division (c) by lot and thus the sample formed 47.54% The skills of basketball and football take the first stage Second to the homogeneity of some variables (length, weight, age) as shown in table (1).

Table 1:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>175.10</td>
<td>5.40</td>
<td>175</td>
<td>0.30</td>
</tr>
<tr>
<td>The Weight</td>
<td>69.91</td>
<td>6.01</td>
<td>70.01</td>
<td>0.21</td>
</tr>
<tr>
<td>Age</td>
<td>19.22</td>
<td>1.02</td>
<td>19</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Table (1) shows that the sample is homogeneous and distributed naturally because the torsion coefficient is confined between (±3).

Research tools and equipment: (Tape measure, Medical balance, People, Stopwatch, Basket balls, Footballs, Basketball, Stadium, Football goal, chalk, Whistle, laptop, Electronic, Calculator, Adhesive tape with different colors and Medical balls).

Tests used for research:
1. Test explosive power of the arms (throwing the medical ball on the chair/distance): 4
   Purpose of the test: to measure the explosive power of the arms
2. Test the characteristic power of the speed of the legs (bend knees and extend them in 10 seconds). 5
   Purpose of the test: to measure the characteristic power at the speed of the two men
3. Thoracic Passing Test (Accuracy of Goal Scoring/Score). 5
   The purpose of the test/measure the accuracy of the scroll (passing of the bra).
4. The test of loop shoot scoring (Measuring loop shoot scoring/Sec.). 5
   Purpose of the test: Measuring loop shoot scoring.
5. Passing test: the test and the hand-bounced on the wall for 20 seconds. Purpose of the test: Know the measurement of passing accuracy.

6. Test quench ball inside the box measurements (2 m × 2 m). Purpose of the test: To measure the accuracy of stopping the ball in all parts of the body accept the arms.

Pretests: The researchers conducted the pretests in the sports hall of the Faculty of Physical Education and Sports Sciences, Mustansiriyah University, The physical tests and football tests were conducted on 13/11/2018 and then the basketball tests were conducted on 14/11/2018.

Application of educational units: Before launching the modules, the researchers conducted two modules introducing the modules in the McCarthy and Merle models. The researchers then applied the proposed modules in the first experimental group.

1. Notes: (Interpretation): Where educational method are used to help the process of learning a skill such as passing bra basketball and then processing.
2. Thinking (Expansion) After perception the student works on making decisions and prefers the simulation system to learn directly
3. Active experimentation (applied. Presentation) Conduct applied exercises or exercises similar to playing for the learner’s skills while trying to learn another skill such as scoring and then.


The second experimental group works with the Merle model and works according to the steps.

1. The principle of activation: It is the presentation of general information about the skill and explain and take out a model and ask questions.
2. Principle of evaluation: Here is the introduction of the student in the preparation of public and private, provided and physical exercises collectively.
3. Principle of application: The exercises are explained in the form of stations and the application of each station and the teacher observing their application.
4. The Principle of Integration: Here students are discussed about the contents of the unit of instruction skill.

The educational modules which lasted (5 weeks) were carried out by two units per week and each chest passing skill with physical variables under study (2 units.) With physical variables and skills are applied by college curriculum. Where the units are implemented on 18/11/2018 and completion of the implementation of 25/12/2018 according to the time allocated to the skill by the teacher of the subject.

Posttests: It was conducted on 26-27/12/2018, for physical and basketball and foot skills.

Statistical means: The statistical bag (SPSS) was used to process the search results.

Results and Discussions

Table 2: Shows the arithmetic and standard deviations of the pre and posttests of physical variables, basketball and football offensive skills, calculated (t) value, error rate and significance for the two research groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
<th>(t) Value</th>
<th>Significance Value</th>
<th>Type of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive power</td>
<td>First experimental</td>
<td>4.33</td>
<td>0.779</td>
<td>6.22</td>
<td>0.55</td>
<td>8.99</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>Second experimental</td>
<td>4.05</td>
<td>0.895</td>
<td>5.48</td>
<td>0.73</td>
<td>3.98</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td>Power characteristic of speed</td>
<td>Second experimental</td>
<td>7.01</td>
<td>1.300</td>
<td>12.38</td>
<td>1.70</td>
<td>19.90</td>
<td>0.001</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>First experimental</td>
<td>7.00</td>
<td>1.270</td>
<td>11.31</td>
<td>1.021</td>
<td>23.01</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td>Chest passing</td>
<td>Second experimental</td>
<td>18.8</td>
<td>1.36</td>
<td>22.7</td>
<td>1.30</td>
<td>5.65</td>
<td>0.001</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>First experimental</td>
<td>20.0</td>
<td>1.48</td>
<td>19.0</td>
<td>1.65</td>
<td>4.89</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td>Loop shoot</td>
<td>Second experimental</td>
<td>9.55</td>
<td>1.9</td>
<td>9.10</td>
<td>0.69</td>
<td>3.10</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>First experimental</td>
<td>10.60</td>
<td>1.05</td>
<td>10.20</td>
<td>0.50</td>
<td>4.11</td>
<td>0.001</td>
<td>Sig.</td>
</tr>
</tbody>
</table>
From table (2) the application of the four steps model McCarthy educational model that helped students to improve physical variables and offensive skills basketball and football and contributed to the two models in the impulse and motivation of learners to participate in harmony in classroom attitudes This gave them enough space to think about the intrinsic features inherent between the examples belonging to the concept of skill and the non-belonging examples common mistakes, and the awareness of the relationships among them, and strengthened the learners a sense of confidence and the ability to conclude, and to be a productive learning effective, and this is confirmed by the educational literature To provide students with the opportunity to rely on themselves to know the common characteristics of exercises and examples belonging to the concept of skill, and examples not belonging to the skill and make them a focus of the learning process in contrast to the traditional method based on the teacher’s.

The McCarthy model is a learning that has a better sense of retention than any other learning.

The introduction of activities and exercises for the use of concepts and the active participation of learners in these exercises led to the enhancement of the concept and its application and use in new educational situations later. As well as the correction of errors during the performance feedback in the McCarthy model and informing learners of the correct performance or the correct answer to the activities and skills they have contributed to increase the effectiveness of learning and raise the adequacy of the students of the first experimental group, and agrees with the views of (Bruner) who emphasizes that the learner must repeat Organize the concepts or information of the content to be learned and integrate it with what has already been learned in its mental structure and then have a new organizational structure that reveals something by doing activities and activities that further consolidate.

The application of units came regularly and tidy according to the gradient from easy to difficult and part to all and thus works with the cooperation of learners where the application of exercises given during the units came with the capabilities of learners, which were given in the form of cooperative groups and the transition from one exercise to another based on the performance of the previous exercise This is part of the requirements of the model that the McCarthy model works on the opportunity to learn within different groups and this develops the spirit of cooperation and teamwork skills.

The student moves in this from active experimentation to sensory experiences and blends the learner’s understanding with his individual experiences and works to apply them in practice, (develops previous
experiences and information and updates this information in a modern way, and uses ideas in multiple forms to allow students to discover the meanings and concepts of teamwork and apply them). The teaching method of McCarthy model works to raise the level of effective lesson planning from the planning, implementation and evaluation by the teacher according to the model steps (the presence of the method or method is an excellent area for planning and teaching active and effective methodological materials).  

The teaching according to McCarthy model, which works to increase the motivation for learning among learners and the different motivation among them, which led to their rush to learn the skills of basketball and football self and in cooperation with the group and it works on the spirit of cooperation and collective solidarity between the same group to work in a cooperative spirit in order to reach the goal Please with all enthusiasm and optimism and excellent morale and get rid of the monotony and the traditional constrained context of kinetic performance so that the teaching method McCarthy model works on the participation of learners in order to reach a good performance and work on the carrot and attract the attention of the You know to learn through the educational process (the educational model that allowed the appropriate educational environment and allow the learner the opportunity to self-learning and to activate the cycle in the learning process).  

By interpreting the results, the researchers demonstrate the effectiveness of McCarthy’s model in improving some of the physical abilities and offensive skills of basketball and football applied to students who sought to help learners, as well as the application that motivated and motivated students to encourage a spirit of cooperation and understanding between them and the teacher.  

Conclusions

1. Effectiveness of McCarthy and Merle model to improve some physical abilities and offensive skills of basketball and football.

2. The effectiveness of educational units prepared by researchers using the models McCarthy and Merle in some physical abilities and offensive skills of basketball and football.

3. Demonstrated that the use of teaching method McCarthy model has a role in learning some physical abilities (explosive power of the arms, the power characteristic speed of the two men) and basketball offensive skills (chest passing and loop shoot scoring) and skills (suppression, passing) football.

4. The second experimental group improved the Merle model in some physical abilities and offensive skills of basketball and football.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

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Objective Evaluation of Shooting Skill Performance According to the Interim Objectives for the Junior Players in Handball

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¹Assist Prof., ²Prof. Dr. University of Diyala, Iraq

Abstract

Shooting skill is considered as the separating point between loss and winning. In addition, the offensive playing planning and skills, in all its types, will be useless if they are not ended and crowned with successful shooting on goal. What’s more, the sports educators agree on the idea saying that the practice of sports, in whatever their levels may be, needs clear objectives with specified specifications.

In order evaluate the training curricula, on the basis of what has been mentioned issues and based on the great significance and the relationship between evaluation and objectives; the two researchers objectively used the interim objectives in evaluating the shooting skill without the interference of the handball trainers subjectivity.

The objective of the study are setting interim objectives for the junior players in the performance of the shooting skill in handball and using interim objectives objectively, evaluating the junior player’s performance of shooting skill in handball.

The sample of the study were selected from the handball junior players. They were (20) players.

The study has come up with the following results, the mean of the previous test was (18.2), and whereas the mean of the first interim test was (20.7).The mean of the second interim test was (23.3). While the mean of the posttest was (26.1)

Keywords: Objective evaluation, shooting in handball and interim objectives.

Introduction

Evaluation is a process that includes giving judgments on the values of things, persons and objects in order to improve, modify and develop them. The duty of evaluation includes: programmers, curricula and method of teaching and training and the issues related to teaching and training the motor skills and in all games and sports activities.

The basic skills in handball are considered as the basic substrate of the game. One of the most important of these skills is shooting skill. The team whose players perform this skill well has the capacity to defeat the opponent team. Shooting skill is also considered as the separating point between loss and winning. In addition, the offensive playing planning and skills, in all its types, will be useless if they are not ended and crowned with successful shooting on goal.¹

Therefore, the trainers spend long time in training the shooting skill to make the players master it. The successful trainer or teacher always seeks implementing processes of assessment and evaluation in order to get knowledge of the play’s or the learner’s level of progress; and also to know the impact of training or teaching on that level. Each programmer, whether training or teaching, has specific objective and assessment and evaluation are those tools that both achieve the objective.

The sports educators agree on the idea saying that the practice of sports, in whatever their levels may be, needs clear objectives with specified specifications. In other words, all the processes of teaching, training and competing are in need of objectives because practice without objective is like moving one objects in the space without the power of gravity, then no one knows the starting point nor the horizon of end. Therefore, building objectives has wide range of space in the processes
of teaching and training, then achieving superiority, reaching the achievement and the best performance setting out from the idea that the objective is the final behavior that can be noticed and assessed and predicted that the learner can do after undergoing the educational situation.2

To evaluate the training curricula, on the basis of what has been mentioned issues and based on the great significance and the relationship between evaluation and objectives; the two researchers objectively used the interim objectives in evaluating the shooting skill without the interference of the handball trainer’s subjectivity.

By the following up of the two researchers, their experiences as handball players and trainers and their conversations with some handball trainers and players, There are two questions have grown up in the researchers.

How do the handball trainers evaluate the shooting skill performance of their junior players?

Do the handball trainers use interim tests to know the level reached by the players in the shooting skill?

Objectives of the study:

1. Setting interim objectives for the junior players in the performance of the shooting skill in handball.
2. Using interim objectives objectively to evaluate the junior player’s performance of shooting skill in handball.

Methodology

Method followed and study sample: Choosing the method of study is one of the important issues in implementing the procedures of the study. It is the problem of the study that specifies the type of method used in achieving solution and treatment to the problem. Thus, the two researchers used the descriptive method with the scanning style, for its suitability to the nature of the problem and aims of the study.

Whereas the sample is “ the part that represents the community of the study or the model on which the researcher do most of his work. That sample should be characterized by a main condition that is the capability of generalizing its results on the original group from which it has been selected.” Thus, the sample of the study were represented by the handball junior players of the specialized school. They were (20) players.

Means of collecting information:

- Arabic and foreign resources.
- Internet.
- Notice.
- Personal interviews made with some experts and specialists.
- The form of identifying the interim objectives (Houdale Stone 1993).
- Data inserting form.

Devices and Tools used in the Study:

- Two electronic timers (Sewan) made in Germany.
- Chinese (hp) laptop computer.
- Two Japanese (Sony) digital cameras.
- Two (NIKE) whistles.
- Ten standard hand balls.
- Standard handball court.

Method of specifying the interim objectives: In order to specify the interim objective of each player, it should implement the following:

1. Do three attempts of the test.
2. The mean of the three attempts should be counted.
3. The mean should be subtracted from best record the player did.
4. The result in step three should be added to the best record done by the player and the resulting number should be considered as the medium range.
5. The result in step three should be added to the medium range to achieve the targeted range either future interim objective on which the player should work to achieve.


Tools Used: Handball, handball goal drawn on the wall (3 × 2) m and then divided into nine rectangles to measure the accuracy of shooting and draw a line on the ground (9) m away from the goal as in Figure (1).

Performance Method: The player is shooting from behind the line step by step, taking into account the following:
A- Shooting of the rectangles (9, 7, 3, 1), which represent the angles of the goal, which dimensions (100 × 60) cm get four degrees.

B- Shooting rectangles (8, 2), which represents the area above the head of the goalkeeper and between his feet, which dimensions (100 × 60) cm receive three degrees.

C- Shooting rectangles (6, 4), which represents the extent of the arms of the goalkeeper, which dimensions (100 × 80) cm obtain two degrees.

D- Shooting rectangle (5) represents the area of the chest and the trunk of the goalkeeper, which dimensions (100 × 80) cm obtain one degree.

E- If the ball goes out the player gets zero.

F- Each player performs ten shoots for one attempt only.

**Fig. (1): Shooting skill test**

**The application of tests:** The researchers applied the skill test correction in the closed hall of the club of Diyala/Iraq as follows:

1. Pre-test at the beginning of the experiment on 1-9-2019
2. First interim test two weeks after the start of the experiment on 15-9-2019
3. Second interim test two weeks after the first progress test on 29-9-2019
4. After the test after two weeks of the second interim test on 13-10-2019.

**Statistical means:** The researchers used the following statistical method:

- Analysis of variance 2-L.S.D Test

**Results and Discussions**

**Table (1): Shows the results of some descriptive statistical treatments for handball aiming skills for the interim goals**

<table>
<thead>
<tr>
<th>Stages</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Skewness</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>18.2</td>
<td>2.21</td>
<td>22</td>
<td>15</td>
<td>.333</td>
<td>0.512</td>
</tr>
<tr>
<td>1st Stage</td>
<td>20.7</td>
<td>2.17</td>
<td>25</td>
<td>18</td>
<td>.462</td>
<td>0.512</td>
</tr>
<tr>
<td>2nd Stage</td>
<td>23.3</td>
<td>2.17</td>
<td>28</td>
<td>20</td>
<td>.657</td>
<td>0.512</td>
</tr>
<tr>
<td>Post-test</td>
<td>26.1</td>
<td>2.57</td>
<td>30</td>
<td>22</td>
<td>.104</td>
<td>0.512</td>
</tr>
</tbody>
</table>
Table (2): Shows the results of the analysis of variance and the value of (f) for the pre- inter and post-tests of handball

<table>
<thead>
<tr>
<th>Error%</th>
<th>(f) Value</th>
<th>Degrees of Freedom</th>
<th>Mean of Squares</th>
<th>Sum of Squares</th>
<th>Difference Source</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>44.223</td>
<td>3</td>
<td>229.813</td>
<td>689.438</td>
<td>Between sets</td>
<td>Aiming with Handball</td>
</tr>
<tr>
<td></td>
<td></td>
<td>76</td>
<td>5.197</td>
<td>394.950</td>
<td>Inside sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>79</td>
<td>1084.388</td>
<td></td>
<td>Sum</td>
<td></td>
</tr>
</tbody>
</table>

Table (3): Shows the results of (L.S.D.) test for the pre-, inter-, and post-tests of hand-shooting

<table>
<thead>
<tr>
<th>Statistical Significance</th>
<th>Error%</th>
<th>L.S.D. Value</th>
<th>Difference Between Arithmetic Mean between the Two Tests</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moral in for the first interim test</td>
<td>0.001</td>
<td>1.43</td>
<td>-2.55</td>
<td>Pretest- 1st stage</td>
</tr>
<tr>
<td>Moral in for the second interim test</td>
<td>0.000</td>
<td></td>
<td>-5.1</td>
<td>Pretest- 2nd stage</td>
</tr>
<tr>
<td>Moral in for the post test</td>
<td>0.000</td>
<td></td>
<td>-7.9</td>
<td>Pretest- post-test</td>
</tr>
<tr>
<td>Moral in for the second interim test</td>
<td>0.001</td>
<td></td>
<td>-2.55</td>
<td>1st stage-2nd stage</td>
</tr>
<tr>
<td>Moral in for the post test</td>
<td>0.000</td>
<td></td>
<td>-5.35</td>
<td>1st stage- post test</td>
</tr>
<tr>
<td>Moral in for the post test</td>
<td>0.000</td>
<td></td>
<td>-2.80</td>
<td>2nd stage- post-test</td>
</tr>
</tbody>
</table>

Discussions

It is clear from the tables (1) (2) and (3) that the results show that the post-test has surpassed the results of the first and second preliminary tests in the skill of handball correction and these results coincide with the great importance of the role of the interim goals that were applied to the sample. During the interim goals form, which includes some statistical steps that give the player an indication of the next goal to be achieved and this gives us a clear impression and perception on the subject of goals in sports as the topic of the interim goals is one of the most important topics has been addressed by researchers and scientists of its importance and reached through the results. According to scientists, the concept of goal is to achieve a special level of progress in the performance of a work and is usually determined within a special time. Goal Setting is also one of the most important guidance and guidance that the athlete should pay attention to. A goal is intended to achieve a certain level of progress or mastery in a work within a specified period of time, the goal focuses on achieving a certain level of performance or record a certain number in a race and this progress or improvement will be within a specific time unit. For a period of one to three months or after (20) units of education or training or during a period that may reach two years. The role and importance of setting goals in sports reinforced the conviction of many sports workers, whether they are trainers or teachers, who are always looking for ways and mechanisms to help them succeed in their educational or training tasks away from traditional patterns that are not linked to the aspects of education and training psychological factors. Among them the motivation therefore put a number of benefits achieved by the process of setting goals during sports practice, namely:

- Improve performance and quality of practice.
- Clarify expectations.
- Help to get rid of boredom to make education and training more challenging.
- Increase self-motivation.
- Develop a sense of pride, satisfaction and self-confidence.

The researchers, through their presence and proximity to the research sample when applying the interim goals, have noticed that the members of the sample were experiencing moments of enthusiasm and impulsivity when they are conducting the interim tests and were asking those on the tests to know the percentages of their development and what is required to achieve in the next tests so we can say with great confidence that the impact of interim tests on the motivation of the players was very large and this is proved by the results of the dimension, and the motivation and its role and its impact on learning and training that the motivation function includes three dimensions:

1. Liberate the emotional energy inherent in the organism that provokes a particular activity or this
applies to the theoretical motives of the process of acquiring skills and modification of patterns of behavior.

2. Dictates that individuals respond to a particular situation with neglect of other situations as dictated by the way to act.

3. Directing the behavior of a particular destination
   This is linked to the two previous functions, it is not enough that the organism is active but must direct a specific destination.

Conclusions

1. Results of the post-test are superior to the results of the first and second pretest and interim tests.

2. Effectiveness of developing the objective method in the objective way used by the researchers in developing the skill of correction

3. The level of performance of the players in the correction skill escalated from one test to another.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq.

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

References


Significance of Differences in the Performance Momentum Power of Arms, Legs, and the Accuracy of Shooting in Handball According to Normal Weight Categories for Junior Players

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Abstract

Basic skills are considered to be the first basis in handball. One of the most important basic skills is shooting skill. Therefore, it should be trained on and mastered to let the team guarantee ending attacks successfully. The variable of momentum power is in the first rank in the order of the physical capacities in handball. Coaches are well aware of the idea of developing the skillful performance is related to developing physical capacities especially momentum power. The weight of the player is considered as one of the most important physical measures that affects sports performance. The increase of mass of the body (weight) of the player is regarded as one of the muscles capacity obstacles because it is an overload burden (resistance) to both power, speed and performance in the sports activities field that require conducting fast and strong movements as happens in in handball. The problem of the study lies in our ignorance to the role of normal weight and weight categories that are far from it; whether increase or decrease in the performance of momentum power of (arms and legs) and the accuracy of shooting of Junior handball players. Whereas the aims of the study were:

• Knowing the performance level of momentum power (arms and legs) and the shooting accuracy for junior handball players.

• Knowing the differences in the performance of momentum power (arms and legs) and the accuracy of shooting for the junior handball players according to their classification into particular weight categories.

While the sample of the study was represented by (20) junior handball players in the province of Diyala.

The study came up with the following results:

• There is no incorporeal significance differences between the two categories of the weight in the arms and legs momentum power and shooting accuracy.

• The increase found between the two categories of weight compared to the normal weight wasn’t great, but it was normal and within the requirements of handball game.

Keywords: Significance, differences, momentum power and shooting accuracy.

Introduction

The basic skills are considered as the basis in handball. It is also considered as the basic factor to achieve winning in matches. They have a main part in training. Coaches spend long time to get them achieved. One of the most important of these skills is shooting. Therefore, it should be trained on and mastered to let the team guarantee the successful end of the attacks. If a team failed to score a goal, this means that all the teams’ efforts, of helping the player to be in the shooting position, went in vain. In addition to losing the ball and the change of the team from offensive to defensive position. This may be negatively reflected on the spirits
of the players and their performance. Which, eventually, leads the team to lose the match.\(^1\)

The variable of momentum power has the first rank in the order of the physical capacities in handball. Coaches fully understand that the performance skillful improvement is related to developing physical capacity, especially momentum power, because it has a great and principal role in strengthening parts of the body and growing groups of muscles that have principal role in the speed of playing. Because handball player needs the most of his power in the shortest period of time. Thus he will have the ability to shoot powerfully, quickly and jump highly. While in the position of weakness, the player will not be able to master shooting skill, jumping passing to the colleague. League passing to the weakness, the player will not be able to master shooting needs the most skillful performance, because it is the basic factors in developing performance.\(^2\)

Body measurements are considered as the most important specifications of practicing sports activities; because they contribute to perform various basic skills and physical abilities in handball. Player’s weight is one of the most effective variables in sports performance because the increase in the weight of the player is considered as one of the muscles capacity obstacles because it will be additional burden (resistance) on power, speed and performance in the sports activities field that demands conducting quick and powerful movements as it often happens in handball (height and weight (often plays important roles in the success of performing some sports games and activities that are practice days important roles in the such. In this study, the researcher wants to recognize the role of weight of the handball players in performing momentum power and the accuracy of shooting. In that, players are divided in weight category according to whether they are near or far from the normal weight within agreed percentage and depending on the ideal weight and according to the statistical equation for this purpose and here lies the importance of the study, Weight is considered as the most body measurements used in the scientific studies. Thus it is possible that it can be beneficial as one of the physical growth measurement. It is scientifically proved that there is a link between weight and the performance of physical skill and abilities. In some sports activities, increasing in weight is something demanded, while it is considered as an obstacle. g demanded, while it is considered as element. It is scientifically proved that there is a link between and here lies the importance of

the study red as one of the muscles capacity orbs be considered as a valid reference of fatigue.\(^3\)

It is important to know the difference between the ideal weight and the normal weight. The first one is what the individual should, accurately, be it should be in accordance with the height. While the latter is a peek to the specified deviation, the increase or decrease in particular percentage Depending on such percentage, weights of the players are classified into particular weight categories. The problem of the study lies in the idea that we do not know the role of the normal weight and the weight Categories that are far away from it, whether increase or decrease in the performance of the momentum power and the accuracy of shooting for the Junior handball players.

**Objectives of the Study:**

1. Knowing the performance level of momentum power (arms and legs) and the shooting accuracy for junior handball players.

2. Knowing the differences in the performance of momentum power (arms and legs) and the accuracy of shooting for the Junior handball players according to their classification into particular weight categories

**Method of the Study:** Choosing the method of study is one of the important issues in implementing the procedures of the study. Thus, the researcher used the descriptive method of the scanning style, for its suitability to the nature of the problem and aims of the study. While the sample of the study was represented by the junior players of the specialized school in the province of Diyala in handball. They were (20) players.

**Tools and Means used in the study to collect information:**

- Arabic and foreign resources.
- Data processing form.
- Chinese laptop (hp).
- Handball.
- Standard handball court.
- Medical weight scale.
- Measurement ribbon.

**Tests of the Study:**

First, Momentum power test for the arms (pushing medical ball with three Kg weight).\(^4\)
Name of the test. Pushing the medical ball with three Kg weight from the standing position.

**Aim of the test:** Measuring the momentum power of the arms.

Description of the performance. The tested stands behind the first line, pushes the ball forward as strong and fast as he can (momentum power of arms).

Account the score. Each tested is given two attempts, the best of which is recorded the distance is counted by meter

**Second,** Testing the momentum power of the legs (wide leap from stable position):\(^5\)

Aim of the test measuring the momentum power of the legs.

**Tools:** Measurement ribbon, chalk, level floor in order not to let the tested slip. Drawing a line on the floor (start line).

**Method of performance:** The tested stands behind the start line with his legs slightly opened swings the two arms forward backward and backwards, with arched knees to the middle, the trunk should be put forward until he reaches the starting position of swimming. From this position, arms should be swing forward powerfully with stretching legs as the stretching of the trunk. Pushing the floor with the feet powerfully in an attempt of jumping forward as further as he could.

**Measurement:** The distance of the leap is measured from the starting line-up or without touching the floor. The tested is give two attempts the best of which is recorded.

**Third,** Shooting skill tests:\(^6\)

Objective of the test: Measuring the accuracy of Shooting.

**Tools used:** Handball, handball goal drawn on the wall (3 × 2) m and then divided into nine rectangles to measure the accuracy of shooting and draw a line on the ground (9) m away from the goal as in Figure (1).

**Performance method:** The player is shooting from behind the line step by step, taking into account the following:

G- Shooting of the rectangles (9, 7, 3, 1), which represent the angles of the goal, which dimensions (100 × 60) cm get four degrees.

H- Shooting rectangles (8, 2), which represents the area above the head of the goalkeeper and between his feet, which dimensions (100 × 60) cm receive three degrees.

I- Shooting rectangles (6, 4), which represents the extent of the arms of the goalkeeper, which dimensions (100 × 80) cm obtain two degrees.

J- Shooting rectangle (5) represents the area of the chest and the trunk of the goalkeeper, which dimensions (100 × 80) cm obtain one degree.

K- If the ball goes out the player gets zero.

L- Each player performs ten shoots for one attempt only.

**Fourth,** body measurement for the individuals of the sample:\(^7\)

- **Age:** Age data were collected by the direct interview between the researchers and the sample of the study (question and answer) data were recorded in a special form.

- **Height:** The height of all the individuals of sample, who are (20) players, was measured with a metal ribbon fixed on the wall and it’s pointed by the ruler and the player should bare footed. This is so, because we need to measure the height accurately and record it in a special from.

- **Weight:** The weight of the players was measured by an electronic scale. The normal weight of sample players bodies were specified by using the following equation:\(^8\)

\[
\text{The normal weight} = \text{the actual weight – the ideal weight/the ideal weight } \times 100
\]

Using this equation, the percentage mean of increase and decrease was concluded, the percentage was (20-30\%) as an increase or decrease from the normal level. While the normal weight was specified in the percentage of (10\%). The normal weight of all the individuals of sample was concluded according to the following steps:

1. Concluding the ideal weight of each player from special standard table, by which the ideal weight of each player is concluded. This table includes three variables (age, weight and height). In that, each height has an ideal weight in front of it starting from (150) cm and ending in (188) cm. Knowing that this table is for the ages (24) and under.
2. The height and the weight of all the individuals of sample were measured and the equation of the ideal weight was applied using the standard table of the ideal weights.

3. According to step two results the normal weight of all individuals of the sample of the study was concluded. They were categorized into two categories:

A. The first category: includes those individuals whose weights decrease in (10%) from their normal weight. And those are people whose weights have normal increase.

B. The second category: includes those individuals whose weights increase (10%) of their normal weights. Those are called the weight category of (10%) percentage increase, Table (1).

Table (1): Shows some descriptive statistical treatments for age, height and weight by categories of the study sample

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Category</th>
<th>Players</th>
<th>Mean</th>
<th>SD</th>
<th>Coefficient of Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>1st</td>
<td>9</td>
<td>17.97</td>
<td>0.49</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>17.70</td>
<td>0.35</td>
<td>0.30</td>
</tr>
<tr>
<td>2</td>
<td>Height</td>
<td>1st</td>
<td>9</td>
<td>175.22</td>
<td>3.45</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>159.45</td>
<td>3.12</td>
<td>3.03</td>
</tr>
<tr>
<td>3</td>
<td>Weight</td>
<td>1st</td>
<td>9</td>
<td>62.43</td>
<td>2.21</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>63.62</td>
<td>1.62</td>
<td>-1.10</td>
</tr>
<tr>
<td>4</td>
<td>Weight in Increase</td>
<td>1st</td>
<td>9</td>
<td>13.79</td>
<td>6.12</td>
<td>-1.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>11.15</td>
<td>6.35</td>
<td>-1.04</td>
</tr>
</tbody>
</table>

Applying the tests: The researcher applied his tests and measured the momentum power of arms and legs and the accuracy of shooting on the junior handball players who were (20) players. That was on Tuesday and Wednesday 1st and 2nd of October.

Statistical Means: Mean for the identical samples, torsion coefficient, standard deviation and T-test.

Results

Table (2): Shows some descriptive statistical treatments for the physical tests and shooting accuracy according to weight categories

<table>
<thead>
<tr>
<th>No</th>
<th>Tests</th>
<th>Category</th>
<th>Players</th>
<th>Mean</th>
<th>SD</th>
<th>Hi. Value</th>
<th>Lo Value</th>
<th>Coefficient of Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Momentum Power of Arms</td>
<td>1st</td>
<td>9</td>
<td>7.73</td>
<td>0.16</td>
<td>8</td>
<td>7.55</td>
<td>0.653</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>7.81</td>
<td>0.26</td>
<td>8.20</td>
<td>7.45</td>
<td>0.427</td>
</tr>
<tr>
<td>2</td>
<td>Momentum Power of Legs</td>
<td>1st</td>
<td>9</td>
<td>2.18</td>
<td>0.11</td>
<td>2.30</td>
<td>2</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>2.18</td>
<td>0.8</td>
<td>2.30</td>
<td>2.05</td>
<td>0.049</td>
</tr>
<tr>
<td>3</td>
<td>Shooting Accuracy</td>
<td>1st</td>
<td>9</td>
<td>24.66</td>
<td>2.64</td>
<td>28</td>
<td>21</td>
<td>0.098</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>11</td>
<td>22.72</td>
<td>2.90</td>
<td>28</td>
<td>18</td>
<td>0.030</td>
</tr>
</tbody>
</table>

Table (3): Shows the results of the (T) test between the two categories of the weight in the study.

<table>
<thead>
<tr>
<th>No</th>
<th>Tests</th>
<th>Category</th>
<th>Mean</th>
<th>SD</th>
<th>T-Test</th>
<th>Error Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Momentum. Power of Arms</td>
<td>1st</td>
<td>0.18</td>
<td>0.09</td>
<td>0.81</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Momentum Power of Legs</td>
<td>1st</td>
<td>0.8</td>
<td>0.04</td>
<td>0.19</td>
<td>0.631</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shooting Accuracy</td>
<td>1st</td>
<td>1.93</td>
<td>1.25</td>
<td>1.55</td>
<td>0.849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussions

Table (2) results showed that all the torsion coefficient of momentum power of arms and legs and the accuracy of shooting of handball is limited between (3-) and (3+). This indicates that these results distributed normally. While the results of table (3) showed that T values in all tests were not referent, therefore; there are no incorporeal reference differences between the two categories of the weight in all tests. The reasons behind that is the average of weight increase of the players over the normal level was not great. In that the number of the players in the first category, normal weight, was (9). Players who have increase over the normal weight in (10%) were (11). This means that the real increase happened in the weights of players, was important and necessary. This is so, because the nature and specialty of handball needs strong muscles players that help them in the matches to do the skills, especially shooting and other physical abilities especially the arms and legs momentum. The improvement in the strength of the muscles leads to improvement in the performance level from (8-12) time compared to the athletes who only use the tactical skills. In accomplishing the achievements in the sports games. Here we may have a reality that most researchers emphasized on it is not the increase of weight that makes a burden in all times, but in some sports games like handball; the logical and understandable increase is considered as a necessary issue during the performance, and this what emphasized the momentum power is influenced by the weight.

Conclusions

• There is no incorporeal reference differences between the two categories of the weight in the arms and legs momentum power and shooting accuracy.

• The increase found between the two categories of weight compared to the normal weight wasn’t great, but it was normal and within the requirements of handball game.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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References


Effect of Healthy Training According to Lactic Threshold to Develop Performance Tolerance (Defensive and Offensive) and Some Functions of Blood and Liver for Young Football Players

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Abstract

Anaerobic threshold is barrier between oxygenic action and non-oxygenic action and work is characterized by high intensity and difficulty which causes accumulation of lactic acid in blood and muscles that exceeds ability to get rid of it, which causes pressure on work of body and its inability to continue, then decrease in performance, so researcher prepared exercises according to anaerobic threshold to increase capabilities of players to face causes of tiredness and continue to perform for long time. Research problem concerned with decrease of players performance and their inability to continue to play for a long time in competition without appearance of fatigue. Study aims to prepare drills according to anaerobic threshold to hold out pressure of high-performance level and some functional indicators of blood and liver. Researcher used empirical method that suits with nature of problem. Sample of research identified about (18) young players from Wasit football club and then divided them into two groups (empirical and control group), and he used statistical method like statistical program SPSS to treats search results (AM, standard deviation, Independent sampling codes, interrelated sampling codes). researcher concluded that exercises according to anaerobic threshold contributed to develop performance level which is reflected positively on functional indicators of blood (red and white blood cells, and cortisol), while there was no change in level of liver functions to harmonize training loads with functional abilities of players. researcher recommends dependence on results of tests as indicator and guidebook to regulate training curriculum.

Keywords: Defensive, Offensive, Training, Develop Performance, Blood and Liver.

Introduction

Work of trainers is always aimed at improving performance components of athletes. Thus, sports training is a pivotal and basic process to enhance their physical, skill and planning capabilities according to requirements of specialized activities.

Which is a major goal of work of trainers, which is reflected positively on level of performance of athletes, as it raises level of efficiency to perform its functions, which reflects positively on level and nature and output of sports performance, which is sought by athlete and athlete. Development and high level of athlete and achieving achievement depends greatly on harmony and harmony between physical, functional and functional aspects of body of player and this harmony and harmony does not come normally or coincidence, but adoption of trainers and specialists on scientific planning in proper organization of training and application in form that best results positive to raise level of work and efficiency of work of body of athlete to continue to perform distinctive for a long time without exposure to fatigue. Level of performance in football depends mainly on training and physiological factor as it comes in forefront to influence level of performance, which is closely related to training process and vocabulary, which urges adaptation to body’s vital organs and their ability to resist fatigue. Lactic threshold represents boundary between oxygenation and non-oxygen. Work is characterized by high intensity and difficulty, which causes an increase in accumulation of calories burning waste and a rise in level of lactic acid in muscle and blood beyond ability to get rid of it, state of fatigue and low level of performance, As game of football is characterized
by lack of stability in performance throughout time of
game efficiently without falling down level as changing
attitudes of game and change effort of athlete and to raise
capabilities and capabilities of body of player in a way
that enables them to continue to perform for a longer
period needs to train in proportion to Which requires
efficiency of energy required in accordance with system
of production of energy prevailing is Lactic system,
both at level of defense or attack, which takes an upward
curve in difficulty of performance in view of high level
of competition, As a result of training in all its types and
in all energy systems, changes in level of blood or liver
functions have a clear effect on nature of work of body.

Football is one of games that is characterized by
its performance of constant change and instability.
This means adopting its performance on more than one
system for producing energy and continuing work for a
long period of time. anaerobic energy system is lactic at
most times of game and leaves no residue in muscle or
blood which causes fatigue.

**Research Areas:**

1. Human Field/Players of Alsharqia Youth Football
   Club/Wasit Governorate.


**Research Methodology:** Researcher used
experimental method to suit nature of problem. Experimental approach defines it as a “deliberate and
acceptable change of conditions defined as an accident
and observation of resulting changes in incident itself
and its interpretation (1).

**Society and sample research:** Research community
is determined by players of Eastern football club (18)
players divided into two groups (experimental and
control) with design of equal groups with tribal and
remote tests. Experimental group is trained in accordance
with exercises prepared by researcher while training
control group according to curriculum prepared by
coach, And importance of finding homogeneity among
members of study and to avoid factors that affect results
of experiment and to enable researcher to re-variance
to experimental factor has been adopted measurements
for variables (length - weight - age - training age) and
using value of torsion coefficient of Mispronounce all
indicated that it achieved curve equinoctial ranging from
(± 3) which shows good distribution of sample as shown
in Table (1).

**Means of collection of information and devices
used:** In order to achieve research objectives, researcher
used tools and tools that enable him to obtain information
and data required to solve research problem.

**Arab and foreign sources and references:** Physical
and biochemical tests and measurements, device of
weight and length,Electronic stopwatch Japanese type
Casio - Number (3),Football yard, Soccer Balls Number
(15), Plastic figures - Number (30), Tube keeping blood
contains EDTA, Yapit device for checking serum –
German, Blood measuring device Blood coulter, On step
American-made.

**Pre-Tests:** Researcher carried out tests and pre-
test measurements of blood withdrawal by assistant
medical staff of laboratory of Dr. Muntader al-Saidi on
Wednesday, 28/6/2017 and for groups (experimental and
control). physical test (carrying defensive and offensive
performance) was conducted at (4) 29/6/2017 for sample
of research on stadium of Wasit Sports Club, and in light
of results of tribal measurements, vocabulary of exercises

---

**Table (1): Arithmetic, standard deviations, intermediate, and spline coefficients**

<table>
<thead>
<tr>
<th>Torsion coefficient</th>
<th>Mediator</th>
<th>standard deviation</th>
<th>Arithmetic mean</th>
<th>measuring unit</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.87</td>
<td>180</td>
<td>1.72</td>
<td>180.5</td>
<td>cm</td>
<td>Length the</td>
</tr>
<tr>
<td>0.15</td>
<td>70.4</td>
<td>1.92</td>
<td>70.5</td>
<td>kg</td>
<td>weight Age</td>
</tr>
<tr>
<td>2.65</td>
<td>21</td>
<td>0.79</td>
<td>0.79</td>
<td>year</td>
<td>Age</td>
</tr>
<tr>
<td>1.11</td>
<td>3</td>
<td>0.54</td>
<td>2.8</td>
<td>year</td>
<td>Training age</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No. 4</td>
</tr>
</tbody>
</table>
were placed on threshold of anaerobic differential, which will be applied to experimental group as control group exercises according to curriculum prepared by coach.

**Main experience:** After studying many sources and references in field of sports training and physiotherapy, researcher prepared appropriate training according to lactic threshold, which is based mainly on anaerobic energy system, which is characterized by high intensity and less than maximum using high intensity training and repetitive training as training method. Performance of football is characterized by a repetition of performance, diversification of exercises and adoption of competitive and exciting exercises to increase motivation and desire of players and their training. Training modules prepared by researcher included exercises using different types, metal tracks, barriers, speed training for different distances, as show below:

**Remote tests:** After completion of training program, researcher conducted post-tests on Saturday, 2/9/2017 after completion of training program, where blood was drawn to sample of research at 10 am by medical staff assistant to Dr. Muntader al-Saidi, (Carrying defensive and offensive performance) on Sunday, 3/9/2017 at 3 pm at stadium of Eastern Sports Club. Researcher has done that conditions of remote tests, whether blood extraction or physical testing (carrying defensive and offensive performance) same conditions as tests of tribal sample of research.

**Statistical means:** After completion of implementation of training vocabulary and conduct of remote tests, data obtained by researcher were processed using SPSS program. In following statistical method: AM - Standard division SD - torsion coefficient - test for interrelated samples - independent sample tests).

**Results**

Presentation and analysis of results of tribal and remote tests of functional blood and liver indicators and carrying out defensive and experimental performance of experimental group.

**Table (2): The arithmetic (A), standard deviations (SD), AM(AM) of differences, square deviations of differences**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-test</th>
<th>Post test</th>
<th>AMσ</th>
<th>AM σ</th>
<th>T value</th>
<th>difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
<td>x</td>
<td>y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBC</td>
<td>6.5</td>
<td>1.12</td>
<td>7.85</td>
<td>1.18</td>
<td>1.35018</td>
<td>7.5</td>
</tr>
<tr>
<td>RBC</td>
<td>5.40</td>
<td>0.33</td>
<td>5.90</td>
<td>0.38</td>
<td>0.40008</td>
<td>2.5</td>
</tr>
<tr>
<td>Hb</td>
<td>14.43</td>
<td>0.67</td>
<td>14.9</td>
<td>0.74</td>
<td>0.470028</td>
<td>16.07</td>
</tr>
<tr>
<td>GOT</td>
<td>29.32</td>
<td>2.28</td>
<td>28.800</td>
<td>1.89</td>
<td>0.52027</td>
<td>1.92</td>
</tr>
<tr>
<td>GPT</td>
<td>17.400</td>
<td>0.981</td>
<td>16.</td>
<td>1.00</td>
<td>1.25613</td>
<td>1.69</td>
</tr>
<tr>
<td>Cortisol</td>
<td>325</td>
<td>0.178339</td>
<td>325</td>
<td>0.18</td>
<td>3.74</td>
<td>3.75</td>
</tr>
<tr>
<td>Perform defensive and offensive performance</td>
<td>1.12</td>
<td>0.012129</td>
<td>0.016179</td>
<td>0.028607</td>
<td>6.07</td>
<td></td>
</tr>
</tbody>
</table>

Freedom degree (8) and level of significance (0.05)

Table (2) shows results of tribal and remote tests of experimental variables of experimental group in WBC variable. AM in tribal test was 6.5 and SD(1.12), mathematical mean in post-test (7.85) and SD(1.18) For differences (1.35) and square deviations of differences (0.18) and extraction of value of (t) calculated (7.5) is found to be greater than value of (T) scale of (2.30) at degree of freedom (8) and level of significance (0.05) Between tribal and remote tests and for post-test.

In RBC variable, was (5.40) and SD (0.33), mathematical mean was in post-test (5.90) and SD(0.38).
mathematical mean of differences (0.40) (C) and level of significance (0.05), indicating a significant difference between tribal and remote tests and for benefit of post-test.

Table (3): Square deviations of differences for tribal and remote tests and tabular value (t), significance

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-test</th>
<th>Post test</th>
<th>XF</th>
<th>F²</th>
<th>Calculated (T) value</th>
<th>(T) differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
<td>x</td>
<td>y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBC</td>
<td>6.51</td>
<td>1.32</td>
<td>6.82</td>
<td>1.09</td>
<td>0.35</td>
<td>0.12</td>
</tr>
<tr>
<td>RBC</td>
<td>5.46</td>
<td>1.68</td>
<td>5.52</td>
<td>0.17</td>
<td>0.06</td>
<td>0.036</td>
</tr>
<tr>
<td>Hb</td>
<td>14.220.83</td>
<td>14.260.59</td>
<td>0.04</td>
<td>0.013</td>
<td>3.07</td>
<td></td>
</tr>
<tr>
<td>GOT</td>
<td>29.132.19</td>
<td>29.7</td>
<td>2.11</td>
<td>0.57</td>
<td>0.32</td>
<td>1.78</td>
</tr>
<tr>
<td>GPT</td>
<td>17.5</td>
<td>1.89</td>
<td>17.371.86</td>
<td>0.13</td>
<td>0.1690.769</td>
<td>Non-sig.</td>
</tr>
<tr>
<td>Cortisol</td>
<td>323</td>
<td>1.14</td>
<td>331</td>
<td>1.12</td>
<td>4</td>
<td>1.32</td>
</tr>
<tr>
<td>Perform defensive and offensive performance</td>
<td>1.13</td>
<td>0.013</td>
<td>0.19</td>
<td>0.013</td>
<td>0.013</td>
<td>1.19</td>
</tr>
</tbody>
</table>

freedom degree (8) and level of significance (0.05)

In Hb variable we find that AM in tribal test was (14.22) and SD(0.83), mathematical mean was in post-test (14.26) and SD(0.59), mathematical mean of differences (0.04) (3) and (0.05), indicating a significant difference between pre and post-tests and benefit of post-test.

In Got variant we find that AM in tribal test was (29.13) and SD(2.19), computational mean was in post-test (29.7) and SD(2.11), mathematical mean of differences (0.57) (C) and (0.05), indicating that there is no significant difference between pre-and-post test.

In Gpt variable we find that AM in tribal test was (17.5) and SD(1.899) while mathematical mean in post-test (17.37) and SD(1.86). mean of differences (1.13) and square deviations of differences (0.169) (0.769) were found to be less than tabular value of (2.30) at degree of freedom (8) and level of significance (0.05) indicating that there is no significant difference between pre and post-tests.

In cortisol variable we found that AM in tribal test was (327) and SD(1.14). mathematical mean in post-test (331) and SD(1.12) were AM of differences (4) value of (t) calculated (3.03) was found to be greater than value of (T) of scale (2.30) at degree of freedom (8) and level of significance (0.05), indicating existence of a significant difference between tests of pre and post and for benefit of post-test.

mathematical mean in tribal test was (1.13) and SD(0.013). mathematical mean was in post-test (1.19) and SD(0.014). mean of differences (0.06) value of calculated value of (4.61) was found to be greater than tabular value of (2.30) at degree of freedom (8) and significance level (0.05) indicating a significant difference between pre and posttests.

Display and analysis of results of tests of dimension of functional indicators of blood and liver and bear defensive and offensive performance of experimental and control groups.
Table (4): Tabular values, and significance for functional blood and liver indices in post-tests of two groups (experimental and control).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-test</th>
<th>Post test</th>
<th>(T) value</th>
<th>differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td>WBC</td>
<td>7.85</td>
<td>1.18</td>
<td>6.82</td>
<td>1.09</td>
</tr>
<tr>
<td>RBC</td>
<td>5.90</td>
<td>0.38</td>
<td>5.52</td>
<td>0.17</td>
</tr>
<tr>
<td>Hb</td>
<td>14.9</td>
<td>0.74</td>
<td>14.26</td>
<td>0.59</td>
</tr>
<tr>
<td>GOT</td>
<td>28.80</td>
<td>1.89</td>
<td>29.7</td>
<td>2.11</td>
</tr>
<tr>
<td>GPT</td>
<td>16.10</td>
<td>1.256</td>
<td>17.37</td>
<td>1.8</td>
</tr>
<tr>
<td>Cortisol</td>
<td>339</td>
<td>1.18</td>
<td>331</td>
<td>1.12</td>
</tr>
<tr>
<td>Perform defensive and offensive performance</td>
<td>1.29</td>
<td>0.016</td>
<td>1.19</td>
<td>0.014</td>
</tr>
</tbody>
</table>

degree of freedom (16) and differences level (0.05)

Table (4) shows results of remote tests of research variables of two groups (experimental and control). In WBC variable we found that experimental mean in experimental group was (7.85) and SD(1.18), while mean of control group (6.82) and SD(1.09) and extraction of calculated value of (2.71), With a score of (16) and a significance level of (0.05) indicating a significant difference in post-test and for benefit of experimental group.

In RBC variable, mean of experimental group was (5.90) and SD(0.38), while control mean of control group (5.52) and SD(0.17) and value of calculated value of (4.22) (12.2) at freedom level (16) and significance level (0.05) indicating a significant difference in post-test and for benefit of experimental group.

In Hb variable we found that experimental mean in experimental group was 14.9 and SD(0.74), mean of control group (14.26) and SD(0.59) and calculation of calculated value of (2.78) (12.2) at freedom level (16) and significance level (0.05) indicating a significant difference in post-test and for benefit of experimental group.

In GOT variable we found that mean of experimental group was (28.80) and SD(1.89) while mean of control group (29.7) and SD(2.11) and extraction of value of (t) calculated (1.32) (12.2) at degree of freedom (16) and level of significance (0.05) indicating that there is no significant difference between two groups (experimental and control).

In GPT variable we found that experimental mean in experimental group was (16.100) and SD(1.256) while mean of control group (17.37) and SD(1.8) and extraction of calculated value (t) of (0.295) (12.2) at degree of freedom (16) and level of significance (0.05) indicating that there is no significant difference between two groups (experimental and control).

Discussion

By examining results of post-test of experimental and control groups as shown in Table (4), we find that there is a significant difference between tests of two groups in variable (WBC) and for benefit of experimental group which means that exercises prepared by researcher according to Latakian threshold, In a timely manner contributed to positive results and increase in size of white blood cells as well as good training age enjoyed by members of research sample helped increase activity of white blood cells, and this is confirmed by Abdul Rahman Abdul Hamid, “increase in activity and
effectiveness of white blood cells have a correlation age of training for athlete as well as appropriate period for that (1).

In RBC variable we find that there is an improvement in level and role of this variable because it is related to tolerance component, which took a lot of space in exercises because football player is in great need of endurance in performance because endurance is base of anaerobic abilities because performance training muscle helps to extract more oxygen and therefore ability to work for a longer period of time. Kamal Jamil-Rabadi, citing (Aklom, 1972), points to an increase in blood volume (1).

In biochemical variables (GoT, GpT) for two groups of research before and after exercises, we find that results are not significant and this means that these variables did not encounter any defect in performance of its role as a result of exposure to training as it is dependent on safety of liver cells and called enzymes Liver, Liver, which arises from special tissues in liver, heart and muscles and at a normal level ranging from (0 - 41) IU/L, level of these enzymes (GoT, GpT) increases in event of a specific defect and physical effort to add burdens on these devices and deductions in endurance exercises and increase burden when there is a defect in formation of training loads, and since exercises that were subjected to members of research sample is Therefore, these enzymes have no problems in performance of their functions and thus found that their forgetfulness is normal in body of athlete, which indicates no significant differences between two groups of research because “high physical activity intensity accompanied by muscle fatigue in muscle, which is evident in pain in muscles and level Technical performance is related In one aspect of extent of change in level of these enzymes and damage in muscle fiber accompanied by an increase in some enzymes with a high specialization such as enzyme (GoT, GpT) (2).

In variable Cortisol Cortisol, we find that there is a significant difference in tests of dimension of two groups of research and for benefit of experimental group and attributed researcher this preference because members of experimental sample were subjected to exercises ranging between high and below maximum, causing physical effort affecting organs of body and cortisol increases during effort Physical “is to provide glucose consumed during physical effort, whether from sources of carbohydrate or non-carbohydrate for provision of energy necessary for muscle work during competition effort, which imposes on athlete a physical effort leads to occurrence of Physiological responses and this is required by neuromuscular compatibility during physical effort (3).

Cortisol is an important component of energy saving during physical and skillful physical activities, as in game of football. Cortisol is increased as a result of high physical exertion and “increased during violent sports activities as it helps to speed metabolism of energy sources (1).

Conclusions
Exercises contributed to increase performance and economy with effort and energy of players, which was reflected on other variables.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not required

References
1. Abu Ela Ahmed: Sports training, physiological basis, 1, Cairo, Dar Al-Fikr Al Arabi, 1997
6. Mohammed Abbas: Effect of competition effort in level of concentration of cortisol hormones, insulin and lactic acid in blood of youth basketball players, published research, University of Qadisiyah.
Prevalence of Malnutrition in Community-Dwelling Egyptian Elderly

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Abstract

This study aimed to assess Egyptian elder’s nutritional status and determined effect of chronic diseases on elder’s nutritional status. Tools of the study; (1) Socio-demographic & medical data, (2) assessment of the top ten chronic diseases among Egyptian elders, and (3) Mini-Nutritional Assessment (MNA®) screening tool. It’s a prospective, cross-sectional study. The studied sample was 345 Egyptian elders. According sample age (M± SD = 68.06 ± 7.708). They live in the Beni-Suef governorate. The results mentioned that thirty-nine percent of subjects were less than 75Yrs, sixty-two had one chronic disease or more. Twenty percent had hypertension while 0.6% had Alzheimer’s disease. The study shows more than one-third (39.1%) of elders were at risk of malnutrition while about one-quarter (22.9%) were malnourished. There aren’t statistically significant differences between age and nutritional status (P-Value ˃ 0.005). While there is a positive relationship between the presence of chronic diseases in Egyptian elders and their risk of malnutrition with statistically significant differences (P-Value ≤ 0.005). Egyptian elderly had unsatisfactory nutritional status, they need an educational program about therapeutic nutrition according to their health conditions

Keywords: Malnutrition, Elders, Mini-Nutritional Assessment (MNA®).

Introduction

Number of elderly persons is growing rapidly in the world. The global number of elders were 524 million in 2010.1 According to the World Health Organization, it is estimated that there will be approximately 1.2 billion elderly people in 2025, and this figure will reach 2 billion by 2050, about 80% of them living in developing countries.2

The U.S. Census Current Population Report, the older population in the USA were ≥ 65 years will almost double from 43.1 million in 2012 to 83.7 million in 2050.3

Nutrition is an important aspect of health in persons 60 years and above. Malnutrition in the elderly is often under-diagnosed. Malnutrition and risks of malnutrition in the elderly population may have various undesirable results, as prolonging hospital, increasing care costs, decreasing quality of life and increasing mortality rate.4 Careful nutritional assessment is necessary for both the successful diagnosis and development of comprehensive treatment plans for malnutrition in this population.5

Underweight and overweight elderly people (BMI < 19 and BMI > 25, respectively) frequently have a loss of muscle mass, a compromised immune system and have increased complications and premature death.6

Older adults are especially exposed to malnutrition, which often goes undetected and increases the risks of illness and death. The nurse plays a key role in prevention and early intervention of nutritional problems.6

The Mini Nutritional Assessment screening tool is an effective, easily administered tool designed to detect people who have malnutrition or at risk for developing it.7,8

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The current study aimed to assess Egyptian elder’s nutritional status and determined effect of chronic diseases on elder’s nutritional status.

Patients and Method

Design: It’s a prospective, cross-sectional study.

Setting of the Study: This study was carried out in geriatric’s clubs in the Beni-Suef governorate in Egypt.

Exclusion Criteria: Elders with cancer diseases were excluded as a group with higher malnutrition risk.

Ethical Consideration: An official approval letter was obtained from the Dean of Faculty of Nursing in Minia University and delivered to the administrator of geriatric’s clubs in the Beni-Suef governorate in Egypt. To get the necessary approval to conduct the study. This letter included permission to collect the necessary data and explain the purpose and nature of the study. Verbal consent was gotten from patients before their sharing in the study.

Data Collection: The data were collected from the beginning of May to the end of September 2019.

Tool of data collection: Researcher developed a structured interview questionnaire based on the review of literature, it consists of three parts;

Tool (1): Socio-demographic and medical data include; (age, sex, level of education, source of income, presence of chronic diseases………).

Tool (2): Mini-Nutritional Assessment MNA® screening tool is used to evaluate the nutritional status of elderly people. The MNA® can be completed in about 15 minutes, published in 1994 by Guigoz, et al. 9

Method of Data Collection: The Mini Nutritional Assessment MNA® screening tool, consisting of a screening phase and an assessment phase.

(a) The screening phase; used as a short form to find patients at risk of malnutrition. It consists of six items: a food intake item, two anthropometric parameters (recent weight loss and body mass index), and three general parameters about mobility, physical and emotional stress, and neuropsychological.

(b) The assessment phase; include anthropometric measure (calf and upper arm circumference), general questions about lifestyle, medication, and mobility, dietary related questions about number of meals, food, and fluid intake, and mode of feeding, and subjective assessment about personal view of health and nutritional status.

The Mini Nutritional Assessment scores of both phases distinguish between elderly person with adequate nutrition (MNA score ≥ 24), at risk of malnutrition (MNA score 17.5-23.5), and protein-calorie malnutrition (MNA < 17).

Statistical analysis: Study data were analyzed using the SPSS 9. Qualitative data were styled as numbers and percentages and quantitative data styled as mean and standard deviation. Qualitative variables were compared by using chi-square test. Comparison between distributed items done through using ANOVA test. Concerning the correlation between quantitative variables was analyzed by calculating the Spearman correlation measurement. Statistical tests of two-sided variables considered significance was set at p < 0.05.

Results

Table: (1): Socio-demographic and Medical data of Studied Sample (n= 345)

<table>
<thead>
<tr>
<th>Items</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 &lt; 75 Yrs</td>
<td>207</td>
<td>60</td>
</tr>
<tr>
<td>75 &lt; 85 Yrs</td>
<td>116</td>
<td>33.6</td>
</tr>
<tr>
<td>≥ 85 Yrs</td>
<td>22</td>
<td>6.4</td>
</tr>
<tr>
<td>Means ± SD.</td>
<td>68.06 ± 7.708</td>
<td>68.06 ± 7.708</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>187</td>
<td>54.2</td>
</tr>
<tr>
<td>Female</td>
<td>158</td>
<td>45.8</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not married</td>
<td>14</td>
<td>4.1</td>
</tr>
<tr>
<td>Married</td>
<td>131</td>
<td>38</td>
</tr>
<tr>
<td>Divorced</td>
<td>30</td>
<td>8.7</td>
</tr>
<tr>
<td>Widow</td>
<td>170</td>
<td>49.3</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
<tr>
<td>Level of education:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>167</td>
<td>48.4</td>
</tr>
<tr>
<td>Read and Write</td>
<td>108</td>
<td>31.3</td>
</tr>
<tr>
<td>Secondary</td>
<td>52</td>
<td>15.1</td>
</tr>
<tr>
<td>University</td>
<td>18</td>
<td>5.2</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
<tr>
<td>Items</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Source of Income:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirement</td>
<td>289</td>
<td>83.8</td>
</tr>
<tr>
<td>Family</td>
<td>49</td>
<td>14.2</td>
</tr>
<tr>
<td>Work</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Place:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cite</td>
<td>87</td>
<td>25.2</td>
</tr>
<tr>
<td>Rural</td>
<td>164</td>
<td>47.2</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>94</td>
<td>27.2</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of Chronic Disease:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not present</td>
<td>131</td>
<td>38</td>
</tr>
<tr>
<td>One disease</td>
<td>168</td>
<td>48.7</td>
</tr>
<tr>
<td>More than one diseases</td>
<td>46</td>
<td>13.3</td>
</tr>
<tr>
<td>Total</td>
<td>345</td>
<td>100</td>
</tr>
</tbody>
</table>

As regard to socio-demographic and medical data of the studied sample, it was found that 60% from them ranged from sixty years to less than seventy-five, 54.2% from them were men, 49.3% were illiterate, 47.2% from villages, 48.7% had one chronic disease and 13.3% had more than one chronic disease.

![Fig. (1): Distribution of top ten chronic diseases among Egyptian elders (n= 345)](image1)

Figure one shows the top ten chronic diseases found in the present studied sample, it was found that 20% of them had hypertension, 17.1% had diabetes, 8.1% had hypertension & diabetes, and 3.2% had romantics diseases, while only 0.6% had Alzheimer’s disease.

![Fig. (2): Total scores of elders’ nutritional status (n= 345)](image2)
Figure two shows the nutritional status of the studied sample, it was found that more than one third (38.0%) were normal and 39.1% at risk of malnutrition while about one quarter (22.9%) of them were malnourished.

**Table (2): Relation between Elders’ Nutritional Status and Medical/socio-demographic data**

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>Normal</th>
<th>At Risk of Malnutrition</th>
<th>Malnourished</th>
<th>Chi-Square (P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td><strong>Presence of Chronic Diseases:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a- Not present</td>
<td>69</td>
<td>52.7</td>
<td>47</td>
<td>34.8</td>
</tr>
<tr>
<td>b- One chronic disease</td>
<td>48</td>
<td>36.6</td>
<td>69</td>
<td>51.1</td>
</tr>
<tr>
<td>c- More than one chronic disease</td>
<td>14</td>
<td>10.7</td>
<td>19</td>
<td>14.1</td>
</tr>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a- 60 &lt; 75 Yrs</td>
<td>86</td>
<td>41.5</td>
<td>76</td>
<td>36.7</td>
</tr>
<tr>
<td>b- 75 &lt; 85 Yrs</td>
<td>35</td>
<td>30.2</td>
<td>52</td>
<td>44.8</td>
</tr>
<tr>
<td>c- ≥ 85 Yrs</td>
<td>10</td>
<td>45.5</td>
<td>7</td>
<td>31.8</td>
</tr>
<tr>
<td><strong>Living Place:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a- City</td>
<td>44</td>
<td>33.6</td>
<td>28</td>
<td>20.7</td>
</tr>
<tr>
<td>b- Rural</td>
<td>62</td>
<td>47.3</td>
<td>73</td>
<td>54.1</td>
</tr>
<tr>
<td>c- Nursing Home</td>
<td>25</td>
<td>19.1</td>
<td>34</td>
<td>25.2</td>
</tr>
<tr>
<td><strong>Level of Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a- Illiterate</td>
<td>63</td>
<td>48.1</td>
<td>70</td>
<td>51.9</td>
</tr>
<tr>
<td>b- Read and Write</td>
<td>42</td>
<td>32.1</td>
<td>42</td>
<td>31.1</td>
</tr>
<tr>
<td>c- Secondary</td>
<td>18</td>
<td>13.7</td>
<td>17</td>
<td>12.6</td>
</tr>
<tr>
<td>d- University</td>
<td>8</td>
<td>6.1</td>
<td>6</td>
<td>4.4</td>
</tr>
</tbody>
</table>

*P value ≤ 0.05 = significant differences

Table (2), shows that about two-thirds (64.6%) from Elders with one chronic disease are malnourished while only 19.0% from elders without chronic diseases are malnourished. It shows statistically significant differences between the presence of chronic diseases in Egyptian elders and their nutritional status with statistically significant differences (P-Value ≤ 0.005). While there aren’t statistically significant differences between age and nutritional status (P-Value > 0.005).

It was found that, 44.3% of elders who stay in the nursing home and 36.7% from elders in villages, while only 19.0% from elders in the city are malnourished significant differences between elders’ address and their nutritional status (P-Value ≤ 0.005). While there aren’t statistically significant differences between the level of education of the studied sample and their nutritional status (P-Value > 0.005).

**Discussion**

The present study aimed to assess the nutritional status of the Egyptian elders and to determine effect of chronic diseases on nutritional status.

The current study estimated the top 10 chronic diseases affecting elderly people, it found hypertension is the 1st disease followed by diabetes. This result agrees with Ward and Schiller, 2014 study concerning hypertension while disagreeing with them concerning diabetes which arranged as the 4th disease in elders people.

Our study results confirm that 38% of elders people in Beni-Suef governorate were well-nourished, 39.1% at risk for malnutrition and 22.9% had malnutrition. It’s in the same way of study of Abdelrahman and Elawam, 2012 which found, 44% from Egyptian elders in urban areas were well-nourished, 41.5% at risk of malnutrition and 14.5% were malnourished. Also, the current study agrees with the study of Rashmi, et al., 2015 with a slight difference in percent. They found out of the total of 360 Indian elderly persons, 15% were malnourished and 55% were at risk of malnutrition.
And also, our study results found no relation between the level of education and malnutrition in Egyptian Elders. This disagrees with studies of Abdelrahman and Elawam, 2012\textsuperscript{11} and De Silva, et al., 2017\textsuperscript{13} which found the negative relationship between the level of education and nutritional status.

The current study found that, Egyptian elders living in rural areas suffering from malnutrition. This result agrees with studies of De Silva, et al., 2017\textsuperscript{13} in Sri Lanka and Tamang, et al., 2019\textsuperscript{14} in Nepal which noted that elderly persons living in rural areas had malnutrition more than those in urban. This may be due to low income of elders who live in the village.

**Conclusion**

Egyptian elderly had unsatisfactory nutritional status, more than one-third were at risk for malnutrition and about one quadrant was malnourish. There are statistically significant differences between number of chronic diseases in elderly persons and his/her nutritional status (P-Value $\leq 0.005$). This reflects the persistent need for an educational program about therapeutic nutrition according to their health conditions.

**Limitations:** A limitation of this study is the cross-sectional design, no conclusions can be drawn in line with the cause-effect model. Besides, the study was conducted in one governorate, so its findings could not be generalized to other settings of Egypt.

**Source of Funding:** Self.

**Conflict of Interest:** Nil.

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Eco-Epidemiological Analysis of Dengue Hemorrhagic Fever (DHF) in Makassar City

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Abstract

Dengue hemorrhagic fever (DHF) is still a public health problem in the world, including Indonesia. This study aims to determine the relationship of ecological, epidemiological factors with the endemicity status of DHF in Makassar City in 2013. This study used a cross-sectional study design. A sample of 14 sub-districts in Makassar City, South Sulawesi Province, was categorized based on the endemicity status of DHF. Sampling using exhaustive sampling. Data collection is done through secondary data analysis, observation, and documentation. Data were analyzed using the Mann Whitney test. The results showed that the ecological factors associated with the endemicity status of DHF in Makassar City were population density (p <0.05), while the rate of larva free, rainfall, and occupancy density was not related to the endemicity status of DHF (p> 0.05). Therefore, more attention needs to be paid to districts with high population densities and the need to establish trends in the spread of dengue cases based on ecological factors to determine areas prone to dengue fever and their treatment priorities.

Keywords: Dengue Hemorrhagic Fever (DHF), Endemicity, Ecology

Introduction

Dengue hemorrhagic fever (DHF) is still a public health problem in the world, including Indonesia. DHF is an infectious disease caused by the dengue virus and transmitted by the Aedes aegypti mosquito.¹ Around 2.5 billion inhabitants live in dengue-endemic countries, and there is a population at risk of DHF affected by 70% who live in Southeast Asian and Western Pacific Countries. Since 2000, the dengue epidemic has spread to new areas, and in 2003 there were eight countries reporting dengue cases, one of which was Indonesia.²

DHF is an endemic disease in several regions of South Sulawesi, including Makassar City. The number of dengue cases in Makassar City has increased from 223 cases in 2010 to 452 cases in 2012.³

In terms of epidemiology, in addition to host factors and agent factors, environmental factors also influence the incidence of DHF, so an ecological approach to DHF epidemiology is needed in different geographical conditions. Several studies have concluded that ecological factors are related to the epidemiology of DHF. These ecological factors include vectors, climate, topography, and human ecology.⁴

Research related to DHF eco-epidemiological analysis in India found that the main factors affecting DHF outbreaks are climate factors, namely rainfall, temperature, and relative humidity.⁵ Temperature variations that affect variations in efficiency Ae. aegypti is one of the important factors that influence the variation of DHF events.⁶ The existence of environmental
differences, such as differences in vegetation and differences in the presence of predator vectors, also affect the differences in entomological parameters associated with dengue events.\(^{(7)}\)

Analysis of the endemicity status of dengue fever in a region can be associated with disease determinants, which include environmental, geographic and demographic factors. The difference in ecological and geographic conditions in an area also influences the pattern and type of disease, as well as the epidemiology of DHF. Based on the background description, the researcher is interested in studying the relationship of ecological, epidemiological factors with the endemic status of DHF in Makassar City in 2013. By obtaining information on ecological factors related to the DHF endemicity status, it is hoped that DHF control activities can be planned more efficiently and effectively adjusted with the state of the area.

**Method**

This study is an analytic study with a cross-sectional study design to identify environmental factors that are epidemiologically suspected to be directly or indirectly related to the endemicity status of DHF. This research was conducted in Makassar City, South Sulawesi Province, Indonesia. The target population in this study is the eco-epidemiological data and the incidence of DHF in each District/Kelurahan in Makassar City. Exhaustive sampling technique is used for the sampling of this study, namely, 14 districts in Makassar with endemicity and non-endemicity status of DHF in 2010-2012.

The data used in this study are secondary data in the form of dengue case data, climate data, population density data, larvae free data, and base maps of the study area, each obtained from the Health Office, the Meteorology and Geophysics Agency, the Central Statistics Agency, Bakosurtanal, Department of Spatial Planning and Regional Planning Agency of Makassar City area. Data collection is done through secondary data analysis, observation, and documentation. Data were analyzed using the Mann Whitney test to assess the relationship between ecological factors and the endemic status of DHF.

**Results**

**The incident Dengue Hemorrhagic Fever**

Graph 1: Distribution of Dengue Hemorrhagic Fever Cases in 14 Districts in Makassar City in 2010-2012

Graph 1 shows the distribution of dengue cases in Makassar City, which tends to decrease every year. In 2010, the highest incidence of DHF occurred in Rappocini District (12 cases), and the lowest was in three districts namely Mariso, Makassar, and Ujung Pandang District (no cases). In 2011, the highest incidence of DHF occurred in Rappocini District (15 cases), and the lowest occurred in two districts namely Bontoala District and Ujung Tanah District (1 Case). In 2012, the highest incidence of DHF occurred in Biringkanaya District (17 cases), and the lowest was in Ujung Pandang District (no cases).

**DHF Endemicity Status:** Table 1 shows that the sub-districts in Makassar are more dominant with DHF endemic (78.6%).
Table 1: Endemicity of Dengue Hemorrhagic Fever in 14 Districts in Makassar City in 2010-2012

<table>
<thead>
<tr>
<th>Endemicity Status</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endemic</td>
<td>11</td>
<td>78.6</td>
</tr>
<tr>
<td>Non-Endemic</td>
<td>3</td>
<td>21.4</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

Relationship of Ecological Factors with DHF Endemicity Status

Table 2: Relationship of Ecological Factors with DHF Endemicity Status in Makassar City in 2013

<table>
<thead>
<tr>
<th>Ecological Factors</th>
<th>Endemicity Status</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Endemic</td>
<td>Non-Endemic</td>
</tr>
<tr>
<td>Larvae free number</td>
<td>6.82</td>
<td>10.0</td>
</tr>
<tr>
<td>Rainfall</td>
<td>5.86</td>
<td>7.40</td>
</tr>
<tr>
<td>Population density</td>
<td>5.78</td>
<td>10.60</td>
</tr>
<tr>
<td>Occupancy Density</td>
<td>7.95</td>
<td>5.83</td>
</tr>
</tbody>
</table>

*Mann Whitney Test

Table 9 shows that the mean rank of larval free numbers in non-endemic DHF areas is higher than in endemic DHF regions. Mann Whitney test results obtained p-value = 0.239, so it was concluded that there was no relationship between larval free rates and DHF endemicity status in Makassar City. Based on rainfall, the mean rank value in DHF endemic regions is lower than in non-endemic DHF regions. Mann Whitney test results obtained p = 0.464, meaning there is no relationship between rainfall and the endemic status of dengue in Makassar City.

The mean rank of population density in non-endemic DHF areas is higher than in endemic DHF regions. Mann Whitney test results obtained p-value = 0.039, so it was concluded that there is a significant relationship between population density with the endemic status of DHF in Makassar City. Based on residential density, the mean rank value in non-endemic DHF areas is lower than in endemic DHF regions. Mann Whitney test results obtained p-value = 0.406, meaning there is no relationship between the density of occupancy with the status of endemicity of dengue in Makassar City.

Discussion

The results of this study indicate that the distribution of dengue cases in Makassar City from 2010 to 2012 tends to decrease every year. Nevertheless, the subdistricts in Makassar City were more dominant in DHF endemic (78.6%), out of a total of 14 districts. Makassar City is a region with a high level of endemicity based on the endemicity level category stated by Marjuki in his research in Malang, which is an area where in the last three years in a row there were more than ten cases/deaths due to DHF. (8)

Based on the results of the Mann Whitney test, it was concluded that ecological factors significantly related to the endemicity status of DHF in 14 districts in Makassar City were population density. The results of this study are in line with research in Denpasar, which states that there is a relationship between population density and the incidence of DHF. (9) This finding is also in line with the results of research in Venezuela which found that population density is positively correlated with the level of DHF endemicity in a region. (10) A denser population will facilitate the transmission of DHF, especially in urban areas, because mosquito flying distances are estimated at 50 to 100 meters. (11) Female mosquitoes can fly as far as two kilometers, but the normal ability is about 40 meters. In densely populated areas with high mosquito distribution, the potential for virus transmission increases and tends towards the formation of an endemic area.

Larvae free rate is the percentage of houses/buildings not found larvae. Free larvae numbers and house index better illustrates the extent of the spread of mosquitoes in an area. The higher Larvae free rate value in an area shows that the incidence of DHF is lower. Research in Medan and Gorontalo found that the presence of larvae inside or outside the home was significantly related to the incidence of DHF. (12, 13) But the two studies are not following the results of this study, which found that there was no relationship between ABJ and DHF endemicity status. The difference in the results of this study can be caused by the number of study samples that are too small. Also, based on ABJ percentage data obtained from the Makassar City Health Office, it can be seen that almost all districts have ABJ percentage values above 80%; even many districts with endemic status have ABJ percentages above 90%. This means that other factors affect endemicity status in each sub-district because even though most of the houses (> 80%) are declared larvae-free, DHF still occurs. So it can be said that there is no significant relationship between the percentage of ABJ with the incidence of DHF.
Similar to larval free numbers, the results of this study also concluded that there was no relationship between rainfall and DHF endemicity status in Makassar City. This study is not in line with research in Thailand, which found that there was a relationship between rainfall and the incidence of DHF.\(^{(14)}\) The difference in the results of this study can occur because the influence of rainfall varies according to the amount of rain and the physical condition of an area. Too much rain will cause flooding, and too little rain will cause drought, resulting in the temporary movement of mosquito breeding sites, so that vector breeding will decrease. Towards the rainy season or the transition, the season is marked by the least frequency of rain, so that there is a puddle of clear water long enough to be a habitat for dengue virus carriers, the Aedes aegypti mosquito.

Dwelling density can facilitate the transmission of DHF from person to person. However, in this study, no relationship was found between occupancy density and DHF endemicity status. This is in line with research conducted in Surabaya which also found no link between the incidence of DHF with occupancy density.\(^{(15)}\) There is no relationship between the density of occupancy and endemicity status of dengue fever can be caused by knowledge and attitudes of urban residents who are better towards a disease and the increasing number of health facilities that are spread evenly and easily accessible by the community, so that if there are family members who suffer from dengue disease then members other families will immediately seek treatment before the disease is transmitted to other family members.

**Conclusions**

This study concludes that the ecological factors associated with the endemicity status of DHF in Makassar City are population density, while the variable rate of larvae free, rainfall, and occupancy density is not related to DHF endemicity status.

Therefore, more attention needs to be paid to districts with high population density and the need to establish trends in the spread of DHF cases based on ecological factors to determine areas prone to DHF as well as to see the achievement of DHF disease prevention programs. Also, it is hoped that there will be an increase in regional-based health problem analysis to make it easier to determine priority priorities and more appropriate preventive measures.

**Ethical Clearance:** Our study was not directly applied on human, hence ethical clearance was not required.

**Source of Funding:** Self funding

**Conflict of Interest:** The author declare that he has no conflict of interest.

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Association of Demographic Characteristics of Construction Workers and Work Environments to Workplace Accident in High Building (Hotel) Construction

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Abstract

Introduction: Until now construction sector is still dominant contributors on workplace accident (WA) in Indonesia. However, there is a limited report analysing the causal factors. Demographic characteristics and work environment are suspected factors to be responsible on this condition.

Objectives: This study aimed to analyse the factors associated with WA occurrence on high building (hotel) construction.

Method: This research has been conducted on 105 workers at a high building construction in Samarinda by one of Indonesian largest construction company. Factors observed were age, working experience, level of education, working time, adherence to a standard operating procedure, health and safety knowledge, health and safety attitude, level of noise, lighting at a workplace, and work fatigue. Cramer’s V test and odds ratio were applied to see an association between the WA occurrence and the factors as well as their level.

Results: During the 11 months construction, 58 WA occurrence were recorded. It is about 55.2% of the whole number of workers. Age \((p=0.000)\), working experience \((p=0.000)\), working time per day \((p=0.001)\), adherence to SOP \((p=0.000)\), lighting exposure \((p=0.03)\) and health and safety knowledge \((p=0.000)\) showed significance correlation on the WA occurrence.

Conclusions: Construction sector is still high risk work sector in Indonesia. Demographic characteristic (age, working experience and health safety knowledge) and working environment (working time, adherence of SOP, lighting exposure) are essential factors need to be considered to overcome the WA occurrence in high building construction.

Keywords: High building, hotel, workplace accident, work environment, Samarinda.

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Introduction

Construction sector plays an essential role in the economy of a country because its significant contributions to the gross domestic product.¹ ³ However, it belongs to a high-risk job in developing countries cause of its high rate of workplace accident (WA) contribution.⁴ ⁶ ⁷ The construction WA are quite high in Malaysia,⁴ Thailand,⁸ Uganda² and Iran.⁸ Similarly, the construction sector in Indonesia is the highest contributors to WA with the number of 32% compared to other sectors.¹⁰ Manufacturing, transportation, forestry, mining industries, and other sectors, were accounted for 31.6, 9.3, 3.8, 2.6, and 21%, Several factors related to WA in construction are an inadequate in providing resources for safety and operational procedure, unsafe act, failures in constructed site management, age of workers, work experience, gender, length of service, work location, and climatic zones, workers’ negligence, failure too bey work
procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment and poor workers attitude about safety, and poor safety culture.\textsuperscript{8,11} Construction factors associated to reduce the WA occurrence in the construction sector in developing countries, including Indonesia. This study aimed to analyse the factors associated with WA in construction sector. This finding is advantageous to overcome the problem by identifying and evaluating the parameters associated with WA in high building construction.

**Material and Method**

This research was conducted from Dec 2017 until Oct 2018 at a high building (hotel) construction in Samarinda by one of the largest Indonesian construction companies. Proportional random sampling was applied to get a total of 105 respondents with various duties of work. The hotel has 12 floors, one semi-basement, 174 rooms, five meeting rooms, a ballroom, a town hall restaurant, a swimming pool, a gym, and a spa counter.

Age, working period, education level, working time, occupational health and safety (OHS) knowledge and attitude were measured by questionnaires.\textsuperscript{17,18} Work fatigue was measured by IFRC’s Subjective feelings of fatigue.\textsuperscript{19,20} The adherence of standard operating procedure standard operating procedure (SOP) and WA was measured by interview and direct observation. The level of noise exposure and lighting at the workplace were measured by sound level and lux meter, respectively. Cramer’s V and odds ratio\textsuperscript{21,22} were applied to analyse the correlation and the association level between the WA occurrence and its related factors.

**Results**

The construction workers are most young (17-41 years, 82.80%). Senior and Seconadry High School (70%) are the dominant education background level of the workers. Many workers (63.81%) have working experience of 1-8 years (Table 1). Number of workers (62.86%) have working time of more than 8 hours per day, 65.71% adhered to SOP, 16.19% exposed to noise above threshold limit value 85 dB, 69.52% with work with illumination <100lux, 56.19% have good OHS knowledge, 86.67% showed favourable OHS attitudes and 69.52% have experienced moderate fatigue (Table 1).

During this study, number of WA occurrence accounted at 55.2%, in which most occurred during the day (37%). WA types often took place were hit by a hammer and punctured by spikes with the number of 20.0 and 17.1%, respectively (Table 2.)

Table 1: Related factors associated with workplace accident (WA) of construction workers \((N=105)\) in high building (hotel) construction in Samarinda, Indonesia

<table>
<thead>
<tr>
<th>Variable</th>
<th>Workers</th>
<th>Workplace Accident</th>
<th>p***</th>
<th>Odd ratio****</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Σ</td>
<td>%</td>
<td>Σ</td>
<td>%*</td>
</tr>
<tr>
<td>Age (Year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-29</td>
<td>48</td>
<td>45.71</td>
<td>33</td>
<td>68.75</td>
</tr>
<tr>
<td>&gt;29-41</td>
<td>39</td>
<td>37.14</td>
<td>19</td>
<td>48.72</td>
</tr>
<tr>
<td>&gt;41-53</td>
<td>14</td>
<td>13.33</td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td>&gt;53-63</td>
<td>4</td>
<td>3.81</td>
<td>2</td>
<td>50.00</td>
</tr>
<tr>
<td>Working Experience (Years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td>67</td>
<td>63.81</td>
<td>47</td>
<td>70.15</td>
</tr>
<tr>
<td>&gt;8-16</td>
<td>25</td>
<td>23.81</td>
<td>9</td>
<td>36.00</td>
</tr>
<tr>
<td>&gt;16-26</td>
<td>13</td>
<td>12.38</td>
<td>2</td>
<td>15.38</td>
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<tr>
<td>Education</td>
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<td></td>
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</tr>
<tr>
<td>Elementary school, not graduated</td>
<td>8</td>
<td>7.62</td>
<td>2</td>
<td>25.00</td>
</tr>
<tr>
<td>Elementary school (graduated 6th class)</td>
<td>27</td>
<td>25.71</td>
<td>15</td>
<td>55.56</td>
</tr>
<tr>
<td>Variable</td>
<td>Workers</td>
<td>Workplace Accident</td>
<td>( \hat{p} *** )</td>
<td>Odd ratio****</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
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<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>( \Sigma )</td>
<td>%</td>
</tr>
<tr>
<td>Secondary high school (graduated 9th class)</td>
<td>33</td>
<td>31.43</td>
<td>21</td>
<td>63.63</td>
</tr>
<tr>
<td>Senior high school (graduated 12th class)</td>
<td>37</td>
<td>35.24</td>
<td>20</td>
<td>54.05</td>
</tr>
<tr>
<td>Working time</td>
<td>0.001</td>
<td>1.580</td>
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<tr>
<td>( \leq 8 ) hours</td>
<td>39</td>
<td>37.14</td>
<td>24</td>
<td>61.54</td>
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<tr>
<td>( &gt; 8 ) hours</td>
<td>66</td>
<td>62.86</td>
<td>34</td>
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<tr>
<td>Adherence of SOP</td>
<td>0.000</td>
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<td></td>
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</tr>
<tr>
<td>Adherence</td>
<td>69</td>
<td>65.71</td>
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<tr>
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<td>36</td>
<td>34.29</td>
<td>6</td>
<td>16.67</td>
</tr>
<tr>
<td>Noise exposure</td>
<td>0.835</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>( \leq 85 ) dB</td>
<td>88</td>
<td>83.81</td>
<td>49</td>
<td>55.68</td>
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<tr>
<td>( &gt; 85 ) dB</td>
<td>17</td>
<td>16.19</td>
<td>9</td>
<td>52.94</td>
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<tr>
<td>Lighting exposure</td>
<td>0.038</td>
<td>1.530</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \leq 100 ) lux</td>
<td>73</td>
<td>69.52</td>
<td>37</td>
<td>50.68</td>
</tr>
<tr>
<td>( &gt; 100 ) lux</td>
<td>32</td>
<td>30.48</td>
<td>21</td>
<td>65.63</td>
</tr>
<tr>
<td>OHS knowledge</td>
<td>0.000</td>
<td>6.230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>28</td>
<td>26.67</td>
<td>24</td>
<td>14.29</td>
</tr>
<tr>
<td>Enough</td>
<td>18</td>
<td>17.14</td>
<td>17</td>
<td>94.44</td>
</tr>
<tr>
<td>Good</td>
<td>59</td>
<td>56.19</td>
<td>17</td>
<td>28.81</td>
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<tr>
<td>OHS attitude</td>
<td>0.465</td>
<td>1.176</td>
<td></td>
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<tr>
<td>Unfavourable</td>
<td>14</td>
<td>13.33</td>
<td>9</td>
<td>64.29</td>
</tr>
<tr>
<td>Favourable</td>
<td>91</td>
<td>86.67</td>
<td>49</td>
<td>80.33</td>
</tr>
<tr>
<td>Work Fatigue</td>
<td>0.932</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>22</td>
<td>20.95</td>
<td>12</td>
<td>54.55</td>
</tr>
<tr>
<td>Mild</td>
<td>73</td>
<td>69.52</td>
<td>41</td>
<td>56.16</td>
</tr>
<tr>
<td>( &gt;14 )-Intermediate</td>
<td>10</td>
<td>9.53</td>
<td>5</td>
<td>50.00</td>
</tr>
</tbody>
</table>

Note: Data were collected during 11 months of construction. Total WA was 58 (55.24%). WA calculated as workers occurred one or more accidents. *) Partial percentage (calculated by number of workers related to the specific level of variable), **) Absolute percentage (calculated by all number of workers), *** Correlation by Cramer’s V test, **** Mantel-Haenzel test, the level was changed to two level prior analysis, 17-14 and \( >14 \)-63 years for age, 1-16 and \( >16 \)-24 years for working experience, low and high for OHS knowledge.

Table 2: Time occurrence and type of workplace accident in high building (hotel) construction in Samarinda, Indonesia (N=105)

<table>
<thead>
<tr>
<th>Time occurrence and type</th>
<th>Workers</th>
<th>Work accident</th>
<th>%*</th>
<th>%**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time occurrence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning</td>
<td>3</td>
<td>5.17</td>
<td>2.85</td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>39</td>
<td>67.24</td>
<td>37.14</td>
<td></td>
</tr>
<tr>
<td>Night</td>
<td>16</td>
<td>27.58</td>
<td>15.23</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punctured nails</td>
<td>18</td>
<td>31.03</td>
<td>17.14</td>
<td></td>
</tr>
<tr>
<td>Pinched</td>
<td>9</td>
<td>15.51</td>
<td>8.57</td>
<td></td>
</tr>
<tr>
<td>Hit by a hammer</td>
<td>21</td>
<td>36.20</td>
<td>20.00</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>10</td>
<td>17.24</td>
<td>9.52</td>
<td></td>
</tr>
</tbody>
</table>

Note: Referred to note in Table 1.


**Discussion**

**Association between demographic characteristics and WA:** Age and working experience are often used as hypotheses in analysing of WA, several studies reported different results on young and elder workers of dimensions of incidence, severity, type of accident and type of injury. In this study, which the worker is dominated by young workers shown that age and working experience were significantly related to WA. This result is inline with previous studies.13,14,20,23,24

By levelling of age and working experience to 2 categories (young workers: 17-41 years and elder workers: > 41-63 years; Low work experience: 1-16 years and high work experience: > 16-26 year), the young workers and low working experience workers have twice and 3 times higher on WA risk compared to those elder and high work experience workers, respectively. This study are in accordance with previous study, which reported that young workers were found to be accidents due to carelessness and lack of experience, although physically have a higher reaction and agility.24 The working time of > 8 hours per day run the WA risk of 1.5 times higher than the less working time. Long working time will lead to work fatigue and will have an impact on occupational accidents.25,26

Level of workers education affects the perceptions of workers’ OHS, which later affected on OHS behaviour and incidence of occupational accidents.21 However, in this study, the education level of workers isn’t associated with the WA.

**Association between the working environment and WA**

**Adherence to the SOP:** The results prove that workers compliance to SOP associated with WA. This result emphasises the previous study that the most significant contributor to the cause of the WA is risky behaviour. One type of unsafe behaviour in the workplace is ignoring SOP.28 The workers who disobey work procedures have a risk of experiencing WA 12 times more than SOP-compliant workers.

**Noise exposure and lighting at the workplace:** In this study, most respondents (83.3%) were exposed to noise but still below the threshold limit value (TLV) (85 dB for 8 hours per day). Many studies have concluded that noise exposure reduces the listening ability, lowers alertness and ultimately increases hearing loss and occupational injury risks.29,30 However, in this study, noise exposure isn’t significantly related to occupational accidents; this is probably due to only a small proportion (16.2%) of respondents exposed to noise over the threshold value.

It is found that lighting in the workplace is significantly related to WA. The results of this study reinforce previous research that concluded physical factors at the workplace such as noise, vibration, light, thermal climate and radiation are not merely mean that it will only affect an individual physically but can also have a significant impact on wellbeing and comfort, performance and the risk of an accident.31 The workers, who didn’t expose to light at the TLV, have risk to WA 1.5 times higher than those exposed to light at TLV.

**OHS knowledge and attitude:** Respondents’ knowledge of OHS was mostly good (56.2%), and statistically significant with workplace accidents. This result reinforces previous research that the knowledge of OHS has a significant effect on safety performance. Knowledge are variables that need to be analysed in work behaviour because of its powerful influence on work behaviour, which can affect individual perception, risk assessment, and decision making.32,33 The workers with low OHS knowledge are at risk of WA experiencing 6 times higher than those with high OHS knowledge.

Attitudes of workers toward OHS at work mostly favourable (86.7%), but no associated with the occupational accident. As revealed previously, the attitude was one part of the individual factors influencing risky behaviour and accidents on construction sites. Workers who have been trained and have proper knowledge of his work but still decided to commit unsafe acts, won’t be free of workplace accidents unless they change their attitude.34-36

**Work Fatigue:** Most construction workers experienced mild work fatigue (69.5%), but statistically wasn’t related to workplace accidents. Previous research concluded that occupational fatigue is a potential hazard in the workplace that affects the decreased ability to think logically and decrease the response to danger, and this can lead to workplace accidents,25,35,37 but in this study, it wasn’t proven yet.

**Conclusions and Recommendations**

WA in high building construction in Indonesia, was high as 55.2% of workers had experienced with WA.
62.9% of the WA occurred during the night shift. Age, working experience, working time, adherence of SOP, lighting in the workplace, and knowledge of OHS were associated significantly to the WA incidents. These findings highlight that construction management should give more attention to demographic characteristics and work environment to improve the safety work in high building construction in Indonesia.

Acknowledgement: Authors are very grateful to all workers and management of the construction company who participated in this study.

Ethical Clearance: This study was reviewed and approved by the Ethical Commission of Health and Medical Research, Faculty of Medicine, Mulawarman University, Indonesia.

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Conflict of Interest: Nil

References
Developmental Initiatives for Person with Disabilities: 
Appraisal on Village Based Rehabilitation of 
Amar Seva Sangam

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Abstract

Disability is the type of impairment. Person with disabilities is the people who are physically and mentally affected with some of the impairment whether it may be partial or temporary. It significantly distresses a person’s life happenings and might be current since birth or else arise during a person’s period. Formation of Self-Help Groups is a major approach used to facilitate target population work as a single unit with greater bargaining power. Disabled persons are giving various developmental initiatives to uplift their livelihood. Factually, people with disabilities partake mostly remained on condition that for concluded resolutions that separate out them, such as housing organizations and special schools. Policy consumes now a days removed in the direction of public and educational insertion, and medically intensive solutions have given mode to extra collaborating method recognizing that people remain disabled by eco-friendly issues as fine as by their bodies. This study developmental initiative among person with disabilities was chosen by how they are facing problems in the society, their livelihood needs and how they are excluded from the society. This study aims to identify the needs and their difficulties that are faced in the society and helps to solve them. This study also reveals the exclusion of person with disabilities in the current scenario. This study finally helps to solve the problems of the disabled and provides some developmental initiatives for the livelihood.

Keywords: Disability, Livelihood, Development, Initiatives.

Introduction

Disability is an impairment that might be intellectual, growing, knowledgeable, mental, physical, and sensory or around grouping of these. It significantly marks a person’s life actions and might be existing from birth or happen through a person’s generation. Factually, people with disabilities partake mostly remained on condition that for concluded resolutions that separate out them, such as housing organizations and special schools. Policy consumes nowadays removed in the direction of public and educational insertion, and medically intensive solutions have given mode to extra collaborating method recognizing that people remain disabled by eco-friendly issues as fine as by their bodies. Nationwide and worldwide inventiveness – such by way of the United Nations Standard Rules on the Equalization of Occasions of Peoples with Disabilities– partake combined the human rights of people with disabilities, concluding in 2006 with the implementation of the United Nations Convention on the Rights of Peoples with Disabilities (CRPD). Replies to disability have altered since the 1970s, provoked mainly via the self-organization of people with disabilities, and through the rising propensity to get disability as a human rights problem. Exclusion of any type disconnects individuals from social relations and puts a limit on their full participation in the activities that are assigned by society according to norms and conventions.

Disability: Conceptual Frame: According to World Health Organization’s International Classification of impairments, disabilities, and handicap impairment is defined as a disturbance affecting functions that are essentially mental (memory, consciousness) or sensory, internal organs (heart, kidney), the head, the trunk or the limbs. Disability is a restriction or inability to perform an activity in the manner or within the range considered normal for a human being, mostly resulting from the impairment. Handicap is the result of an impairment.
or disability that limits or prevents the fulfillment of one or several roles regarded as normal, depending on age, sex and social and cultural factors.\(^{(1)}\)

**Causative Factors:** Disability is a major cause of social exclusion and it is both the cause and consequence of poverty (Department for International Development, 2000)\(^{(2)}\). The World Bank studies contended that half a billion people with disabilities are undeniably amongst the poorest of the poor\(^{(4)}\) and are estimated to 15 to 20 percent of the poorest in developing countries\(^{(3)}\). Study projected that the motor disability counts the second highest percentage of disability, it is perhaps the most neglected as it is often felt that this group does not need any special care or attention like the other categories (viz. visual, mental, hearing impaired) and thus characterized as an underrepresented group in the disability movement\(^{(10)}\). The causes of disabilities mainly vary according to different age groups, although there are differences between males and females\(^{(6)}\). It is also important to note that the causes of disability differ according to the type of disability, regions and other background characteristics a person belongs to\(^{(8)}\).

**Review of Literature:** Seventy million people in India cannot step out of their homes because of an inaccessible physical infrastructure and transport system, thus reducing them to families for sustenance and are a burden on society. Accessible infrastructure will enable people with disabilities to get education, employment, and dignity\(^{(7)}\). Access to public transport, toilets, hospitals, government offices, public spaces like parks, educational institutions, places of worship are still inaccessible\(^{(15)}\). The areas like education, teaching aids, books in Braille and interpreters for the hearing and speech impaired are still not available to large sections of the disabled\(^{(9)}\). According to Rao, while disability causes poverty, it is also possible that in a country like India, poverty causes disability\(^{(14)}\). The combination of poverty and disability results in a condition of “simultaneous deprivation.”\(^{(10)}\)

According to Harris-White, this is a syndrome that sets up barriers to the participation of persons with disabilities in the normal routines and activities of the community, including regular schooling\(^{(13)}\). The unreliability of data on the educational participation of children with disabilities is marked- both in terms of estimates in the school going age group and indeed the numbers actually attending school\(^{(12)}\). Not more than 4 percent of children with disabilities have access to education\(^{(11)}\).

A majority of the disabled resides in rural areas where accessibility, availability, and utilization of rehabilitation services and its cost effectiveness are the major issues to be considered\(^{(17)}\). Despite reservation for persons with disabled in employment, the employment rate in India is relatively low compared to that of the all-India working age population, with great variations across gender, the urban/rural sectors and states\(^{(13)}\). Persons with disability suffer from both social and material disability. The society, which is caught up with uniformity, cannot see people with differences with the same eye\(^{(12)}\). For the 40-60 million people with mental and physical disabilities in India, discrimination and stigma are daily occurrences. In a country where social standing including through marriage is crucial, having a disability often means being relegated to the bottom of the pile\(^{(10)}\). Problems of Women with Disability Women and girls with disabled are of all ages, all racial, ethnic, religious, and socioeconomic backgrounds and sexual orientations; they live in rural, urban and suburban communities\(^{(5)}\). Women and girls live at the corner of disability and womanhood with two multiple barriers to achieving their life goals\(^{(8)}\). While many women derive enormous strength, resilience and creativity from their multiple identities, they also face the consequences of discrimination\(^{(9)}\). They are seen imperfect, incomplete, inferior, asexual, and non-productive and denial recognition as women and human beings\(^{(8)}\).

**Objectives of the Study:** This study is made to profile initiatives of Amar sevasangam which is the Amar Seva Sangam is a premier institution in the field of Disability Management in the country, to assess the effectiveness developmental initiative for person with disabilities by Amar Seva Sangam and to analyze the role of village based rehabilitation to enhance the livelihood of person with disabilities.

**Method of Study:** Both qualitative and quantitative method is used. Survey method was used for the study. In order to gather information on the effectiveness of Amar Seva Sangam researcher conducted survey among the person with disabilities. A focus group discussion has conducted and self help group’s members to get improvement for growth factor on availability, accessibility, flexibility and reachability of government policies and development of Amar Seva Sangam. The researcher used two types of tools for data collection; they are Interview Schedule and Focus Group Discussion format.
Result and Discussion

The study on the developmental initiatives of person with disabilities has been carried in Amar Seva Sangam. It also covers the various developmental initiatives that are undertaken by the state and central government and the organization in which they implement that policies and programmes for them. It shows the various measures that are undertaken for the person with disabilities through the organization. The respondents were having busy schedule in their work which made their availability for data collection very difficult.

Developmental Initiatives: It indicates the effectiveness of developmental initiatives by Amar Seva Sangam for the development of person with disability. Majority of the respondents (55 percent) opined that Amar Seva Sangam is giving equipment disable people and 73 percent of them opined that they are getting periodical training and training for livelihood among person with disability (based on the opinion of 78 percent). 54 percent of the respondents are aware of their rights and they are also aware of various welfare schemes and policies for the better livelihood among the person with disability. According to the responses of 83 percent and 80 percent of the respondents they are being safe and free from exploitation and abuse and also getting Barrier Free Environment respectively. Participation in social gathering and recreational activities is common phenomena, it based on the opinion of 64 percent of the respondents.

Role of Self Help Group for development of person with disability: It indicates the role of village based rehabilitation of person with disability especially based on the activities of Self Help Group. Majority of the respondents (79 percent) aware of developmental initiatives and 68 percent are involved in the advocacy activities. 52 percent are opined that they not availed loans and because of the conventional fear in loans. But 41 percent are availed loans and 43 percent are saying yes for appreciation of repayment of loans. According to the opinion of 54, their jobs are supporting for their and also activities in Self Help Group also support for personality development of its members. Economic aspects of the women soap opera viewers. 78 percent of the respondents preferring to watch serial because of luxury interiors. 65 percent of soap opera viewers have greediness to get a luxurious life as like serials. 77 percent have an inferior feeling once seeing the luxurious life in serials. 69 percent are attracted by the urban city life which shown in the serials rarely. 82 percent of them have spendthrift attitude due to regular watching of serials and self motive aspects in serials is very rare, according to the opinion of 82 percent of the respondents.

A structural text modeling was developed based on the opinion raised during focused group discussion among the person with disability in order to analyzing effectiveness of developmental initiatives of Amar Seva Sangam towards the availability, accessibility, reachability and flexibility of initiatives. There are many initiatives are taken by Amar Seva Sangam which was very accessible and available to the disabled in which they are involved very much. The Vocational training organized by the organization are very much accessible, flexible, available and also reachable to the needy. The representation in group of disabled people are very much eager to develop participation and involvement in activities, which was accessible, flexible, available and reachable and it help them to implement new plans and programmes. Amar Seva Sangam are giving loans generating self employment and it leads to transparency.
by means of accessible, flexible, available and reachable of initiatives. Amar Seva Sangam was very helpful for them in getting many benefits given by government and number of persons getting rehabilitation which was more accessible, flexible, available and reachable. The disabled people participation was very high in group activities and the Amar Seva Sangam very much appreciate the involvement. Based on the opinion of the respondents the equipments, aids and appliances are accessible, flexible, available and reachable to the disabled people. Amar Seva Sangam was providing training and developments for disabled people for their livelihood programmes and Introducing new plans and schemes for welfare. Medical camps for needy, periodical training programmes and loan facilities for generating self employment were the regular phenomena of Amar Seva Sangam. It showed the effectiveness of Amar Seva Sangam activities are very much accessible to target group, it is available for purpose, flexible according to the situation and also reachable to right hands.

Conclusion

Disability is not mutually agreed, similar to gender; it is collectively collected from universal truth. The major causes of disability contain a contact at individual; interpersonal, relations and community levels. The researcher carried out an elaborate study on various factors related to disabilities, its causative factors, cognitive factors, various policies by government and developmental initiatives of Amar Seva Sangam especially village based rehabilitation. The study was conducted in four main blocks of Thirunelveli district. The study revealed that disabled people are not aware of the government policies and programmes due to bureaucratic corruption and lack of support from the government officials. So the government policies and programmes for person with disability were not much accessible, available, and also not reachable to the needy. The study further analyzed the effectiveness of Amar Seva Sangam’s developmental initiatives and it is revealed that, developmental activities of Amar Seva Sangam have been very effective and appreciable in sustainable developmental aspects to enhance the livelihood of the person with disabilities than government implementations. So this study helps in promoting effectual actions for obstacle of disability and for remedy of the disable people to develop.

Ethical Clearance: data used in this study pertained from the preliminary field survey at Tirunelveli, Tamil Nadu, India.

Source of Funding: Self

Conflict of Interest: Nil

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Study the Composition of Fatty Acids in Blood Serum Parts During the Fasting Month (Ramadan)

Mohammed A.H. Alobeady1, Raghad A.A. Al Hialy2

1Asst. Professor; 2Lecturer, Chemistry Department, College of Education for Pure Science, University of Mosul

Abstract

This study dealt with the measurement of several variables in the blood serum for a group of people in the case of fasting (Ramadan) for (14-16) hours, where the blood serum was withdrawn from people during daylight hours after fasting (5-8) hours and then follow the same people after (15) days of fasting and then after (25) days as well as blood serum samples were collected for the same people one month after the end of the month of Ramadan and the age of people ranged between (19-80) years and both sexes (males and females) are healthy people and do not suffer from any apparent disease. The study focused on measuring the percentage of fatty acids in the three segments separated from serum (cholesterol ester, triglyceride and phospholipids) which were separated by thin layer chromatography and then the esterification of the separated fatty acids was carried out using (BF3/methanol) method. Percentage of fatty acids (SFA, MUFA and PUFA) using a capillary gas chromatography device The results of this study indicated a significant increase in the percentage of saturated fatty acids, a non-significant decrease in the percentage of monounsaturated fatty acids, and a non-significant decrease in the percentage of polyunsaturated fatty acids in The serum cholesterol ester portion of the fasting group compared with the control group The results of this study indicated a significant increase in the percentage (SFA), a non-significant decrease in the percentage (MUFA), and a non-significant increase in the percentage (PUFA) in the Tricyclic serum for serum group The results of this study showed a significant increase in the percentage (SFA), a significant decrease in the percentage (MUFA), and a significant non-significant decrease in the percentage (PUFA) in the serum phosphate fat portion of the fasting group compared with Control group.

Keywords: Fatty acids, cholesterol ester, fasting, saturated fatty acid.

Introduction

This study was designed to identify the effect of fasting on the level of chemotactic variables and the percentage of fatty acids in serum. Fasting is an integral part of many religions in terms of the pattern, duration and limits of fasting that differ between different religions [1], and fasting in biochemical conditions is to refrain from eating calories for (12-14) hours (2). Ramadan is the ninth month of the Islamic calendar during this month and it is expected that all healthy adult Muslims, males and females abstain from foods, liquids, oral medications and smoking from dawn to sunset and this type of fasting is addressed in our study, which lasts (29 to 30 days) [3] Fasting affects many metabolic processes in the human body and physiological indicators return to normal after the end of the month of fasting, indicating the safety of fasting for healthy people. [1] The human diet is a complex mixture of reactive components that cumulatively affect health [2], and fast e An excellent model of how dietary modifications affect lipid profile [3]. Studies have shown beneficial changes in serum on chemotactic variables in terms of high variables (HDL) and low variables (TG, TC, LDL) that are considered to be the main risk factors For coronary heart disease and cerebro vascular disease [4] diet modification (fasting) is a treatment for hyperlipidemia and is also taken in conjunction with drug therapy in people with coronary heart disease risk. Fasting also affects the percentages of fatty acids in the three parts of the blood serum, as this effect is positive and the percentage of fatty acids with different varieties is balanced in the three parts of the blood serum. [1].

Materials and Method

Blood samples were collected for healthy people who were fasting after a period days and then follow
up the people themselves after (20) days of fasting and control group where the samples were collected for the period (17/5-16/6 (2018), where (5) milliliters of blood was withdrawn for each person and then the samples are left for Serum is separated. After that, the serum divided into two parts.

Section 1: Measurement GLU, TC, HDL, LDL, TG, PL by Kits and VLDL was theoretically calculate.

The second section kept in freezing at (-18)°C until the start of the analysis of fatty acids.

The percentage of fatty acids of the three parts of the serum (CE, PL and TG) was measured after the separation of each of the three parts using (TLC) technique. These parts are distributed on the used silica gel plate resulting from the separation of serum components blood using a solvent system consisting of (hexane/ether/formic acid) in percentages (2:20:80) (V/V/V).[5]

The fatty acids are then re-esterified for each of the three previously separated parts using BF3/Methanol (16%) [6], and then diagnosis and analysis of the percentage of fatty acids for each part using standard models.

Percentage of fatty acids: The serum fatty acid content of the above three components was estimated by means of injecting (1) micro-liters of the model prepared for measurement in the (CGC)[7] Figure (1) shows the graph resulting from the analysis and measurement of the ratio of (23) fatty acid standard using the device (CGC).

Table (1): Standard fatty acids

<table>
<thead>
<tr>
<th>Fatty Acids</th>
<th>Retention Time</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 4:0</td>
<td>2.28</td>
<td>0.09</td>
</tr>
<tr>
<td>C 6:0</td>
<td>3.62</td>
<td>0.14</td>
</tr>
<tr>
<td>C 11:0</td>
<td>6.47</td>
<td>0.15</td>
</tr>
<tr>
<td>C 12:0</td>
<td>10.81</td>
<td>0.172</td>
</tr>
<tr>
<td>C 14:0</td>
<td>13.23</td>
<td>0.084</td>
</tr>
<tr>
<td>C 15:0</td>
<td>15.71</td>
<td>0.18</td>
</tr>
<tr>
<td>C 16:0</td>
<td>18.12</td>
<td>0.086</td>
</tr>
<tr>
<td>C 18:0</td>
<td>20.51</td>
<td>0.17</td>
</tr>
<tr>
<td>C 18:1trans</td>
<td>21.25</td>
<td>0.095</td>
</tr>
<tr>
<td>C 18:1cis</td>
<td>22.79</td>
<td>0.036</td>
</tr>
<tr>
<td>C 18:2</td>
<td>23.46</td>
<td>0.048</td>
</tr>
<tr>
<td>C 18:3</td>
<td>27.47</td>
<td>0.068</td>
</tr>
<tr>
<td>C 20:0</td>
<td>25.22</td>
<td>0.363</td>
</tr>
</tbody>
</table>

Statistical Analysis: The results were analyzed for the levels of chemotherapeutic variables (Glu, TC, LDL, HDL, VLDL, TG and PL) as well as percentage analysis of fatty acids in the three segments separated from serum lipids. Blood using t-test for groups of equal number and different totals to compare the results of people fasting with the control group in general, where the acceptable probability level is (P> 0.05)[8].

Results and Discussion

The results of this study showed a significant decrease in (Glu) concentration in the fasting group compared with the control group. This may be attributed to lower calorie intake during Ramadan compared to other months as well as the nature of muscular effort and sleep during fasting month. [9] The results indicated a significant decrease in (TC) concentration in the fasting group compared to the control group. This is consistent with several studies that indicated this decrease during fasting. Insulin sensitivity. The results also indicated a significant increase in (HDL-C) level in the fasting group compared to the control group. This corresponds to several studies in the case of fasting. The role of hepatic lipase, which controls the level of (HDL-C) and during fasting, is an increase in the effectiveness of hepatic lipase which leads to an increase in the level of this type of cholesterol during the fasting period and low level of (TC) [10]. This study indicated a significant decrease in (LDL-C) level in the fasting group compared with the control group. This corresponds to a number of studies that indicated the possibility of (LDL-C) level during the fasting period[11]. There was a significant decrease in the (TG) in serum in the fasting group compared with the control group. This can be due to the nature of food intake during the fasting period as the concentration of this type of fat depends on the level of neutral triglycerides, which are directly related to the food [12]. (LDL/HDL) is
an important clinical indicators to diagnose the risk of disease Cardiovascular \[13\]. The increase or decrease in this ratio is an indication of the progression of metabolic processes within the normal level and the normal ratio should be less than 3.3 \[14\]. The ratio (TC/HDL) refers to this ratio The risk of developing cardiovascular disease and its probability of occurrence is more specific than the total cholesterol level of serum \[15\]. The results of this study indicated a significant decrease in this percentage of the total fasting compared with the control group, and the ratio (TG/HDL) This is one of the important indicators on the occurrence of atherosclerosis and the higher this percentage increased the probability of developing atherosclerosis \[16\]. The results of this study showed a significant decrease in this ratio in the fasting group compared to the control group. This indicates the usefulness Fasting affecting the insulin level The results of this study indicated a significant decrease in (PL) in the fasting group compared to the control group. The hepatic lipase enzyme is effective during fasting, leading to increased lipolysis in general and phospholipids in particular \[17\] all results shown in Table (2).

Table (2): Biochemical parameters in control group and fasting group

<table>
<thead>
<tr>
<th>Biochemical Parameters</th>
<th>Control</th>
<th>Fasting</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N mmol/l</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>5.04±0.94 *</td>
<td>4.13±0.78*</td>
<td>0.001 &lt;</td>
</tr>
<tr>
<td>TC</td>
<td>4.91±0.81</td>
<td>4.60±0.97</td>
<td>0.093</td>
</tr>
<tr>
<td>HDL-C</td>
<td>1.27±0.42</td>
<td>1.43±0.43</td>
<td>0.059</td>
</tr>
<tr>
<td>LDL-C</td>
<td>3.68±0.70</td>
<td>3.13±0.85</td>
<td>0.001</td>
</tr>
<tr>
<td>VLDL-C</td>
<td>0.58±0.30</td>
<td>0.44±0.14</td>
<td>0.009</td>
</tr>
<tr>
<td>TG</td>
<td>1.40±0.71</td>
<td>1.04±0.53</td>
<td>0.004</td>
</tr>
<tr>
<td>TC/HDL-C</td>
<td>3.86±1.66</td>
<td>3.55±1.12</td>
<td>0.262</td>
</tr>
<tr>
<td>LDL-C/HDL-C</td>
<td>2.89±1.02</td>
<td>2.51±1.00</td>
<td>0.334</td>
</tr>
<tr>
<td>TG/HDL-C</td>
<td>1.05±0.62</td>
<td>0.79±0.46</td>
<td>0.051</td>
</tr>
<tr>
<td>PL mg/100ml</td>
<td>126±34.3</td>
<td>80.3±2.97</td>
<td>0.017</td>
</tr>
</tbody>
</table>

* Mean±SD

**Fatty acids in the cholesterol ester:** The results of this study showed a significant increase in the percentage of (SFA) for the fasting group compared with the control group. A significant decrease in the percentage of (MUFA) for the fasting group compared with the control group. There was a significant decrease in the ratio of (PUFA) to the fasting group compared to the control group as shown in Fig. 2 and Table 3. Lipid triglycerides in adipose tissue (ATGL) that oxidize and metabolize fats, especially cholesterol ester and triglycerides in adipose tissue \[18\] [19]. Located in For food with their serum levels and give an indication of the usefulness of fasting in affecting the proportion of fatty acids of all kinds in this part of the blood serum \[20\] [21].

Table (3): Fatty acids in the cholesterol ester

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>Control</th>
<th>Fasting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:0</td>
<td>5.22±0.16*</td>
<td>4.40±1.49</td>
</tr>
<tr>
<td>11:0</td>
<td>1.95±0.16</td>
<td>4.25±1.70</td>
</tr>
<tr>
<td>12:0</td>
<td>2.35±0.18</td>
<td>4.84±1.36</td>
</tr>
<tr>
<td>14:0</td>
<td>2.55±0.18</td>
<td>3.71±0.33</td>
</tr>
<tr>
<td>15:0</td>
<td>2.27±0.14</td>
<td>4.44±1.84</td>
</tr>
<tr>
<td>16:0</td>
<td>2.35±0.19</td>
<td>8.78±3.89</td>
</tr>
<tr>
<td>18:0</td>
<td>2.16±0.11</td>
<td>2.42±0.33</td>
</tr>
<tr>
<td>20:0</td>
<td>2.74±0.10</td>
<td>2.13±0.52</td>
</tr>
<tr>
<td>21:0</td>
<td>5.85±0.12</td>
<td>4.08±1.18</td>
</tr>
<tr>
<td>22:0</td>
<td>1.86±0.01</td>
<td>2.49±0.47</td>
</tr>
<tr>
<td>23:0</td>
<td>2.51±0.02</td>
<td>2.31±0.88</td>
</tr>
<tr>
<td>24:0</td>
<td>2.66±0.23</td>
<td>1.99±0.49</td>
</tr>
<tr>
<td>Total</td>
<td>34.47±1.6</td>
<td>45.83±15.48</td>
</tr>
</tbody>
</table>

* Mean±SD

**Fatty acids in the triglyceride:** The results of this study indicated a significant increase in (SFA) for the fasting group compared with the control group as . This may be due to insulin sensitivity during the fasting period. There is an inverse relationship between insulin sensitivity and fatty acid level \[22\]. This is due to the effect of fasting on a number of specific enzymes. By removing saturation and elongation which plays an important role in increasing . This may be due largely to food intake in addition to The effect of fasting on enzymes that regulate lipolysis \[23\] which leads to the formation of a greater percentage of polyunsaturated fatty acids through increased fat oxidation and de-saturation of some short-
chain acids and converted to long chain (PUFA) and this corresponds to a number of recent studies in the field of fasting.\textsuperscript{[24]} The percentage of fatty acids indicates and its installed in triple part of the serum in general to the amount of fatty acids within the existing food intake, as the proportion of fatty acids in this part of the blood serum are highly correlated associated with the nature and the amount of fatty acids present in the intake of food during the fasting period.\textsuperscript{[25]}

**Fatty Acids in the Phospholipids:** The results of this study indicated a significant increase in the (SFA) of the fasting group compared with the control group. This may be due to the role of the liver during the fasting process as the liver plays an essential role in the formation or demolition of this type of phospholipids by controlling the amount of (SFA) entering or exiting the blood serum to the liver, which affects the percentage of this type of acid as the process of demolition of fat increases during the fasting period and the liver plays a major role in this process\textsuperscript{[26]} and to The presence of a significant decrease in the level of fatty acids This may be attributed to the fact that fasting affects the body mass rate in the first stage by activating the activity of the enzyme lipoprotein lipase and thus affecting the rate of formation of triglycerides. The results of this study indicated that there was increase in the percentage of fatty acid (22: 2n6) of serum dimple, fasting group compared with the total. This can be attributed to insulin sensitivity, which in turn affects the action of desaturating enzymes, since the action of these enzymes is closely related to The results of this study indicated that there is a variation in the percentage of fatty acids in this part of the blood serum compared ester cholesterol and triglycerides, which is consistent with many studies in this area. As the proportion of fatty acids in this part of the blood serum\textsuperscript{[27]} It is an indication of the importance of fasting by increasing compatibility and hepatogenesis of both (SFA), especially fatty acid (16: 0) and (PUFA) n: 3, as phospholipids are a good vector for recycling fatty acid of fatty proteins it promotes the health of the body through the redistribution and transmission of fatty acids between different parts of the serum.\textsuperscript{[28]}

**Conclusions**

1. The study indicated a significant decrease in serum(TC) level in the fasting group compared to the control group, which indicates the usefulness of fasting in reducing the risk of high serum cholesterol. High serum cholesterol leads to an increased risk of heart disease and atherosclerosis.
2. The study indicated a significant rise in (HDL) level and a significant decrease in LDL level. This proves the role of fasting in controlling metabolism in general and fat metabolism in particular. The body fats fat during fasting as a major source of energy during the fasting period and then the body returns to normal after breakfast.
3. The study indicated the effect of fasting on the level of fatty acids (PUFA/MUFA/SFA) in the three parts of the serum where the effects were different from high percentage of fatty acids and low percentage of (MUFA). The multicomponent compared with control groups demonstrating the role of fasting in influencing the metabolism of all types of fatty acids in different parts of the serum.

**Ethical Clearance:** All samples were taken from colleges at dept. of chemistry-Mosul university, according to their agreement.

**Source of Funding:** Self-funding.

**Conflict of Interest:** Nil.

**References**

23. Marks K. Fasting enriches liver TG with n-3 PUFA... Genes Nutr Doi. 2015;10(1007).
Effects of Paan Dependence and the Attitude-Social Influence-Self Efficacy (ASE) Model on Paan-Use Cessation Intention among Bangladeshi Women

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Abstract

Background/Objectives: This study aimed to identify the factors influencing paan-use cessation intention (PUCI) among Bangladeshi women to obtain basic data for the development of paan-use cessation (PUC) programs.

Method/Statistical analysis: 173 Bangladeshi women participated in the study between May and June 2019. Data were analyzed using descriptive statistics, chi-square, factor analysis, t-test, and logistic regression analysis.

Findings: Among participants, 54.3% had PUCI. Factors influencing PUCI were attempt at PUC in the past year, recognizing the need for education on PUC, PUC attitude, and secondary dependence motives.

Improvements/Applications: Customized PUC programs should be developed based on Bangladesh women’s demographic and paan-use characteristics, actively encouraging attitude formation related to PUC.

Keywords: Chewing tobacco, tobacco dependence, tobacco use cessation, intention, Bangladeshi women.

Introduction

Paan refers to betel quid chewing. It is estimated that approximately 10-20% of the global population use paan. Bangladesh has very high paan-use rates, in particular, showing higher rates among women than men.

Paan is known to be highly addictive, and contains nicotine, harmful substances and carcinogens, having a negative impact on pregnancy and childbirth. Therefore, paan use among Bangladeshi women affects not only their own health but that of the following generation, which highlights the urgent need for PUC.

Existing studies on paan use in Bangladesh have focused on identifying paan use rates, harmfulness of paan, and demographic characteristics related to paan use, which demonstrates that paan, unlike cigarettes, is socially accepted in Bangladesh.

Previous studies on smoking have shown that smoking-cessation intention plays an important mediating role, eventually leading to actual smoking cessation. Smoking-cessation intention in Trantheoretical model (TTM) is a predictor of success in smoking cessation. Thus, the more smoking-cessation intention, the more likely people intend to attempt to stop smoking. From this perspective, it is important to identify the level of paan dependence, PUCI, and factors influencing such intention for successful PUC among Bangladeshi women.

The ASE model is suitable for identifying health-promotion-related behaviors and intentions for such behaviors and has been used for studies on smoking-cessation intention and areca nut chewing among Taiwanese adolescents and college students as well as predicting the intention to quit school. Based on these studies, the effectiveness of the ASE model has been adequately validated.

This study aimed to establish basic data for the development of PUC programs and measures to promote PUC among Bangladeshi women.
The specific objectives were to:
1. Identify paan dependence, ASE model factors, and PUCI among Bangladeshi women.
2. Identify PUCI according to the general characteristics of participants (demographics and characteristics related to paan use and cessation).
3. Identify associations of PUCI with ASE factors and paan dependence.
4. Identify the factors influencing PUCI.

Materials and Method

This study involved a descriptive study of Bangladeshi women who used paan aiming to identify the influence of paan dependence and ASE model factors on PUCI.

Theoretical Framework: To determine potential factors influencing PUCI, general characteristics included demographics showing differences regarding paan use rate\textsuperscript{[12]} as well as paan use, which dependence increases with use\textsuperscript{[2]}, and PUC characteristics influencing PUCI.

Panan dependence represents desire and repeat of paan use, classified as positive dependence motives (PDMs): loss of control/craving and etc., and secondary dependence motives (SDMs): affective enhancement and etc.\textsuperscript{[13]}.

In the ASE model, attitude refers to making a positive or negative assessment for PUC\textsuperscript{[7]}. Social influence contains both social norms, modeling and social support from their families or peers for PUC\textsuperscript{[14]}. Self-efficacy refers to the confidence that an individual can perform PUC\textsuperscript{[15]}. Meanwhile, PUCI refers to the willingness to quit using paan in the near future; in the present study, this was assessed with “I will quit paan sometime in the future,” which was answered as “yes/no.”

Research Participants and Data Collection: Participants in this study were women aged 18–59 years using paan for at least 6 months in the impoverished region of Dhaka. The required sample size was calculated with G*Power 3.1, based on a significance level of .05, statistical power of .95, and effect size of .15. Considering a drop-out rate of 20\%, questionnaires were distributed to 192 women. Excluded containing invalid responses, as a result, 173 questionnaires were used in the final analysis. Data were collected between May and June 2019 using a self-report questionnaire. Participants provided written informed consent. For illiterate participants, the questions were read to them by a local interpreter.

Instruments: This study used a structured questionnaire. Permission of each instrument was obtained from each corresponding researcher, which was revised and supplemented for application to paan in this study and was rated on a 5-point scale.

Variables related to paan use and cessation: The study used six items related to paan use and seven related to PUC, which were revised and modified from Global Adult Tobacco Survey (GATS) Bangladesh 2009\textsuperscript{[16]}.

Panan dependence: The Oklahoma Scale for Smokeless Tobacco Dependence (OSSTD)\textsuperscript{[13]} with 23 items was used, which are divided into two major categories: PDMs and SDMs. The reliability of the instrument as measured by Cronbach’s $\alpha$ was .93 and .96 in a previous study\textsuperscript{[13]} and this study, respectively.

ASE factors related to PUC

Attitude. The attitude instrument in a previous smoking-cessation intention study\textsuperscript{[7]} was used with 16 items. Some items were scored reversely. Higher scores indicate a more positive attitude toward PUC. Cronbach’s $\alpha$ was .65 and .64 in a previous study\textsuperscript{[7]} and this study.

Social influence. The social influence instruments was used in previous studies\textsuperscript{[7,11]} with six items: two for social norm, modeling, and social support, respectively. After data collection, factor analysis was performed. The component analysis of subdomains showed that social influence could be divided into two components; thus, excluded social norms, only the four items in modeling and social support were used. Higher modeling scores indicated more PUC models around the participants and higher social support scores indicated greater support for PUC. Cronbach’s $\alpha$ was .65, .86 and .61 in previous studies\textsuperscript{[7,11]} and this study.

Self-efficacy. The self-efficacy instrument was used in a previous study\textsuperscript{[7]} with 12 items. Higher scores indicated higher self-efficacy regarding PUC. Cronbach’s $\alpha$ was .83 and .94 in a previous\textsuperscript{[7]} and this study.

Data Analysis: Collected data were analyzed using SPSS 23 version with descriptive statistics, t-test, chi-square, factor analysis, and logistic regression analysis.
Results

The mean paan dependence (PDMs+SDMs) score was 3.62 (SD=1.19). The mean score of attitude was 2.89 (SD=0.54), while the mean self-efficacy score was 2.47 (SD=1.24). And, 54.3% had PUCI (Table 1).

Table 1: The level of paan dependence, PUC-related ASE model factors, PUCI (N=173)

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
<th>M±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paan dependence (PDMs+SDMs)</td>
<td>3.62±1.19</td>
<td></td>
</tr>
<tr>
<td>PDM</td>
<td>3.67±1.25</td>
<td></td>
</tr>
<tr>
<td>SDM</td>
<td>3.60±1.21</td>
<td></td>
</tr>
<tr>
<td>ASE model factors related PUC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>2.89±0.54</td>
<td></td>
</tr>
<tr>
<td>Social influence</td>
<td>3.06±1.16</td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td>2.93±1.38</td>
<td></td>
</tr>
</tbody>
</table>

The mean age was 38.26 years and 74.6% were unemployed (Table 2). There were significant differences in PUCI by general characteristics; age ($\chi^2=9.60, p=.022$), education level ($\chi^2=11.93, p<.001$), frequency of paan use ($\chi^2=13.13, p<.001$), period of paan use ($\chi^2=9.55, p=.023$), average paan use per day ($\chi^2=17.16, p<.001$), age at first paan use ($\chi^2=7.49, p=.024$), having attempted PUC in the past year ($\chi^2=29.66, p<.001$), and need for PUC education ($\chi^2=12.65, p<.001$).

Table 2: Distribution of PUCI by general characteristics (N=173)

<table>
<thead>
<tr>
<th>Variables</th>
<th>PUCI</th>
<th>(\chi^2) or (t) ((p))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (Years old)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-29</td>
<td>6 (7.6)</td>
<td>19 (20.2)</td>
</tr>
<tr>
<td>30-39</td>
<td>30 (38.0)</td>
<td>37 (39.4)</td>
</tr>
<tr>
<td>40-49</td>
<td>20 (25.3)</td>
<td>25 (26.6)</td>
</tr>
<tr>
<td>≥50</td>
<td>23 (29.1)</td>
<td>13 (13.8)</td>
</tr>
<tr>
<td></td>
<td>(38.26±0.28)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>59 (74.7)</td>
<td>46 (48.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>20 (25.3)</td>
<td>48 (51.1)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>63 (79.7)</td>
<td>66 (70.2)</td>
</tr>
<tr>
<td>Yes</td>
<td>16 (20.3)</td>
<td>28 (29.8)</td>
</tr>
<tr>
<td>Socioeconomic status(SES, Monthly rent payment)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>41 (51.9)</td>
<td>39 (41.5)</td>
</tr>
<tr>
<td>Middle</td>
<td>18 (22.8)</td>
<td>17 (18.1)</td>
</tr>
<tr>
<td>Higher</td>
<td>20 (25.3)</td>
<td>38 (40.4)</td>
</tr>
<tr>
<td>Paan-use Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of paan use</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70 (88.6)</td>
<td>61 (64.9)</td>
</tr>
<tr>
<td></td>
<td>Occasional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 (11.4)</td>
<td>33 (35.1)</td>
</tr>
<tr>
<td>Period of paan use (Years)</td>
<td>&lt;5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 (25.3)</td>
<td>34 (36.2)</td>
</tr>
<tr>
<td></td>
<td>5-&lt;10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (13.9)</td>
<td>24 (25.5)</td>
</tr>
<tr>
<td></td>
<td>10-&lt;15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (13.9)</td>
<td>11 (11.7)</td>
</tr>
<tr>
<td></td>
<td>≥15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37 (46.8)</td>
<td>25 (26.6)</td>
</tr>
<tr>
<td>Average paan use per day</td>
<td>&lt;5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23 (29.1)</td>
<td>57 (60.6)</td>
</tr>
<tr>
<td></td>
<td>≥5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 (70.9)</td>
<td>37 (39.4)</td>
</tr>
<tr>
<td>Age at the first paan use (years old)</td>
<td>&lt;18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (13.9)</td>
<td>23 (24.5)</td>
</tr>
<tr>
<td></td>
<td>18-&lt;30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31 (39.2)</td>
<td>45 (47.9)</td>
</tr>
<tr>
<td></td>
<td>≥30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37 (46.8)</td>
<td>26 (27.7)</td>
</tr>
</tbody>
</table>
There were significant differences in PUCI by paan dependence (PDMs+SDMs) \((t=4.97, \ p<.001)\), PDMs \((t=4.54, \ p<.001)\), SDMs \((t=4.98, \ p<.001)\), and among ASE model factors, attitude \((t=-4.75, \ p<.001)\) and self-efficacy \((t=-4.86 \ p<.001)\) (Table 3).

### Table 3: Distribution of PUCI by paan dependence and PUC-related ASE model factors (N=173)

<table>
<thead>
<tr>
<th>Variables</th>
<th>PUCI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>M±SD</td>
</tr>
<tr>
<td>Paan dependence (PDMs+SDMs)</td>
<td>4.07±0.92</td>
</tr>
<tr>
<td>PDMs</td>
<td>4.10±1.01</td>
</tr>
<tr>
<td>SDMs</td>
<td>4.06±0.92</td>
</tr>
<tr>
<td>PUC-related ASE Model</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>2.70±0.39</td>
</tr>
<tr>
<td>Social influence</td>
<td>3.02±1.12</td>
</tr>
<tr>
<td>Modeling</td>
<td>2.80±1.33</td>
</tr>
<tr>
<td>Social support</td>
<td>3.24±1.64</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>2.00±1.00</td>
</tr>
</tbody>
</table>

In Table 4, the logistic regression model using the Backward: Likelihood Ratio (LR) method was significant \(\chi^2=75.68, \ p<.001\). The odds of having PUCI was 7.85 times higher when PUC had been attempted in the past year; 5.49 times higher for participants who recognized the need for PUC education; and 2.88 times higher when the mean score for PUC attitude had increased by 1 point. On the other hand, a 1-point increase in SDMs led to a 0.61 odds increase, indicating a lower likelihood of having PUCI.

### Table 4: Factors influencing PUCI (N=173)

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.02</td>
<td></td>
<td>.031</td>
</tr>
<tr>
<td>Attempt at PUC in the past year (Yes)*</td>
<td>7.85</td>
<td>3.24-19.05</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Need of PUC education (Yes)**</td>
<td>5.49</td>
<td>1.87-16.09</td>
<td>.002</td>
</tr>
<tr>
<td>Attitude</td>
<td>2.88</td>
<td>1.09-7.61</td>
<td>.033</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>1.48</td>
<td>1.00-2.19</td>
<td>.052</td>
</tr>
<tr>
<td>SDMs</td>
<td>.61</td>
<td>.41-.91</td>
<td>.016</td>
</tr>
</tbody>
</table>

\(\chi^2=75.68, \ p<.001\), Nagelkerke \(R^2=.474\)

*Dummy variable: Attempt at PUC in the past year (No), **Dummy variable: Need of PUC education (No)
Discussion

This study was to identify the factors influencing PUCI among Bangladeshi women with a focus on paan dependence and the ASE model.

Regarding the general characteristics, almost half were aged 40 years and over and had lower SES, and over 60% had not received regular education and had no occupation with similar results to paan-use studies in Bangladeshi women\(^\text{[5,16,12]}\) and in Malaysians (mostly Indians)\(^\text{[17]}\). And, approximately 20% was under 18 years at first paan use, which indicates that paan use started at an early age\(^\text{[2]}\) because of seeing family members use paan\(^\text{[6]}\) and became a long-term habit, recognizing paan use as a positive behavior\(^\text{[18]}\).

As for four significant factors of PUCI in the logistic regression analysis, PUC education needs to be provided for individuals who have previously attempted PUC in exploring the reasons for failure in previous attempts and promoting success through stress management\(^\text{[6]}\) and image training for coping with enticement and intimidation from other paan users.

Recognizing the need for PUC education reflects the desire of participants to obtain accurate information about paan. Low awareness and knowledge about paan could act as motivating factors that make it easier to use paan\(^\text{[7]}\), thus, educational activities regarding paan-use risk\(^\text{[6]}\) must be provided in considering the education level and targeting those aged 30-39 years showing the highest PUCI.

More negative attitude toward PUC results in lower PUCI. Therefore, in Bangladesh, where is liberal about paan use\(^\text{[6]}\), long-term and repetitive education is more ideal than short-term, single-session education for enhancing PUC attitude.

Regarding SDMs, in particular, choline in areca nut, an ingredient in paan, excites the parasympathetic nerves to slow tension and induces a euphoric feeling\(^\text{[2]}\), and in zarda, an ingredient in paan, the nicotine content more than doubles that in typical cigarettes\(^\text{[3]}\), thus, a higher frequency of paan use increases paan dependence, making PUC even more difficult. Therefore, it is important to start PUC education as early as possible, even before paan use, and to immediately target paan users with a shorter period and a lower frequency of use.

Meanwhile, to increase self-efficacy, as not shown a significant factor, it is important to acquire skills to prevent re-use of paan where paan use is typically consumed\(^\text{[6]}\), along with identifying helpers with positive reinforcement. Moreover, social influence was not also an influencing factor because paan use in Bangladesh is in strong community-based bonds. Therefore, a group approach considering sociocultural aspects is recommended over an individual approach\(^\text{[5]}\).

This study is significant because it was the first study conducted in Bangladesh to analyze PUCI among Bangladeshi women focusing on paan dependence as well as ASE model factors regarding PUC. The high paan use rate and dependence among our participants re-emphasize the need for future systematic studies in Bangladesh. However, because the participants in this study were residents in an impoverished region, the paan-use rate may have been high consistent with previous studies\(^\text{[5,12]}\), thus, it may be difficult to generalize the findings to other regions, and further studies including participants from other areas are needed.

Conclusions

Despite relatively high PUCI, close most participants did not attempt to quit. Having attempted PUC in the past year, recognizing the need for PUC education, positive attitude toward PUC, and lower paan dependence were significant factors influencing PUCI. Therefore, there is the need for systematic education and promotion of tolerant social awareness about paan use based on a sociocultural approach. Moreover, it is important to develop customized PUC programs that reflect the characteristics of paan users.

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Conflict of Interest: Nil

References


Analysis of Biscuit Nutrition Material with Addition of Morning Flour (Moringa Oleifera) from Different Treatments

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Abstract

This study aimed to analyse the content of macro and micronutrients in flour and biscuits with three treatments. This research is a quantitative study with an experimental method of 3 treatments of wheat flour and moringa leaf flour. The results of macro nutrient of moringa leaf flour showed water content of K1 = 6.58%, K3 = 10.28%, K4 = 10.31%. Energy of K1 = 382.48 kcal, K3 = 367.00 kcal, K4 = 369.83 kcal. Carbohydrate of K1 = 43.12%, K3 = 40.78%, K4 = 40.40%. Protein of K1 = 29.82, K3 = 31.78%, K4 = 33.18%. Fat of K1 = 10.08%, K3 8.63%, K4 8.39%. Micronutrient substances namely vitamin C of K1 = 2.66 mg, K3 = 4.51 mg, K4 = 11.19 mg, vitamin B12 of K4 = 0.09. Iron of K1 = 20.90 mg, K3 = 18.14 mg, K4 = 13.34 mg. Zinc of K1 = 3.22 mg, K3 = 3.33 mg, K4 = 3.53 mg. The results of macro nutrient analysis of moringa biscuits showed water content of BK4.1 = 8.84%, BK4.2 = 4.12%, BK4.3 = 6.77%. Energy of BK4.1 = 485.83 kcal, K4.2 = 495.32 kcal BK4.3 = 458.50 kcal. Carbohydrate of BK4.1 = 58.83%, K4.2 = 58.04%, BK4.3 = 58.81%. Protein of BK4.1 = 9.82%, K4.2 = 11.16%, BK4.3 = 11.52%. Fat of BK4.1 = 23.47%, K4.2 = 24.28%, BK4.3 = 19.02%. Micronutrient substances namely vitamin C of BK4.2 = 1.58 mg, Iron of BK4.1 = 8.22 mg, BK4.2 = 9.53 mg, BK4.3 = 13.39 mg. Zinc of BK4.1 = 2.16 mg, BK 4.2 = 3.59 mg, BK 4.3 = 7.72 mg. It can be concluded from nutrient content analysis, the high nutrient content moringa leaf flour was 6 months stored moringa leaf flour because of low water content. While the macro nutrient content of the 3 biscuit treatments was almost the same while the highest micronutrient of iron and zinc was found on biscuit with wheat flour and Moringa flour ratio of 1:1.

Keywords: Macro nutrient, Micro nutrient, Biscuit, Moringa leaf flour.

Introduction

Moringa (Moringa oleifera) is a plant that has been known for centuries as a multi-use plant, nutrient dense and can be used as medicine¹. Most frequently studied moringa species is moringa oleifera and has gained much recognition for their high nutritional value in the form of rich minerals, such as calcium and iron which are essential for growth and development².

Moringa contains 46 powerful antioxidants that protect the body from free radicals, 18 amino acids (8 essential amino acids) needed by the body to build new cells, 36 anti-inflammatory compounds, and 90 natural nutrients such as vitamins and minerals. In the beginning, many people did not believe that there is multipurpose plant that has so many nutrients and medicinal properties, even has better content than other food sources³.⁴.

Moringa is a plant that thrives in Indonesia with various benefits which contains high protein, β-carotene, vitamin C, minerals especially iron and calcium⁵. Nutrients in moringa leaves except for vitamin C have increased in quantity when dried and then processed into powder. Moringa oleifera has great potential for use as a natural preservative and nutraceutical in the food industry⁶.
Research into the influence of giving Moringa oleifera biscuits to hemoglobin (Hb) status in pregnant women shows that there was a significant difference between the groups with biscuits (60 g) and the control group (p≤0.05). Giving Moringa biscuits per day to pregnant women with anemia as an alternative to overcome the problem of malnutrition and anemia in pregnant women. Moringa leaves are a good medicinal plant during pregnancy and postpartum. Biscuits are a popular food, by adding Moringa leaf flour to the process of making biscuits, good for health biscuits can be produced. Moringa leaves contain high protein, vitamins and minerals.

The study was conducted on cakes made from a mixture of Moringa stenopetala (MLP) leaf powder with wheat flour for breastfeeding mothers who lack iron. MLP and wheat flour are mixed in a ratio of 0:100, 5:95, 10:90, 15:85 and 20:80 by using a simplex mixture lattice design and consumption of 100 g cookies per day, so as to meet 53.6% of RDA of nursing mothers. In general, this study showed that T5 (20% MLP mixed) contains higher amounts of Fe, Zn, Ca and P.

Based on these results the manufacture of Moringa leaf flour for biscuits uses heat and food composition table. So to find out the overall nutritional content, it is necessary to do further analysis of the macro and micro nutrient content in biscuits by using Moringa leaf flour from two treatments namely with sunlight and oven. Based on this background, the study aimed to analyze the macro and micro nutrients in flour and biscuits with three treatments.

**Method**

This type of research is a quantitative study with a randomized block design experimental method (RBD) with three treatments. This research was conducted in three stages, the first stage was Moringa leaf flour production, the second stage was Moringa Biscuits production and the third stage was nutrient analysis. Moringa leaf flour production was performed with 2 treatment, the first treatment was that Moringa leaves were blanched then dried (K1). The second treatment was Moringa leaves were blended and then aerated at room temperature (K2), moringa leaf flour which has been stored for > 6 months (K3). Biscuits were made from flour with all nutrients from nutrient analysis, namely K2 flour. Biscuits were made in 3 treatments. The first treatment was that biscuits were made with a ratio of 2:1 between flour and Moringa flour, second treatment was 3:2.5 ratio of flour and Moringa flour, third treatment was 1:1 ratio of flour and Moringa flour.

**Results and Discussion**

Nutrient content analysis was performed at the Saraswanti Indo Genetech (SIG) Laboratory Bogor. There were several analytical method used in this study namely, the water content analysis with SNI 29732011 method point A.3, carbohydrate analysis with 18-8.9/MU/SMM-SIG method, protein analysis with 18-8-31/MU/SMM-SIG. Weibull method.

**Table 1: The results of macro nutrient analysis of Moringa Leaf Flour in 100 gram samples**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Water Content (%)</th>
<th>Energy Kcal</th>
<th>Carbohydrate (%)</th>
<th>Protein (%)</th>
<th>Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moringa Flour (K1)</td>
<td>10.28</td>
<td>367.00</td>
<td>40.78</td>
<td>31.78</td>
<td>8.63</td>
</tr>
<tr>
<td>Moringa Flour (K2)</td>
<td>10.31</td>
<td>369.83</td>
<td>40.40</td>
<td>33.18</td>
<td>8.39</td>
</tr>
<tr>
<td>Moringa Flour (K3)</td>
<td>6.58%</td>
<td>382.48</td>
<td>43.12</td>
<td>29.82</td>
<td>10.08</td>
</tr>
</tbody>
</table>

**Table 2: The results of micro nutrient analysis of Moringa Leaf Flour in 100 gram samples**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Vit. C (mg)</th>
<th>Vit. B12 (mg)</th>
<th>Iron (mg)</th>
<th>Zinc (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moringa Flour (K1)</td>
<td>4.51</td>
<td>-</td>
<td>18.14</td>
<td>3.33</td>
</tr>
<tr>
<td>Moringa Flour (K2)</td>
<td>11.19</td>
<td>0.09</td>
<td>13.34</td>
<td>3.53</td>
</tr>
<tr>
<td>Moringa Flour (K3)</td>
<td>2.66</td>
<td>-</td>
<td>20.90</td>
<td>3.22</td>
</tr>
</tbody>
</table>
Table 1 shows that the macro nutrients of water, energy, carbohydrates and fats in the moringa leaf flour which was dried in the sun compared to those that was aerated were almost the same. Whereas the Moringa leaf flour which was stored for >6 months had lower water and protein content. While the levels of Energy, carbohydrates and fat was more than new Moringa leaf flour. The protein content of moringa leaf flour is very good. Moringa (Moringa oleifera) thrives in tropical and subtropical regions. This plant is rich in nutrients more than other plants and should be able to be a potential source of vegetable protein, but in reality it has not been utilized maximally.13

Table 2 shows high level vitamin of the Moringa leaves which were aerated at room temperature as well as vitamin B12 while iron levels were lower than the others. 6 months stored moringa flour had lower levels of vitamin C, but higher iron content, but zinc levels were lower than new Moringa leaf flour.

Biscuits were made using moringa leaf flour which was blanched and aerated at room temperature (K2). Biscuits were made with 3 treatments. First biscuits with the code BK2.1 are biscuits made with the ratio of wheat flour and moringa leaf flour of 2:1, biscuits with code BK 2.2 which are biscuits made from wheat flour and Moringa leaves with a ratio of 3:2.5, Biscuits with code BK 2.3 which are biscuits made with a ratio of wheat flour and Moringa flour of 1:1.

Table 3 shows the results of macro nutrient analysis of Moringa Leaf Biscuit in 100 gram samples

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Water Content (%)</th>
<th>Energy Kcal</th>
<th>Carbohydrate (%)</th>
<th>Protein (%)</th>
<th>Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moringa Biscuit (BK 2.1)</td>
<td>8.84</td>
<td>485.83</td>
<td>58.83</td>
<td>9.82</td>
<td>23.47</td>
</tr>
<tr>
<td>Moringa Biscuit (BK 2.2)</td>
<td>4.12</td>
<td>495.32</td>
<td>58.04</td>
<td>11.16</td>
<td>24.28</td>
</tr>
<tr>
<td>Moringa Biscuit (BK 2.3)</td>
<td>6.77</td>
<td>458.50</td>
<td>58.81</td>
<td>11.52</td>
<td>19.02</td>
</tr>
</tbody>
</table>

Table 3 shows that the higher the amount of moringa leaf flour used the lower the energy and fat content but the amount of protein increases. While carbohydrates are almost equal in three treatments.

Table 4 shows that the higher the ratio of moringa leaf flour used to make biscuits, the higher iron and zinc.

Table 4: The results of micro nutrient analysis of Moringa Leaf Biscuit in 100 gram samples

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Vit. C (mg)</th>
<th>Vit. B12 (mg)</th>
<th>Iron (mg)</th>
<th>Zinc (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moringa Biscuit (BK 2.1)</td>
<td>-</td>
<td>-</td>
<td>8.22</td>
<td>2.16</td>
</tr>
<tr>
<td>Moringa Biscuit (BK 2.2)</td>
<td>1.58</td>
<td>-</td>
<td>9.53</td>
<td>3.59</td>
</tr>
<tr>
<td>Moringa Biscuit (BK 2.3)</td>
<td>-</td>
<td>-</td>
<td>13.39</td>
<td>7.72</td>
</tr>
</tbody>
</table>

Table 4 shows that the higher the ratio of moringa leaf flour used to make biscuits, the higher iron and zinc.

Another result of the study on the influence of Moringa oleifera biscuit on the hemoglobin (Hb) status of pregnant women showed that there were significant differences between the treatment and control groups after the intervention (p ≤0.05). By giving five pieces (60 g) of Moringa biscuits per day as an alternative to overcome the problem of malnutrition in pregnant women, especially to increase Hb levels. Moringa leaves are medicinal plants for pregnancy and postpartum.

In table 3 shows the lowest water content, this shows the results of very crispy biscuits. The low water content of biscuit that is too low will result in biscuits that are charred and biscuit colors that are too dark, whereas if the water content is too high then the resulting biscuits have a structure that is not too crunchy and will trigger rapid changes in flavor during storage.

Acceptance test was conducted on Biscuit A with a ratio of Moringa flour and flour that is 1:1 while Biscuit B with a ratio of 3:2.5 between flour and Moringa flour.
Table 5: Acceptance Test of Biscuit A and Biscuit B

<table>
<thead>
<tr>
<th>Product</th>
<th>Indicator</th>
<th>Aroma</th>
<th>Texture</th>
<th>Flavor</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biscuit A</td>
<td>Strongly like</td>
<td>16</td>
<td>10</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Like</td>
<td>29</td>
<td>33</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Fairly like</td>
<td>22</td>
<td>31</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Dislike</td>
<td>11</td>
<td>6</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Strongly dislike</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Biscuit B</td>
<td>Strongly like</td>
<td>33</td>
<td>34</td>
<td>41</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Like</td>
<td>34</td>
<td>37</td>
<td>27</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Fairly like</td>
<td>10</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Dislike</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Strongly dislike</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

The result of acceptance test on aroma, texture, flavor and color, showed Biscuit B product was the favorite with a ratio of flour and Moringa which is 3:2.5 with code of BK 2.2.

Conclusion

Based on the analysis of macro and micro nutrients in moringa leaf flour showed that moringa leaf flour which is made by blanching and aerated at room temperature had the highest value of nutrients. Vitamin C and vitamin B12 levels were still present even though the amount was small. The results of the analysis of macro nutrients in biscuits showed that higher Moringa leaf flour, the lower energy and fat content. The higher Moringa leaf flour used, the higher tiron and zinc content. But the organoleptic test results showed that the biscuit preferred by respondents was biscuit BK.2.2.

Ethical Clearance: Taken from Poltekkes Kemenkes Palu, City of Palu, Indonesia committee.

Source of Funding: Poltekkes Kemenkes Palu, City of Palu, Indonesia

Conflict of Interest: None

Reference

10. Lestari RS., Hartono R., Gizi J., Kemenkes PK. Formulation of Making Supplementary Food


Role of Community Based Programmes for Active Ageing:
Elders Self Help Group in Kerala

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Abstract

Ageing is an inevitable process in human life. It is primarily considered as a physiological phenomenon but an individual’s economic, psychological and social areas can affect by the ageing process. Old age population has been growing at an unprecedented rate all over the world. It is true that people live longer because of improved nutrition, sanitation, medical advances, health care, education and economic well-being. In this context there is a felt need to develop new strategies to ensure the welfare and need of old age population. Community based programmes which are easily accessible to elderly can lend a hand for the welfare and long term care of the elderly. Elders Self Help Group (ESHG) is a community based organization of older people above 60 years aimed at improving living conditions for elderly. The need for different type of community based programmes designed exclusively for the welfare of elderly has been indicated by the findings of the present research. The Elders Self Help Group can facilitate the active ageing among the elderly and the pillars of active ageing such as participation, health and security can be strengthened.

Keywords: Active aging, well-being, social security, participation.

Introduction

Old age population has been growing at an unprecedented rate all over the world. Increases in longevity in life, decline in fertility and mortality rates have contributed the population ageing phenomena. Labelled as Graying Nation, with over seven percent of its population above sixty plus segment, India will carry the bulk of burden of caring the elderly population. The size and percentage share of India’s elderly population has increased from 7 percent in 2001 to 8.30 percent in 2011 and projected to increase 10.70 percent in 2021(3). South India has shown a significant increase in elderly population and Kerala is leading with 10.56 percent in 2001 and 11.93 percent in 2011. It is predicted that the number of elderly in Kerala will reach 15.09 percent of the population in 2021(4). In this context the concerns and issues of elderly are multifaceted. A series of development such as weakening of traditional joint family system, more chance in women employability and inability to extend care due to geographical distance between the children and parents created new challenges in the care of elderly. Disability and impairments among the elderly is a cause of concern for elderly as it adversely affected their independence and autonomy. Morbidity, which has higher incidence among the elderly, will cause an increasing burden to the elderly themselves and to their families also. The problem of sensory impairment, orthopedic hazards, dementia, depression, alzheimer’s along with other lifestyle diseases exacerbate the situation even more deeply. In addition women are having a longer life span than men and the number of elderly women in the state is higher when compared to men lead them to a highly vulnerable group among the elderly(2).

The community based programmes are pursued in areas where traditional forms of aid are not yet possible. Different community based programmes like ESHGs, Senior Citizen Clubs, Pensioner’s Union and Community Policing provides care and support to the elders. ESHG is a community based organization of older people above 60 years aimed at improving living conditions for elderly. It is a group of 10 to 20 active elderly who organize themselves. The groups meet four times every month and unite for the care and support of its members. ESHG ensures the mechanism for social support in the community through facilitating activities and delivering services for sustainable livelihood(6).
The ageing process has already begun in Kerala at a much faster rate than anticipated and increasing trend reveals the need for special attention. The emergence of nuclear family system, increasing longevity, high rate of migration to middle east countries, the changing attitude towards the older ones and traditional caregivers, mainly women, are increasingly taking jobs have been affected the life of older generation (1). The morbidity, which have higher incidence among the elderly, will cause an increasing burden to the elderly themselves and to their families. So these two vulnerabilities, natural vulnerability due to health problem and imposed vulnerabilities due to social background will turn out to be a major cause for concern in Kerala (7). The Kerala model development has been appreciated all over India. The standard of living, health, literacy and education are being compared to the development world (10). At the same time social security and welfare measures for the elderly are not on par with the developed countries. As the number of older people continues to increase and traditional social structures break down, families and policy-makers will increasingly need to look for other options. In this context there is a felt need to develop new strategies to ensure the welfare and need of old age population. Such a situation community based programmes which are easily accessible to elderly community can lend a hand for the welfare and long term care of elderly (11).

**Review of Literature:** The part reveals the different dimensions of ageing and its factors. Case studies on elderly in Kerala stated that people who are regularly engaged themselves in mentally challenging activities like reading are less likely to develop dementia in later stage of life. The contribution of elderly towards child-care and this could be a subject of interest to a demographic or socio-economic and who are physically active are much more likely to live longer than those without. The mental and physical activities among the elderly should be encouraged and discouraged due to health aspects (8). The community context is crucial in ageing process and three major reasons. First, inequalities in the spacial distribution of ageing population require attention to how community context shapes and shaped by residents. Second, meeting the service needs of our ageing population requires attention to the natural and planned community contexts in which people age and to which they move. Third, growing popular and scientific interest in the concept of social capital and in social inequalities in health requires integration and response from gerontological theories, researchers and practitioners (12). The abuse and neglect of elderly is not taken-up as a problem by community. The observation of World Elder Abuse Awareness Day concern the rising incidence of extreme violence, neglect, rape, bulgury, homicide affecting elderly across the state. Sensitization programmes are conducted effectively by some of NGOs related to the groups such as street plays at the bus stops and railway station as part of the elderly abuse awareness programme. Migration of the younger generation leaving their parents has compounded the issue of neglect. The scope of community based social service was reviewed in the report of WHO. Community centres for elderly are regarded as ideal locations for social services because of their convenience, familiarity and accessibility. The guide urged the need of improvement in existing social service systems. One of the best examples described in the guide regarding community based programme is issuing identity card for elderly in Mexico City for getting access to lower prizes and some free services. The community based programmes have significant role among elderly in Kerala because of the significant increase in elderly population. In this context the review emphasized the need for a comprehensive study on community based programmes and it is noted that study on ESHGs in Kerala is scanty. Therefore the present study has been undertaken to examine the community based programme through ESHGs.

**Objectives:** The present study attempts to analyse the role of community based programmes in active ageing. This study examine activities of ESHGs and involvement of aged in this group as one of the community based programmes.

**Methodology**

The study conducted among the 98 ESHGs in Kollam district under the initiative by Help Age India and implemented through Quilon Social Service Society (QSSS) as part of post tsunami extended response project at Kollam and Alappuzha districts. Repeated interview sessions and sustained efforts were taken to overcome to complete the data collection. Simplified situational examples have been used for eliciting information instead of direct method.

**Result and Discussion**

The active ageing is analyzed with the community based programme in the present study. Three pillars of active ageing namely participation, health and security
were associated with membership and activities studied by ESHGs. The formation of ESHGs and its activities integrates elderly with the community in democratic way of expression. The ESHGs work under a three tier system which allows the members to disseminate the duties and responsibilities effectively. Activities carried out by the community organization reveal that active ageing process is evident among the ESHG members.

ESHG member’s status on age and sex pattern, literacy level, marital status, assets and income reveals their socio-economic conditions. The present study revealed that female elderly outnumbered male elderly and is substantially agree with the NSSO 60 round data that elderly females were outnumber than males both in rural and urban areas in all parts of south India. Female elderly participated in the ESHG activity fairly well when compared to males. These findings is readily acceptable with the literature that the participation in different programmes by elderly men shows decreasing level but among the elderly women it shows an increasing effect (13). The high participation level of young old compared to the other two categories is evident in the study. The elderly maintained the ESHG records in a proper manner. The incidence of widowhood has been revealed among ESHGs member, the study revealed that widowhood did not resist them from the participatory process and they joined the community based organization without any hesitation. ESHG members undertook their activities independently. Irrespective of age classification as young old, old-old and oldest old the elderly remains a very good level of ADL. It enabled the elderly to associate with community based programmes at different levels of constraints and difficulties.

ESHG organized health care services not only to their own members but also to others in the neighbouring community. Medical outpatient services, pain and palliative and home care service are offered by ESHG members. The members of ESHG offered health friendly social service to the needy people and this components also assisted active ageing among the elderly. The medical out-patient programmes under ‘Vayomithram’ plan by government of Kerala has a significant role in offering medical consultation and distribution of medicines at free of cost. ESHGs even coordinated the activities at the Kollam coastal area. The members of the ESHG are using the medical out-patient programmes during that time and used to take the doctor to the nearby bed ridden patients. The pain and palliative care services has been offered by the group members to the bed ridden and needy people through medical out-patient programmes. The ESHG members offer space and other amenities for conducting the medical out-patient programme. The elderly are more conscious about their health through their active effort and involvement in the prevention and reduction of the disease.

The ESHG became instrumental for getting the pension as they collectively sent the application through federations and submitted memorandum for getting the needy elderly. Those who are not getting the old age pension sought the help from ESHGs and village level federation. Majority of the elderly are living with their spouse or children. The elderly living alone and living with relatives are few in number. It shows the traditional practices of care offered by the grown-up children are prevailing. The loneliness, depression and anxiety may be avoided at certain extend by living with children and spouses. Majority of the elderly are getting care on time from the family members. It further reveals that 29 percent of the elderly received care only after repeated prompting and 8 percent of them are getting delayed care. Proper care at right time ensures the security of elderly. It enables the elderly to live actively and add more years in their life. The activity of daily living under different aspects such as personal hygiene, eating, dressing and undressing, controlling urinary and fecal discharges and transportation shows that ESHG members are fully independent to do their own and it reveals their ability to be active in old age. ESHG members used their group for getting financial assistance to their family in the form of loan. The elderly took loan from the group at a very low percent of interest and help their family. The members offer mental and physical support to the group members by offering help in maintenance, cleaning, preparing food at functions and celebrations. It revealed the sense of belongingness among the ESHG members and towards the family. Majority of the ESHG members (67 percent) are not supporting the old age institutions. It revealed that a majority of elderly like to remain in their own home with their family members. They feel the sense of security through the non-institutionalized settings.

**Recommendations:** The concept of ESHGs should be popularized and new groups will be setup irrespective of societal classification. The government should give financial assistance to the ESHGs. The regularity and payment of old age pension should be monitored effectively through community based organizations. World Elder’s Day and World Elder Abuse Awareness
Day, should be observed by educational institutions with support of elderly organization to create awareness on importance of elderly among youth and children. Setting up of geriatric wards, separate beds, medical officer with experience in geriatric care in all governmental hospitals and ensure separate queues for elderly are the rights for elderly. Ensure a proper monitoring mechanism with the help of community based organizations in district level for the effective implementation of these programmes.

Establish multipurpose utility centre and adult day care centres for elderly in grama panchayat level will help the elderly to come and share their issues and problem in a common ground. The elderly organizations can run the centres with the help and support of common public. A toll free number should set-up for getting immediate assistance and support for elderly. Some states have already implemented toll free number for elderly and it should come up at national level for an emergency support system. Constitution of maintenance tribunal and appelot tribunals at district level and appointment of counsellors for settling the disputes amicably is the provision comes under Senior Citizen (Maintenance, Care and Protection) Act-2007. Most of the states are not implemented it properly and it is a felt need of elderly to set-up the tribunals exclusively for them.

Conduct awareness programmes and melas for popularizing active ageing process among the elderly. It should be conducted at village level to convey the message in ground level for the common public. Service of mobile medical unit comprised of doctor and pharmacist at panchayat level will help the bed ridden, poor and destitute elderly. Integrate subjects related to ageing in school curriculum to eliminate generation gap and getting awareness on problems and issues faced by elderly. New professional courses should come-up exclusively on gerontology and it will increase the scope ageing studies in a progressive way. Establish a research centre for ageing and related studies. As the number of elderly is alarmingly high in the state, the research centre may act as the back bone for framing policy, programmes and research for the welfare of the elderly. Implement pain and palliative care exclusively for elderly population. It should be a multi-disciplinary team comprised of trained health care professionals, social worker, local leaders and youth representatives. Provide support and incentives for agencies that are offering home help service and respite care for the elderly. Introduce geriatric nursing courses at medical colleges for availing specialized trained nurses in care and support for the needy elderly. Design lifelong learning and life skill education programmes for the elderly through ESHGs and community based organizations.

Conclusion

The present study analysed the active ageing process through community based programme. The study revealed that ESHG can facilitate the active ageing among the elderly and the pillars of active ageing such as participation, health and security can be strengthened through ESHGs. The need for different type of community based programmes designed exclusively for the welfare of elderly has been indicated by the findings of the present research. It is a fact that the percentage of elderly population in Kerala is alarmingly high and the social security system alone cannot address the elderly issues and problem in a comprehensive way. The support from community and family is very much essential for the care and support of elderly. In this context, the innovative practices like Elders Self Help Group will help the elderly remain active and add more productive years in their life.

Ethical Clearance: Department review Committee, School of Social Work, Marian College Kuttikkanam.

Funding: Self

Conflict of Interest: Nil

Reference


Molecular Detection of Bacterial Etiologies Causing Meningitis in Pediatric Patients in Taif City, Saudi Arabia

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Abstract
Bacterial meningitis is prevalent in pediatric populations worldwide and associated with mortality and neurological complications in tropical and subtropical regions. This study aimed to evaluate in-use clinical diagnostic approaches against two PCR method in detection of bacterial pathogens implicated in pediatric meningitis in Taif city (Saudi Arabia). The tested PCR method were real-time and multiplex polymerase chain-reaction (RT-PCR and mPCR). One hundred and fifteen CSF samples were collected from suspected pediatric patients with acute meningitis admitted to Taif children’s hospital between January and December 2016. Bacterial identification and antimicrobial susceptibility testing were performed by the automated BD Phoenix™ identification and susceptibility testing system. Culture-based detection identified Citrobacter freundii (in one sample) and Salmonella spp. (in one sample). However, molecular detection by PCR approach of 113 culture-negative samples identified; N. meningitidis, (A serotype), H. influenzae (2-strains), and S. pneumoniae (19A and 23F strains). PCR-based detection approach is more efficient in microbiological diagnosis of bacterial etiologies in CSF specimens.

Keywords: Polymerase chain reaction, Bacterial meningitis, Phoenix system, children.

Introduction
Bacterial meningitis (BM) is a life-threatening inflammation of the meninges and the sub arachnoid apace triggered by bacteriaor bacterial products reaching the meninges1,2. Globally, BM is an important cause of mortality and morbidity especially in tropical and subtropical regions. Up to 25% of meningitis cases in Asia and Africa result in neurological sequelae such as deafness, loss of vision, cognitive impairment and epilepsy2. Such complications can be avoided by early diagnosis and administration of antimicrobial chemotherapy3.

Prior application of vaccination programs, about 90% of BM infections in children were caused by Streptococcus pneumoniae, Haemophilus influenzae type b (Hib), and Neisseria meningitides3. Additionally, other bacterial species such as Streptococcus agalactiae, Listeria monocytogenes, and Escherichia coli are also implicated in BM in children4,5. Pneumococcal meningitis (caused by S. pneumoniae) is more common in children <5 years of age, while meningococcal meningitis (caused by N. meningitidis) is more frequent in elder children6.

In laboratory, conventional culture of CSF specimens is the gold standard approach for BM diagnosis. CSF examination is critical for the diagnosis of all types of meningitis. Gram smear of CSF will mostly reveal the presence of bacteria with sensitivity range from 65% to 80%7,8. On the other hand, CSF culture can be negative in children who received antibiotics prior to CSF collection and examination9. Various nucleic-acid amplification assays have been developed to detect infecting pathogens in BM. Multiplex PCR and real-time PCR techniques have shown substantially higher rates
of detection than culture method especially in patients who had previously received antibiotic treatment. The purpose of this study was to evaluate the effectiveness of application of the RT-PCR and PCR techniques for the concurrent identification of *Haemophilus influenzae*, *Streptococcus agalactiae*, *Streptococcus pneumoniae* (Hib), and *N. meningitides* in CSF specimens collected from suspected bacterial meningitis in children.

**Materials and Method**

**Patients and samples:** Pediatric patients suspected of BM admitted to Taif children’s hospital, Kingdom of Saudi Arabia, were subjected to physical examination with or without lumbar puncture between January and December 2016. The diagnosis of BM was based on clinical presentation consistent with the World Health Organization (WHO) clinical measures of suspected meningitis disease. A total of 115 CSF specimens were further included for detection of bacterial agents.

**Bacterial detection and antimicrobial susceptibility testing:** Bacterial detection and antimicrobial susceptibility testing were performed by the automated BD Phoenix™ 100 Microbiology system (Becton Dickinson, USA) according to manufacturer’s instructions. The tested antibiotics were; amikacin, ceftazidime, etrapenem, meropenem, ceftriaxone, aztreonam, ampicillin, amoxicillin, ciprofloxacin, levofloxacin, tigecycline, ceferoxim, cephalothin, amikacin, cefoxitin, and gentamicin.

**PCR diagnostic approach:** One hundred and thirteen culture-negative specimens were subjected to PCR-based diagnosis of the most common bacterial pathogens implicated in pediatric meningitis. The targeted pathogens and their specific primers are listed in table 1. Bacterial DNA was extracted by QI Aamp DNA mini Kit (Qiagen, Germany) according to manufacturer’s instructions. The purified solution of 5-10 µl of DNA was utilized as a specimen for PCR. Settings of PCR protocols for identification of BM agents were followed as previously published. Serotyping of *S. pneumoniae* and *N. meningitidis* was conducted for the two CSF specimens. The two specimens were found to belong to 19A and 23F serogroups (Fig, 2). *N. meningitidis* isolate belonged to the A serogroup. *S. agalactiae* was not detected in any sample.

**Efficacy of PCR:** The effectiveness of PCR was evaluated against the gold standard test (culture). PCR tests were found very efficient to screen out negative patients with 95% accuracy. However, PCR predictive value positive was low (58.33%) because PCR only targets the agents of whose primers have been included in the test.

**Results**

**Demographic data of cases:** A number of 115 pediatric CSF specimens from suspected bacterial meningitis between January and December 2016. The demographic data of cases is summarized in table 2. Children age ranged from 1.4 to 8 years (4.17±1.71 years).

**CSF cell count:** The differential cell count in CSF specimens ranged from 2 to 8% for neutrophils (3.21±1.43%) and from 15-65% for lymphocytes (30.81±15.58%). Detailed differential cell count in the specimens is summarized in table 3. No significant difference in cell count was found between age groups.

**Identified bacterial species and susceptibility testing:** Only two specimens of CSF (1.74%) revealed positive bacterial growth detected by BD Phoenix™ 100 Microbiology system. The detected bacteria were *Citrobacter freundii* and *Salmonella* spp. In terms of antimicrobial susceptibility testing, *Salmonella* isolate was susceptible to nearly the whole antibiotics utilized in the Taif children’s hospital excluding ceferoxim, cephalothin, amikacin, cefoxitin, and gentamicin, while *Citrobacter freundii* was insusceptible to fluoroquinolones, carbapenems and aminoglycosides, but showed sensitivity to all tested cephalosporins.

**Statistical analysis:** Data were entered and processed by Microsoft Excel 2016 (version 16.0.06769.2017, Redmond, USA). Descriptive statistics and confidence intervals were calculated by normal approximation method. Chi square test was employed to test for difference between groups.
Table 1: Primers of targeted BM pathogens

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Primer sequence (5’ – 3’)</th>
<th>Gene (Amplicon size)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>f: TgCAgAgCgTCCTTTggTCTAT</td>
<td>ply (80bp)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>r: CTCTTACTCgTggTTTCCAACCTgA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. meningitidis</td>
<td>f: gCTgCggTGgTTTCA</td>
<td>ctrA (110bp)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>r: TTgTCgCggATTTgCAACTA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. influenza</td>
<td>f: TATCACACAAAATgCggTTTg</td>
<td>bex (181bp)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>r: ggCCAgAgATAgCATTgA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. agalactiae</td>
<td>f: TCTAgCCCCTCAAgCTCTTg</td>
<td>cspB (798bp)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>r: TgATCggCTgTTTTgACCCTAA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Demographic characteristics of selected cases (n=115)

<table>
<thead>
<tr>
<th></th>
<th>No. of cases</th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>66</td>
<td>57.39 (48.35 – 66.43)</td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
<td>42.61 (33.57 – 51.65)</td>
</tr>
<tr>
<td><strong>Age group (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 2.0</td>
<td>26</td>
<td>22.61 (14.96 – 30.25)</td>
</tr>
<tr>
<td>2.1 – 4.0</td>
<td>37</td>
<td>32.17 (23.64 – 40.71)</td>
</tr>
<tr>
<td>4.1 – 6.0</td>
<td>41</td>
<td>35.65 (26.90 – 44.41)</td>
</tr>
<tr>
<td>6.1 – 8.0</td>
<td>11</td>
<td>9.57 (4.19– 14.94)</td>
</tr>
</tbody>
</table>

Table 3. Age-wise differential cell count (mean±Sd).

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Neutrophils (%)</th>
<th>Lymphocytes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 2.0</td>
<td>3.80±1.74</td>
<td>32.38±17.77</td>
</tr>
<tr>
<td>2.1 – 4.0</td>
<td>2.97±1.42</td>
<td>30.67±16.87</td>
</tr>
<tr>
<td>4.1 – 6.0</td>
<td>3.22±1.19</td>
<td>28.56±11.97</td>
</tr>
<tr>
<td>6.1 – 8.0</td>
<td>2.54±1.04</td>
<td>35.91±17.97</td>
</tr>
<tr>
<td><strong>Normal range</strong></td>
<td>4 ± 4</td>
<td>40±18</td>
</tr>
</tbody>
</table>

* Normal range values of differential count are adapted from reference 17.

Figure 1: A 5% acrylamide bis-acrylamide gel electrophoresis of multiplex PCR products of H. influenza: Lane 2: strain ATCC10211(2a), clinical isolate (2b), gene: bex. N. meningitides: Lane 3: strain ATCC13093 (3a), clinical isolate (3b), gene: ctrA; and S. pneumoniae: Lane 4: strain ATCC6305 (4a), clinical isolate (4b), gene: ply. M: 50 bp ladder DNA, size markers are indicated in base pairs. 1a,1b, and 1c: negative controls for S. pneumoniae, H. influenzae, and N. meningitidis.
Discussion

The overall prevalence of bacterial etiologies was 6.09% detected by culture-dependent (Phoenix system) and culture-independent (PCR) approaches. Such low prevalence was also reported from Iran (6.8% and 2.9%)\(^\text{18,19}\), and Nepal (7.2%)\(^\text{20}\), and Switzerland\(^\text{21}\). The detected bacteria by Phoenix system were *Citrobacter freundii* and *Salmonella*, two aerobic gram negative rods increasingly recognized to cause BM in immuno compromised individuals, or after traumatic experience\(^\text{22}\). The low recovery rate associated with culture method was also reported in a study in Tehran (1.5%)\(^\text{12}\), China\(^\text{23}\), and Switzerland (7.27%)\(^\text{21}\). These observations are most likely resulted from intake of antibiotics prior to CSF culture\(^\text{24,25}\).

Culture-negative specimens (n=113) were subjected to PCR-based analysis. A total of five cases were found positive (4.42%). These observations are in consistent with previous report from Iran (6%)\(^\text{26}\). The detected bacteria were the most commonly reported causes of bacterial meningitis\(^\text{22}\). These species were *H. influenzae*, *S. pneumoniae*, and *N. meningitidis*. Children<5 years with BM are mostly caused by *S. pneumoniae*, where as *N. meningitidis* are frequent in older children\(^\text{22,27,28}\).

Hajj and Umrah are well-known Islamic pilgrimages that have been accompanied by outbreaks of meningococcal diseases\(^\text{15,29}\). The serotypes 19A and 23F of *S. pneumoniae* have been identified in China\(^\text{30}\), Sri Lanka\(^\text{31}\), and India\(^\text{32}\). On the other hand, *H. influenzae* type b remains a major cause of BM in developing third-world countries\(^\text{28,33}\).

A worth noting point is that PCR is not an alternative for culture approach for laboratory detection of pathogens involved in BM. The most apparent reason for such limitations is that addition of primers specific for all potential BM pathogens is not practically feasible\(^\text{21,34}\). PCR approach has more efficacy in detection of bacterial etiologies in culture negative samples. More studies are recommended to address other bacterial and viral causes of pediatric meningitis in Saudi Arabia.

Ethical Clearance: This study was approved by the Faculty of Sciences, Taif University (consent No. 750) and the directory of training and scholarship department in Taif children’s hospital under consent No. 580/305/47A.

Conflict of Interest: Nil

Funding: Self-funded
References


Ultrasound Guidance for Introducing Spinal Anesthesia through Paramedian Approach Versus Landmark Guided Technique During Lower Limb Surgeries, Randomized Controlled Trial

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1MD, 2Assistant Professor, Anaesthesia and SICU and Pain Management, Cairo University, Cairo, Egypt

Abstract

Introduction: Ultrasound imaging skills are appreciated for improving the safety of different puncture techniques supported with the fact that the advances in imaging quality have significantly improved our understanding of neuroaxial Sonoanatomy (1). Today, ultrasound imaging has been used to assist or guide central neuroaxial blocks (2).

Objectives: To identify the value of using the ultrasound guidance in applying spinal anaesthesia when compared with the conventional landmark guided approach, regarding the duration of applying the anaesthetic technique and incidence of associated common complications.

Design: Randomized controlled trial.

Method: 178 patients scheduled to undergo elective lower limb surgeries under spinal anaesthesia in El Kasr Al- Aini Hospital, Cairo University were enrolled in the study. Patients were randomly assigned into landmark guided control group in which 89 patients received landmark guided paramedian spinal anaesthesia and ultrasound group in which 89 patients received real time ultrasound guided paramedian spinal anaesthesia.

Results: The mean numbers of puncture attempts, levels and needle redirections between the control group and ultrasound group were 1.61±0.83 vs. 1.12±0.36 (P value 0.013), 1.15±0.36 vs. 1.06±0.25 (p value 0.018) and 2.68±2.75 vs1.94±1.93 (p value 0.021) respectively. Also the duration recorded during applying the anaesthetic procedure for the control group and ultrasound group were 136.4±83.2 vs. 138.3±63.4 (P value 0.001) correspondingly.

Ultrasound guided group of patients showed significant lower incidence of bloody puncture and paraesthesia after engaging the needle through the dura.

Conclusion: Ultrasound guiding although it took longer duration in application but improved the ease of introducing spinal anesthesia, reduced the number of puncture attempts, number of puncture levels, number of needle redirections, and incidence of complications.

Keywords: Ultrasound, Spinal anaesthesia, Guidance, Landmark, Neuroaxial.

Introduction

Spinal anaesthesia is a wide spread popular method of anaesthesia, used for most of the orthopaedic surgical procedures involving the lower limb (1).

Spinal anaesthesia remains the first choice in such surgeries because of its dense block, rapid onset, low infection risk as from catheter placement in cases of epidural, avoidance of serious complications that may be associated with airway management during general anaesthesia, in addition to other benefits associated with central neuroaxial blockade (e.g. decreased incidence of blood loss, thromboembolism and wound infection) (2).
Spinal anaesthetic block failure among experienced anaesthetists reported to be not more than 1%\(^{(3)}\), however such incidence could be higher in a training environment due to the inability to predict technical difficulties or placing needle accurately with any of the landmark-based techniques. This may lead to multiple needle attempts, block failure, discomfort, poor patient satisfaction and occurrence of complications\(^{(4)}\).

Such failure may be related to improper technique, inexperience (of the unsupervised trainee especially), and inability to appreciate the need for a meticulous approach\(^{(5)}\).

Minimizing the incidence of failure is an important pre-requisite for gaining the benefits of spinal anaesthesia, and to prevent the potential pitfalls\(^{(3)}\).

The use of ultrasound guidance for performing regional anaesthesia is a relatively new and evolving concept, though it was first reported in 1980\(^{(6)}\).

Ultrasound allows real time imaging of neural structures, without either staff or patient exposure to radiation.\(^{(7)}\) Ultrasound-imaging skills are valuable for enhancing the safety of different puncture techniques especially with the developments in imaging quality that have significantly improved our understanding of the Sonoanatomy of the lumbar spine.\(^{(8)}\)

Today, ultrasound imaging has been used to assist or guide central neuroaxial blocks if an interlaminar window that permits passage of sound waves into the vertebral canal can be identified, the same window will permit passage of a needle into the epidural or intrathecal space\(^{(9)}\). This coupled with real-time imaging of the needle passage to the required sites should permit high-quality and low-risk regional anaesthesia.\(^{(10)}\)

It was reported that ultrasound guided epidural needle insertion had reduced the number of puncture attempts\(^{(11-14)}\), reduced the need for multiple levels puncture\(^{(12-14)}\) and improved patient satisfaction during the procedure\(^{(13)}\) for these advantages it was recommended by the National Institute of Clinical Excellence (NICE) in the United Kingdom to recommend that ultrasound guided epidural blocks should be routinely used.\(^{(15)}\)

Our aim in this study was to investigate efficacy and safety of ultrasound guided paramedian sagittal neuroaxial approach in providing spinal anaesthesia for lower extremities surgeries in comparison to the conventional landmark guided approach.

### Table (1): Times recorded presented as mean ± SD

<table>
<thead>
<tr>
<th></th>
<th>Group C (n=89)</th>
<th>Group US (n=89)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anes. Proc. Duration (sec.)</td>
<td>136.4±83.2</td>
<td>138.3±63.4</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Sec: Seconds, Anes. Proc: Anesthetic procedure

Compared to control group, Ultrasound guided group of patients showed statistically significant lower number of puncture attempts, lower number of puncture levels and lower number of needle redirections as shown in table 2.

### Table (2): Number of levels, attempts, redirections noted presented as mean ± SD

<table>
<thead>
<tr>
<th></th>
<th>Group C (n=89)</th>
<th>Group US (n=89)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needle redirections</td>
<td>2.68±2.75</td>
<td>1.94±1.93</td>
<td>0.021</td>
</tr>
<tr>
<td>Needle attempts</td>
<td>1.61±0.83</td>
<td>1.12±0.36</td>
<td>0.013</td>
</tr>
<tr>
<td>Number of levels</td>
<td>1.15±0.36</td>
<td>1.06±0.25</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Compared to control group, Ultrasound guided group of patients showed significantly lower incidence of bloody puncture and paraesthesia after engaging the needle through the dura as shown in table 3.

### Table (3): Complications noted presented as frequency (%).

<table>
<thead>
<tr>
<th></th>
<th>Group C (n=89)</th>
<th>Group US (n=89)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloody puncture</td>
<td>37(41.57%)</td>
<td>8 (8.89%)</td>
<td>0.012</td>
</tr>
<tr>
<td>Paraesthesia</td>
<td>35(39.32%)</td>
<td>9 (10.11%)</td>
<td>0.026</td>
</tr>
</tbody>
</table>

**Discussion**

In this study we found that real time ultrasound guided spinal anesthesia, decreased the number of puncture attempts, number of puncture levels, number of needle redirections, and incidence of complications.

Unfortunately no previous randomized controlled trials were done to attest the real time guided technique in order to compare its role in improving the quality of applying spinal anesthesia with the conventional blind method through and to the best of our knowledge; our study is the first randomized controlled study to compare real time ultrasound technique to conventional manual palpation blind method.
Lee PJ et al (19) who tested real-time ultrasound guided spinal anesthesia in the prone position for 10 patients undergoing knee arthroplasty in an effort to positively attain CSF through this approach, they reported successful spinal anesthesia in all applicants; and they recorded that nine patients needed only one attempt to acquire CSF. A weakness of this study was the small number of patients involved, the lack of a control group and the need for prone positioning of patients for that technique which was problematic.

This trial support our findings, as we demonstrated that ultrasound guided technique group of patients when compared to the control group showed significant lower number of puncture attempts (1.12±0.36 vs 1.61±0.83), lower number of puncture levels (1.06±0.25 vs 1.15±0.36) and lower number of needle redirections (1.94±1.93 vs 2.68±2.75).

In the current study ultrasound guided group of patients significantly showed lower incidence of bloody puncture and paraesthesia after engaging the needle through the dura. In accordance with our study, the meta-analysis (20) concerned with the use of ultrasound as a preprocedural guidance, concluded that ultrasound imaging reduced the risk of traumatic procedures with a risk ratio of 0.27 (95% confidence interval 0.11 to 0.67, P=0.005) with an absolute risk reduction of 0.059 and reduced the odds of a traumatic procedure (0.28 (0.13 to 0.61), P=0.001).

Contrary to our study findings; Arzola et al (21) results differed from our study and most of the supporting studies; they attested using ultrasound preprocedural screening in aiding the introduction of epidural catheters in female patients going for normal labor, they found that ultrasound use didn’t improve the ease of lumbar epidural catheter, there was no difference in median (interquartile range, IQR) epidural insertion time between the ultrasound and palpation groups [174 (120 to 241) versus 180 (130 to 322.5)]s, respectively; P=0.14], the number of interspace levels attempted and needle passes were also similar in both groups; this difference might be attributed to their special population as they selected parturient with easily palpable lumbar spines.

Another study that reported a different finding than ours was conducted by Hayes et al in children (22); they tried to attest the value of using ultrasound scanning in identifying lumbar spaces in children, but they reported no benefit in using ultrasound when compared to manual palpation done by experienced anesthesiologist. This can be explained by the anatomical differences in pediatric population with relatively easy landmarks.

These different results from ours could be attributed for the different nature of the techniques used rather than our real time method and also different reasons for failure in each of them, and so direct comparison is not possible.

Our study had a strength of being done by a single operator with moderate experience in the use of ultrasound, this provides a degree of reliability, that the difference in outcome between the two groups is not due to any difference in operator skills, this also provides the evidence that the use of ultrasound in this procedure is a skill that isn’t hard to acquire.

Ethical Clearance: Taken from the Research Ethics Committee (REC), faculty of medicine, Cairo University (N-15-2016).

Source of Funding: Self-Funded project.

Conflict of Interest: Nil.

References


Effect of Nursing Interpretation and Intervention of Intrapartum Cardiotocography on Pregnancy Outcomes

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Abstract

An important goal of intrapartum monitoring is preservation of fetal well-being by early detection and relief, when possible, of those conditions causing fetal distress and adverse outcomes.

The aim: Assess the effectiveness of nursing interpretation and intervention of intrapartum cardiotocography on pregnancy outcomes.

Design: Quazi experimental design.

The sample: Was convenient sample of 120 cases divided into two groups (study, and control) each one is 60 cases (30 low risks, and 30 high risks).

Tools: three different tools namely assessment sheet for the mother in first stage includes all significant data about the mother, intrapartum fetal monitoring assessment will be done using cardiotocography strip, and Apgar score at one and five minutes.

The settings: Shebin Elkom Teaching and University hospitals-Egypt. The main findings were that no statistically significant relations for low risk cases that being handled with cardiotocography and fetal complications. Instrumental delivery and cesarean section rate for low risk cases in the study group is increased than for low risk in control group shows statistical significance difference. There were strong statistically significant relations between high risk fetal heart rate nursing interpretation and Apgar score in the first minute. Statistical significance to total complications during present labor to the mother.

Conclusion: Continuous cardiotocography should recommended for high-risk pregnancies where there is an increased risk of prenatal adverse outcomes. Cardiotocography for low risk is associated with a significant increase in instrumental delivery and caesarean section rates compared with intermittent auscultation.

Recommendations: continuous electronic fetal monitoring should be recommended for high-risk pregnancies where there is an increased risk of fetal compromise.

Keywords: Interpretation, intervention, Intrapartum, Cardiotocography, pregnancy outcomes.

Introduction

External monitoring is conducted using a doppler ultrasound probe to auscultate and count the FHR during a uterine contraction and detect fetal response for 30 seconds afterwards [¹]. It can also be achieved using an internal transducer that is mounted on the maternal abdomen and protected by an elastic belt or girdle in place. Doppler ultrasound is used by the transducer to track fetal heart movement and is attached to an FHR screen [²]. Internal monitoring is carried out by connecting a screw type electrode with a connection to an FHR screen to the fetal scalp. Rupture of the fetal membranes and at least partial dilution of the cervix before the electrode can be placed on the fetal scalp [³].
In low risk patients in the active phase of labor and every 15 minutes in the second stage of labor, the prescribed intermittent auscultation procedure includes auscultation every 30 minutes. Continuous EFM is indicated if irregularities arise with sporadic auscultation and for use in high risk patients. The FHR recordings may be viewed as encouraging, unreassuring or alarming, depending of the tracing pattern\(^2\). Reassuring patterns associate well with a positive fetal result, but patters that are not reassuring. Evaluation of fetal wellbeing with stimulation of the fetal scalp, pH measurement or both is recommended for use in patients with unreassuring patterns\(^5\).

**Significance of the study:** A growing body of evidence indicates that in predicting both good and bad fetal outcomes. Fetal heart rate evaluation may be equivalent to or superior to fetal blood pH calculation\(^6\). Medical professionals are responsible for correctly diagnosing complications and issues during pregnancy\(^7\).

On the basis of all these factors, the researcher found that it is necessary to assess the impact of nursing perception and intrapartum cardiotocography intervention on maternal and fetal outcomes.

**Aim of the study:** Assessing the effectiveness of nursing interpretation and intervention of intrapartum cardiotocography on pregnancy outcomes.

**Research hypothesis:**
1. Accurate and appropriate nursing interpretation and intervention of cardiotocography during labor (first stage) will improve fetal and maternal outcomes.
2. High risk cases that will not handle with cardiotocography during labor (first stage) will have low maternal and fetal outcomes.

**Subjects and Method:**

**Research design:** A quasi-experimental design

**Setting:** University Hospital and Shebin El-Kom Teaching Hospital.

**Subjects:** Convenient sample was used (120). They were divided into two major groups

**A. Study group, includes**

A1. Cases (high risk) that CTG was handled for (30).

A2. Cases (low risk) that CTG was handled for (30).

**B. Control group includes**

B1. Cases (high risk) that CTG was not handled for (30).

B2. Cases (low risk) that CTG was not handled for (30).

**Data collection instruments:**

**A. Assessment sheet for the mother:** This tool consisted of four parts:

- Part I: included the mother’s socio demographic data
- Part II: family history
- Part III: Obstetric history
- Part IV: Data about the fetus using CTG strip and Apgar score

**B. Apgar score**

**C. Cardiotocography strip**

**Validity and reliability:** Validity and reliability of the instrument(A) were done by panel of expertise in the field of Maternal and Newborn Health Nursing and Obstetrics and Gynecology medicine. The instruments were reviewed for simplicity of language, comprehensiveness and understandability. Test-retest reliability was applied by the researcher for testing the internal consistency of the instruments. It is the administration of the same instruments to the same participants under similar conditions on two or more occasions. Scores from repeated testing were compared. The reliability was done by Cronbach alpha coefficient test equal 0.95.

**Pilot study:** The piloting was conducted on 12 of the laboring to test the applicability of the instruments and to estimate the time needed for data collection.

**Ethical Consideration:** Official steps were taken to obtain a permission to conduct the study, with explanation of the purpose and the importance of the study to the centers authorities and approval from ethical committee is taken before gathering data. An informed verbal consent was obtained from all laboring women before participation in the study. Women were assured that their information were confidential and only used for study process. Also the women were informed that the collected data would be used only for the purpose of the present study, as well as for their benefits of the study.
Procedure:

Preparatory phase: Completing ethical formal letters for all needed authorities

Implementation Phase:

1. The data collection of the study took eight months starting 1/12/2017 ending at 31/7/2018.
2. Settings on CTG machines were standardized and indications for fetal monitoring were determined.
3. The procedure was explained to the mother and obtain permission to commence.
4. The woman was given the opportunity to empty her bladder and maintain an upright or lateral position (not supine).
5. CTGs were labeled with the mother’s name, number and date and time of commencement. 8-Maternal heart rate was recorded on the CTG at commencement of the CTG in order to differentiate between maternal and fetal heart rates.
6. A ‘CTG sticker’ has been developed to support documentation because CTG strip used in the patient’s record.
7. Response to the CTG trace were guided by the algorithm, and any abnormalities were documented in the patient’s record and reported to escalate in light of the patient’s clinical circumstances.
8. Based on the interpretation of the CTG strip, nursing action and management took place.
9- According to the action the researcher attending with the mother during caesarean or normal delivery to evaluate the outcomes on the mother and the fetus

Evaluation: Evaluation was accomplished by determining type and mood of delivery. Complications during and after delivery to the mother were evaluated. The newborn is received and Apgar score is made.

Statistical Data Analysis: Data was statistically analyzed using statistical package for social studies (SPSS. Inc, Chicago, IL, USA) version 20 on IBM compatible computer.

Results

![Figure 1: Antenatal Maternal Risk Factors of CTG for Study Grou](image)

Cases with history of previous cesarean section reaching about two fifth of cases (42.7%). The lowest percent was to intrauterine infection (4.4%).
Figure 2: Intrapartum Fetal Risk Factors of CTG of the Study Group.

Displays that about one third of the cases were with suspicious fetal heart rate on auscultation (30.3%). Meconium staining, post term pregnancy had (24.2%) and (15.3%), premature fetus and multiple pregnancy had the same percent (13.5). As regard to oligogydrominos, it has the lowest percent(5%).

Table 1: Relation between Nursing Interpretations for the Study.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTG interpretation in low risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>25</td>
<td>83.3</td>
</tr>
<tr>
<td>Non reassuring</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Abnormal</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>CTG interpretation in high risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td>Non reassuring</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>Abnormal</td>
<td>8</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Table 1 points to apparently that more than four-fifth of low risk cases had normal fetal heart rate pattern (83%) and only 6.6% of them had abnormal fetal heart rate pattern. On the other hand slightly more than two-fifth of high risk cases had normal fetal heart rate (43.3%) and less than one-third of them had abnormal fetal heart rate pattern (26.7%).

Table 2: Maternal Complications in High Risk (Study Group) and High Risk (Control Group).

<table>
<thead>
<tr>
<th>Variable</th>
<th>High risk (Study)</th>
<th>High risk (Control)</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Complications during present labour to mother</td>
<td>10</td>
<td>33.3</td>
<td>26</td>
<td>86.7</td>
</tr>
<tr>
<td>Perineal tear, cervical tear</td>
<td>3</td>
<td>10.0</td>
<td>21</td>
<td>70.0</td>
</tr>
<tr>
<td>Immediate vaginal bleeding</td>
<td>2</td>
<td>6.7</td>
<td>19</td>
<td>86.7</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal without ventose or Forceps</td>
<td>11</td>
<td>36.7</td>
<td>20</td>
<td>66.6</td>
</tr>
<tr>
<td>Instrumental Delivery</td>
<td>4</td>
<td>13.3</td>
<td>2</td>
<td>6.6</td>
</tr>
<tr>
<td>C.S.</td>
<td>16</td>
<td>53.3</td>
<td>8</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Points to statistical significance to total complications (p < 0.001) during present labor to the mother. Also increased cesarean section rate to the study group (p< 0.001).
Table 3: Fetal complication in low risk (study group) and low risk (control group)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low Risk (Study)</th>
<th>Low Risk (Control)</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No</td>
<td>24</td>
<td>25</td>
<td>83.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>6</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Meconium aspiration</td>
<td>No</td>
<td>26</td>
<td>28</td>
<td>93.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>4</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Caput Succedaneum</td>
<td>No</td>
<td>27</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Cephalohematoma</td>
<td>No</td>
<td>28</td>
<td>28</td>
<td>93.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Need for Ventilation</td>
<td>No</td>
<td>27</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Admission to neonatal intensive care unit</td>
<td>No</td>
<td>27</td>
<td>24</td>
<td>93.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>3</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td>Intrapartum fetal Death</td>
<td>No</td>
<td>30</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Displays no statistical significance difference between fetal complications for low risk of the study group and low risk in control group (p> 0.05) except in need for ventilation (p< 0.05).

Table 4: Maternal Complications in Low Risk (Study Group) and Low Risk (Control Group).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low Risk Cases</th>
<th>Low Risk Control</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Perineal, cervical tear</td>
<td>4</td>
<td>13.3</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Immediate vaginal bleeding</td>
<td>2</td>
<td>6.7</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal without ventose or Forceps</td>
<td>12</td>
<td>40%</td>
<td>25</td>
<td>83.3%</td>
</tr>
<tr>
<td>Instrumental Delivery</td>
<td>9</td>
<td>30%</td>
<td>1</td>
<td>3.3%</td>
</tr>
<tr>
<td>C.S.</td>
<td>9</td>
<td>30%</td>
<td>4</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Shows no statistical significance related to perineal or cervical tear, and immediate vaginal bleeding. Instrumental delivery and cesarean section rate for low risk cases in the study group is increased than for low risk in control group and shows statistical significance difference (p<0.01).

Discussion

Regarding to indications of cardiotocography vaginal birth after cesarean section (VBAC) there were nine cases did not have indications to cesarean section on admission rather than they were being previous cesarean section and more than two third of them were being delivered normally without any complications to neither fetus nor the mother. One third have been delivered cesarean section due to no cervical dilatation response, or development of signs of fetal distress.

Malene and Andersen et al.,[8] reported that a pathological cardiotocogram should lead to particular attention on threatening uterine rupture but cannot be considered a strong predictor. [9][10] are all reported that planned VBAC is a clinically safe choice for the majority of women with a single previous lower segment caesarean delivery.

There were no significant differences in fetal outcomes from using intrapartum CTG for low risk cases compared with fetal outcomes for control group. On the same line[10][11] stated that organizations and stakeholders like the World Health Organization and the International Federation of Gynecology and Obstetrics (FIGO) recommend that intermittent auscultation (IA) should be used to monitor (low-risk) pregnancies during labour. Also,[11][12] reported that the evidence does
not support routine use of antenatal EFM for low-risk pregnant women.

Regarding to high risk cases there is significance difference in using CTG versus intermittent auscultations for high risk cases in concern to fetal outcomes. Supported result by as incidence of fetal distress, moderate-thick meconium stained liquor and neonatal intensive care unit (NICU) admission was significantly more frequent among patients with ominous test results compared with equivocal or reactive test results on admission. Incidence of vaginal delivery was more common when the test was reactive.

Apgar score at (1min) after birth between 4 -5 at 5 minutes had normal fetal heart rate pattern, and about one eight had nonreassuring fetal heart rate pattern, and about one third had abnormal fetal heart rate pattern. Apgar score 5 minutes after birth ≤ 3 were 1%, 9% and 13% respectively. Supported results by showed that there were no association between Apgar scores at one minute and acidosis.

Intervention rate in our study showed that the rates of both operative vaginal delivery and caesarean section were significantly increased with the use of CTG compared with intermittent auscultation for low risk. For this effect was more pronounced if only those deliveries for presumed ‘fetal distress’ were considered. This was Support by who reported that CTG had importance in detection of fetal distress with low Apgar score (P <0.001).

It was obviously clear that the research hypothesis were accepted.

**Conclusion**

- Cardiotocography should be recommended for labor for high-risk pregnancies where there is an increased risk of prenatal adverse outcomes.
- Low risk pregnancy recommended to be monitored by intermittent auscultation.
- Cardiotocography for low risk is associated with a significant increase in instrumental delivery and caesarean section rates compared with intermittent auscultation.

**Recommendations:** Continuous electronic fetal monitoring should be offered and recommended for high-risk pregnancies where there is an increased risk of fetal compromise.

**Ethical Clearance:** Taken from Faculty of Nursing-Ethical committee

**Source of Funding:** Self

**Conflict of Interest:** Nil.

**References**

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The Use of Walnut Tree Bark Powder as a Teeth Whitener

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Abstract

The chemical changes that may occur with carious destruction of enamel lead to unacceptable appearance of teeth. For males and females the appearance of teeth is of most importance, therefore they should take care with their teeth. The cleaning and whitening processes are expensive and may be harmful for enamel of teeth, so this research includes the whitening of teeth by using natural product containing toothpaste. The powdered bark of walnut tree has been used as whitening material in four forms and these are tested on 40 volunteers with stained teeth in dentist clinic. The four products were powder only. Powder mixed with toothpaste, condensed aqueous extract and granules of the product. The percentage of the powder in the paste was 5%, the mixture is homogenized by using mortar and pestle and the pH is tested and calibrated by pH meter to 6.5 which is the acceptable medium for mouth and is included the normal range of saliva pH. The product is examined by brushing gently for two minutes after the brushing for same period by toothpaste without the powder. Walnut bark contains high quantities of minerals particularly manganese, and contains important subgroup of polyphenolic compound called ellagitannins which have antibacterial effects and antioxidant properties. The differences before and after brushing with powder were highly significant.

Keywords: Toothpaste. Walnut bark. Teeth whitener.

Introduction

Enamel is the most mineralized part in the body, leading to form thin, very hard, translucent layer and calcified tissue that cover the crown of the tooth¹. The thickness and the hardness of enamel vary from tooth to other and from person to other one. The hardness of enamel is explained by its composition from inorganic materials 95-98% calcium and phosphate ions that form hydroxyapatite crystals (fig. 1)²,³. These crystals also contain trace minerals like strontium, magnesium, lead and fluoride. Enamel contains specific proteins called enamelines which tend to bind hydroxyapatite crystals⁴. Enamel is permeable so the fluids can move and diffuse. This permeability may affect the density and the hardness of enamel by demineralization which is the loss of calcium and phosphate ions when pH decreases less than 5.5 so the oral medium becomes acidic⁵.

The binding of fluoride ions with apatite occurs by filling the hydroxyl vacancies or by displacing hydroxyl ions. Because of the high charge density presents on fluoride ions, theses ions close and fit with calcium ions in the triangles of apatite leading to stabilize the crystal structure⁶. The binding of carbonate occurs by replacing calcium or phosphate ions, and the replacement depends on the development of crystal⁷.

![Figure 1: Crystal structure of hydroxyapatite](source.png)
ions incorporation have a positive synergistic effect on hydroxyapatite by increasing acid solubility of apatite mineral[10]. Chloride, sodium and lead may be present in the structure of apatite[11]. Organic materials are also present in a low concentration in the structure of enamel in a form of small peptides and amino acids distributed in the mature tissues[12]. Enamel also contains a distinct type of protein called enamelin which comprises 10% of the total enamel protein and involved in amelogenesis[13,14]. Mutation in the gene ENAM that is responsible for enamelin formation can cause amelogenesis imperfect[15].

**Materials and Method**

All reagents used were of high purity. The samples are the walnut tree bark. The bark pieces were collected and rinsed with distilled water three times and dried in oven at 40°C. The bark pieces after drying were powdered by stainless steel grinder three times until fine powder was produced. The powder is stored in a polyethylene container until use. The practical procedure included four parts: the first part is the aqueous extraction of the sample by continuous extraction using soxhlet for 24 hours, the extract is condensed by rotary evaporator then used as a crude extract in the whitening process. The second part is the mixing of powder with ordinary toothpaste and packaging the mixture to be examined. The third part is the formation of granules by mixing the powder with toothpaste and drying the mixture then convert it to granules. The fourth part is the use of powder only. The four products were tested on 40 volunteers in dentist clinic and the teeth were imaged before and after the whitening. The whitening effect of the products has been tested by two ways once by brushing and the second way by using micro motor device at 10000 rpm with soft brush. Three of products showed good results of whitening except the condensed extract, the others have a high effect of whitening. The highest effect of whitening was for the powder only without additives but have not favorable and pungent taste and the pH cannot be controlled easily. The effect of powder containing toothpaste was high and the pungent taste is reduced and the pH can be easily controlled. The effect of granules was less than the powder containing toothpaste despite the granules was made by mixing with toothpaste, this can be explained according to the consistency of the product. The two ways of whitening showed the same results this means that there is no effect for the mechanical cleaning and the brushing is easier. The whitening persists for two months for those that keep care the teeth (fig. 2). The brushing period was three minutes and the results were for one use only. The effect of whitening may be explained by the presence of carbonates, sodium, potassium, calcium, phosphorus, magnesium, iron, cupper, manganese, and zinc ions in the bark of walnut tree, all of these ions and molecules involved in the structure of hydroxyl apatite of the enamel and aid in demineralization process of enamel. Magnesium ions are located in the surface of the apatite crystal which has a stabilizing effect on the apatite lattice. Magnesium and carbonates have a synergistic effect by their incorporation to the hydroxyapatite lattice and by the ability to increase the acid solubility of apatite mineral. The structure of the plant also contains important compound called ellagitannin which is polyphenolic compound and sever antioxidant and has antibacterial effect. This product whitener is natural has no chemical compound which make it distinct over the other whiteners.

**Results and Discussion**

The effect of whitening for the four productswas examined in a dentist clinic by two ways the first one by brushing and the second by micro motor device at 10000 rpm with soft brush. Three of products showed good results of whitening except the condensed extract, the others have a high effect of whitening. The highest effect of whitening was for the powder only without additives but have not favorable and pungent taste and the pH cannot be controlled easily. The effect of powder containing toothpaste was high and the pungent taste is reduced and the pH can be easily controlled. The effect of granules was less than the powder containing toothpaste despite the granules was made by mixing with toothpaste, this can be explained according to the consistency of the product. The two ways of whitening showed the same results this means that there is no effect for the mechanical cleaning and the brushing is easier. The whitening persists for two months for those that keep care the teeth (fig. 2). The brushing period was three minutes and the results were for one use only. The effect of whitening may be explained by the presence of carbonates, sodium, potassium, calcium, phosphorus, magnesium, iron, cupper, manganese, and zinc ions in the bark of walnut tree, all of these ions and molecules involved in the structure of hydroxyl apatite of the enamel and aid in demineralization process of enamel. Magnesium ions are located in the surface of the apatite crystal which has a stabilizing effect on the apatite lattice. Magnesium and carbonates have a synergistic effect by their incorporation to the hydroxyapatite lattice and by the ability to increase the acid solubility of apatite mineral. The structure of the plant also contains important compound called ellagitannin which is polyphenolic compound and sever antioxidant and has antibacterial effect. This product whitener is natural has no chemical compound which make it distinct over the other whiteners.
Figure 2: Images of some volunteers teeth before and after whitening.
Figure 3: Cromascop used to compare between teeth before and after whitening

Conclusions

From the results and the period of whitening, the powder of walnut tree bark is a useful material for teeth whitening and has antibacterial effects because the presence of polyphenolic compounds. The paper discusses and treats important problems for males and females which can be solved in other expensive and harmful ways. The principle of this research depends on the use of natural products instead of chemicals so this whitener is safe to use.

Conflict of Interest: Nil.

Source of Funding: Self funding.

Ethical Clearance:

References

Determination of Dyspnea in Mechanically Ventilated Patients

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Abstract

Background: Although dyspnea is the most common suffering and devastating symptom in the mechanically ventilated patients (MVPs), it is not routinely measured.

Aim of the study: To assess dyspnea and factors contributing to it in MVPs.

Design: A descriptive research design

Settings: Intensive Care Units of Alexandria Main University Hospital.

Subjects: Forty critically ill conscious adult MVPs

Tool of data collection: Dyspnea assessment tool used to collect the data.

Results: 55% of the study sample had dyspnea and 86.4% of dyspneic MVPs had moderate to intense level of dyspnea.

Conclusion: Dyspnea is present in more than half of the MVPs. Moderate to intense dyspnea is more frequent in MVPs.

Keywords: Dyspnea, Mechanical ventilation, Modified Borg Scale.

Introduction

Dyspnea is a subjective experience of breathing discomfort described as air hunger, heavy breathing or choking.1,2 It is a common and often debilitating symptom that affects up to half of patients admitted to acute tertiary care hospitals and 25% of patients admitted to acute tertiary care hospitals seeking care in ambulatory settings.3,4 Presence of dyspnea is a strong predictor of patient’s clinical course and mortality and neglecting it cause suffering, complicate and extend length of stay, and counterbalance physiological benefits in terms of clinical outcomes.4,5,6 Therefore, mechanical ventilation which is a commonly used technological treatment in ICUs,7 aims to maintain adequate oxygenation, alleviate the patient’s respiratory symptoms, reduce the work of breathing (WOB), and improve patient comfort.1,6

However and at the same time, patients on MV may experience distressing symptoms such as anxiety, dyspnea, pain or discomfort, confusion, agitation, and sleep disturbances.8 In other words, dyspnea can persist, reappear, or re-increase after the initiation of MV. This can reveal many complications (such as pneumothorax, pneumonia, cardiac failure, anemia, etc.), air leaks, increased airway resistance, decreased lung compliance, inappropriate ventilator settings, anxiety and pain.6,9 Therefore, dyspnea could be used as a useful clinical management tool for the MVPs.6

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The critical care nurses had an essential role in providing patient-centered care to maintain oxygenation and ventilation adequacy, breathing comfort, and patient-ventilator synchrony.\textsuperscript{(10)} Responsibilities of the critical care nurse related to ventilator management may vary among acute care settings, but no doubt the nurse is the “first-line manager” challenged with MVPs related problems.\textsuperscript{(9)} Therefore, it is very important that they should do their best effort to develop their knowledge and skills needed for effective management of MVPs.\textsuperscript{(9)}

As dyspnea is the most suffering and devastating symptom.\textsuperscript{(11)} A patient-centered approach of nursing care should include routine assessment for dyspnea using an appropriate instrument.\textsuperscript{(5, 9, 12)} Unfortunately, dyspnea is still not routinely assessed in critically ill patients, except during patient weaning from MV.\textsuperscript{(6)} During the last decades, manufacturers and researchers increase their attention on the patient-ventilator interactions.\textsuperscript{(13)} However, dyspnea has not been studied to any great extent in MVPs.\textsuperscript{(6)} In general critical care nurses have a sense of security that, because the patients are supported by the MV, they are receiving adequate ventilation and they are not suffering from dyspnea; however, in fact, dyspnea is common and more frequent problem in MVPs. In addition, there is a knowledge gap in the understanding of dyspnea in those patients. Therefore, this study aimed to assess dyspnea in mechanically ventilated patients.

\textbf{Materials and Method}

\textbf{Design:} A descriptive research design was used to assess dyspnea in MVPs.

\textbf{Sample:} A convenience sample of 40 critically ill conscious patients above 18 years old intubated and attached to MV for more than 24 hours.

\textbf{Settings:} Casualty and general ICU of Alexandria Main University Hospital.

\textbf{Instrument:} Dyspnea assessment tool used to collect the data and was developed after reviewing the related literature.\textsuperscript{(5, 6, 9, 14)} It consisted of two parts. The first part consisted of the patients’ characteristics, MV parameters and the respiratory distress manifestations associated with dyspnea. Arterial blood gases (ABG), peripheral oxygen saturation (SpO\textsubscript{2}) vital signs, anxiety, pain level, blood hemoglobin level (Hb) were also assessed. The second part of the tool consisted of the dyspnea scale. The Modified Borg Scale (MBS)\textsuperscript{(5, 15)} was used to assess dyspnea in MVPs. It is a 12-point scale (0, 0.5, 1–10) with numbers corresponding to descriptions regarding the amount of dyspnea, with no dyspnea rated as 0 and worst maximal dyspnea rated as 10.

\textbf{Data collection:}

The patient’s characteristics and health relevant data were recorded. The manifestations of respiratory distress associated with dyspnea, were continuously observed.

If any abnormality in breathing dynamics was present, dyspnea assessment was done by asking patients first “do you have trouble breathing”. If the answer was yes, then they were asked to rate the intensity by telling the patients the items of Modified Borg Scale (MBS) and ask them to select the dyspnea level. Finally, mechanical ventilation settings, vital signs, Hb level, ABG and SpO\textsubscript{2} were assessed and documented. Pain and anxiety were also assessed by visual analog scales (10-cm VASs to evaluate anxiety (“no anxiety” to intolerable anxiety”) and pain (“no pain” to “intolerable pain”).

\textbf{Data Analysis:} Patient were categorized according to the dyspnea as “present” or “absent” and therefore defining two groups of patients. The patients groups were compared using Wilcoxon rank sum tests for quantitative variables and the Fisher’s exact test for qualitative variables. A multiple logistic regression with a backward stepwise model selection was used to identify factors independently associated with dyspnea. All tests were two sided, and p values < .05 were considered statistically significance. The statistical analyses were performed using SPSS version 17.

\textbf{Results}

Result of this study shows that more than half of the study sample had dyspnea (55%) and the mean age of dyspneic patients was 53.39 ± 17.0. The majority of the study sample (77.5%) was males (90.9% of them were dyspneic). One half of the study sample suffered from pulmonary disorders and 59.1% of them had dyspnea. The mean score of dyspnea modified Borg scale was 6.0 ± 1.8 and this reflect the moderate to intense level of dyspnea. This table also shows that there was significant difference between dyspneic and non dyspneic patients in term of hemoglobin level.

Findings of current study revealed that 31.8% of the dyspneic patients had fever, 27.3% of them had pain and 63.6% of them had anxiety. Dyspneic patients exhibited
abnormalities in breathing dynamics (using of accessory muscle) while, non dyspneic ones did not exhibit any abnormality in breathing dynamics. Also dyspneic patients were more attempting to sit up in bed, had higher respiratory rate(RR), higher HR, higher systolic blood pressure (SBP) and diastolic blood pressure (DBP), lower Hb level, lower SpO₂, lower FiO₂%, lower Vt, lower flow rate, lower PEEP, higher PS, and higher PAP than non dyspneic patients. There were statistically significant differences between dyspneic and non dyspneic patients regarding RR, HR, SBP, DBP, Hb level and SpO₂. It was observed that dyspneic patients were on assist control ventilation (ACV) mode and PSV mode while, non dyspneic patients were on biphasic positive airway pressure (BIPAP), synchronized intermittent mandatory ventilation (SIMV), and continuous positive airway pressure (CPAP) modes and there were statistically significant differences regarding ventilator modes, PAP in dyspneic and non dyspneic patients.

Also it was found that 86.4% of the patients had moderate to intense level of dyspnea. Of those 50% had moderate dyspnea and 36.4% had intense dyspnea. There were statistically significant differences between dyspnea intensity level (mild, moderate and severe dyspnea) regarding abnormalities in breathing dynamics, RR, HR, SBP, and PAP.

**Discussion**

Poor patient–ventilator interaction causes discomfort and dyspnea. Optimizing patient comfort is a main concern in the ICU and relieving immediate suffering is indeed a natural mission of all caregivers. Therefore, the aim of this study is to assess dyspnea in MVPs.

Regarding the presence and intensity level of dyspnea in MVPs, the findings of this study highlight that dyspnea is more frequent in MVPs and our result revealed that more than half of the study sample had dyspnea and the majority of them experienced moderate to intense level of dyspnea. This may be related to assessment of dyspnea in MVPs is neglected due to safety feeling of critical care nurses that MV provide support to patients attached to it. In addition, lack of knowledge and skills related to dyspnea in MVPs. These findings are consistent with Bissett et al and Twibell et al findings who reported that patients had moderate and high levels of dyspnea during MV. On the contrary, Decavèl et al and Merchán-Tahvanainen et al results which revealed that MVPs had low to moderate levels of dyspnea.

In relation to the characteristics of the study sample, one half of the sample diagnosed with pulmonary disorders. This may be due to that the majority of subjects were adult male and more than one third of them were elderly. This may be due to smoking history and aging which affecting on the lung volume. As people are older, their lung functions start to decline (Veljković, 2019).

In our study, Dyspneic and non dyspneic patients did not differ significantly in term of patients’ diagnosis. This may be due to presence of many factors which contribute to dyspnea in MVPs. This result is in agreement with Schmidt et al. (2011) who found that intensity, characteristics and prevalence of dyspnea did not depend on the cause of respiratory failure and this result suggests that dyspnea may be caused by pathophysiology of disease. Indeed, patients with pulmonary disorders reported dyspnea that is may be related to the hyperinflation-induced volume restriction as in COPD patients.

Mechanical ventilation and critical illness induce great anxiety and distress in hospitalized patients. Anxiety and pain may increase dyspnea by stimulating ventilatory drive. We found that there were no statistically significant differences between dyspneic and non dyspneic patients regarding anxiety and pain in MVPs. This may be due to MVPs may be unable to communicate their distress, anxiety and pain. It was reported by Schmidt et al that pain and anxiety were more frequent in dyspneic than in non-dyspneic MVPs and dyspnea was significantly associated with anxiety.

As hemoglobin is a common generator of dyspnea, and at the same time there was an association between anemia and failure of weaning from MV. So, it is of most importance to assess hemoglobin level and correlate it with dyspnea in MVPs. Dyspneic patients had lower hemoglobin level than non dyspneic patients and there was statistically significant difference between dyspneic and non dyspneic patients in term of hemoglobin level. Multivariate analysis showed that there was no significant association between dyspnea and hemoglobin. This is similar to Schmidt et al. (2011) who found that that there was no association between dyspnea and hemoglobin.
Ventilatory settings might be involved in the genesis of dyspnea, in addition to ventilatory mode. In the present study, dyspneic patients were usually on ACV and PSV modes and there were statistically significant differences regarding ventilator modes, PAP in dyspneic and non dyspneic patients. This may be due to higher respiratory rate in ACV which increase inspiratory efforts and hence increase work of breathing. Schmidt et al (6) reported that ACV was the principle cause of dyspnea and found that the ACV mode was independently associated with dyspnea.(17)

Regarding Pressure support ventilation, there were no statistically significant differences between dyspneic and non dyspneic patients. This may be due to that the mean pressure support in dyspneic patients is to some extent similar to non dyspneic patients. On the contrary, Vaporidiet al (2019)(26) who found low pressure support levels have also been associated with a sense of excessive inspiratory effort and there was a trend toward more dyspnea in those who received a pressure support ventilatory mode with a pressure support level < 15 cmH2O.(6)

Other factor may contribute to dyspnea in MVPs is a low tidal volume. We found that there was no statistically significant difference between dyspneic and non dyspneic patients in relation to tidal volume. This may be also related to small variations in the value of the tidal volume in the dyspneic and non dyspneic patients. This is against Rauxet al (2019)(27) found that low tidal volumes were associated with air hunger.

Moreover, the inspiratory flow is among the ventilator settings that may be lead to dyspnea. Our findings indicate that dyspneic patients had a lower inspiratory flow than non dyspneic patients. This may be due to that ventilator flow rate is not adjusted to match the high respiratory demands of critically ill patients. Also there was no statistically significant difference between dyspneic and non dyspneic patients in the term of inspiratory flow. These findings are consistent with Schmidt et al (6)and Binks et al (2017)(28) findings that an inspiratory flow below 1 l/sec equates to a risk of generating dyspnea.

Conclusion

It can be concluded that dyspnea is present in more than half of the MVPs. Moderate to intense dyspnea is more frequent in MVPs. Assessment of dyspnea in the MVPs is feasible and applicable.

Ethical Clearance: The Research and Ethical Committee of the Faculty of Nursing, Alexandria University approved the study, and an ethical clearance was issued. Permissions were requested from hospitals’ management and unit’s managers. Participation in the study was voluntary and an informed written consent was obtained from patients after explaining aim of the study. The right to refuse to participate or to withdraw from the study was emphasized to patients. Confidentiality of participants was maintained.

Source of Funding: Self

Conflict of Interest: Nil.

References


Duplex Ultrasound for Carotid Arteries Must be Done as Screening for All Patients with Coronary Artery Surgery Regardless of Age Group and Risk Factors

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Abstract

Aim: Routine utilizes of Doppler ultrasonography in the clinical examination of the patients for carotid artery stenosis varies according to the age groups. In the present work, predictive level of age groups and co-occurrence risk factors are examined in terms of the necessity of Doppler ultrasonography to be routinely used in the examination of the carotid artery in isolated coronary and associated with carotid artery surgery.

Material and Method: 86 patients underwent carotid endarterectomy in our center between April 2016 and June 2018. Thirty-eight (44.18%) of these patients had been detected during the screening before the coronary artery by-pass graft surgery, whereas 48 (55.82%) were patients referred from the neurology clinic because of severe carotid artery stenosis. Retrospectively reviewed of all patients in terms of gender and age group, as well the existence of hypertension, diabetes, and smoking. Division of patients into two groups: those < 65 years age (Group 1) and those equals 65 and over (Group 2).

Results: Thirty-one (36%) of the patients that underwent carotid endarterectomy was < 65 years’ age (Group 1). Fifteen (17.4%) of these patients were those that would undergo coronary bypass surgery. When the patients had submitted isolated and concomitant carotid artery endarterectomy were evaluated in terms of risk factors, hypertension and diabetes were found significantly higher in group one as compared to group two (p<0.05).

Conclusion: Our opinion Doppler ultrasonography should routinely use together with physical examination in the preoperative evaluation of the patients with coronary artery disease in order not to underestimate such critical carotid artery stenosis that would require surgical intervention.

Keywords: Carotid artery, Doppler ultrasonography, Coronary artery surgery, age, risk factors, endarterectomy.

Introduction

Today, cerebrovascular accident (CVA) is the 3rd leading cause of mortality, second in deaths related to cardiovascular diseases and first in neurological deaths. 80% of CVAs are ischemic and 20% are hemorrhagic. Carotid artery stenosis (CAS) is present in approximately 50% of those who are diagnosed as ischemic CVA’s ¹. Ischemic stroke; is one of the most common prolonged hospitals stays post coronary artery bypass graft (CABG) surgery and the lethal complications that lead to a patient loss ². Critical CAS or occlusion has been shown in the majority of patients with CABG who developed perioperative stroke ³-10. Critical CAS was reported in 36% of patients who will...
As known, patients with CAS who have become symptomatic, refer to neurology clinics and are diagnosed by the examinations. Patients with atherosclerosis who are neurologically asymptomatic and at constant risk for CVA are checked for carotid system integrity, especially in healthcare institutions where they are referred for other atherosclerotic diseases like coronary artery disease or peripheral vascular disease. Some centres are suggesting that pre-CABG carotid artery screening should be performed in diabetic patients for <65 and all patients ≥65 years old ages. It has been observed that the tendency is in this direction in many centres. So, the objective of this study was to investigate the incidence of CAS in patients undergoing CABG and determine the age as a risk factor related to critical carotid stenosis.

**Material and Method**

Between April 2016 and June 2018, 91 carotid endarterectomy procedure was performed for 86 patients. Sixty-five of them were male and 21 females. Five patients had bilateral (4 males, 1 female patient) critical CAS. Of these, 38 (44.19%) patients were diagnosed on the pre-operative assessment before the coronary bypass surgery, and 48 (55.81%) patients were referred from the neurology clinic for the reason of symptomatic CAS. On the carotid Duplex ultrasound, if there is ulceration with more than 50% stenosis, or any 70% or more stenosis on the common or internal carotid artery were considered as critical CAS as recommended in the guidelines. These patients underwent a carotid artery system, digital angiography examination and determination of the same criteria were considered surgical indications. Colour Doppler-angiography compatibility was determined as 98%. There were two groups, aged less than 65 years (Group 1) and 65 years and older (Group 2) and they were retrospectively investigated for coronary artery disease, sex, diabetes mellitus (DM), hypertension (HT) and smoking.

**Results**

The patients who underwent carotid artery endarterectomy, 31 (36.04%) were in group 1 and 55 (63.95%) in group 2. Of Group 1 patients, 15 (17.44%) were diagnosed by Carotid Doppler ultrasonography during preoperative preparation for CABG and 16 (18.6%) of them were referred from the neurology clinic as shown in (Table 1). According to this; on preoperative scans for CABG, 38 patients diagnosed with critical CAS, 15 of them were <65 age (Group 1) patients. As a result, 39.47% of the patients (15/38) with CAS who are diagnosed with pre-CABG carotid artery screening were younger than 65 years old. When the two groups of patients were examined in terms of risk factors, DM and HT rates were significantly higher in group 1 compared to group 2 (p <0.05) (Table 2). According to this, in group 1, 44.4% of patients had DM and 63.5% had HT whereas, in group 2, this rate was determined as 29.4% and 42.2%, respectively. The patients who referred to the neurology clinic evaluated for coronary artery disease (n:48). Twenty-one of them had the critical coronary artery disease, 11 of them treated by PTCA-stent (Percutaneous transluminal coronary angioplasty) procedure, and the remaining referred for CABG. Carotid and coronary surgical procedures were performed in the same session or different sessions according to the severity of coronary lesions. Patients who were referred from neurology clinic for Carotid Endarterectomy and who diagnosed as critical CAS on pre-CABG screening were compared in terms of risk factors. According to this, regardless of age group, DM and HT were significantly higher (p <0.05) in pre-CABG patients. Then who were referred from the neurology clinic (Table 3). In patients diagnosed with CAS on pre-CABG screening, DM was detected in 45.5% and hypertension in 63.5% and patients referred from neurology clinic this rate was determined as 26.3% and 42.2%, respectively. When the age groups and referral centres were compared; there was a statistically significant difference in group 1 and group 2 in the incidence of DM and HT in patients who referred to the neurology clinic. The incidence of DM and HT were significantly higher in group 1. Whereas there was no statistical difference in risk factors between age groups in patients diagnosed with critical CAS on pre-CABG screening. On pre-CABG screening patients DM and HT risk factors have been already high for all ages. As a result, there was no difference for critical CAS between groups in pre-CABG screening (Table 4).
Table 1: Distribution of 86 patients who underwent carotid artery endarterectomy according to age groups and patient groups.

<table>
<thead>
<tr>
<th></th>
<th>Group I &lt;65 ages</th>
<th>Group II ≥65 age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative screening</td>
<td>15 (%17.4)</td>
<td>23 (%26.7)</td>
<td>38 (%44.1)</td>
</tr>
<tr>
<td>Symptomatic patients referred from neurology clinic</td>
<td>16 (%18.6)</td>
<td>32 (%37.2)</td>
<td>48 (%55.8)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31 (%36.0)</strong></td>
<td><strong>55 (%63.9)</strong></td>
<td><strong>86</strong></td>
</tr>
</tbody>
</table>

Table 2: The statistical results of risk factors according to age groups. (DM: Diabetes Mellitus, HT: Hypertension, NS: Non significant)

<table>
<thead>
<tr>
<th>Percentage%</th>
<th>Male</th>
<th>Female</th>
<th>DM</th>
<th>Non DM</th>
<th>HT</th>
<th>Non HT</th>
<th>Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 (&lt;65 age)</td>
<td>74.6</td>
<td>25.4</td>
<td>44.4</td>
<td>55.6</td>
<td>63.5</td>
<td>36.5</td>
<td>15.9</td>
</tr>
<tr>
<td>Group 2 (≥65 age)</td>
<td>76.1</td>
<td>23.9</td>
<td>29.4</td>
<td>70.6</td>
<td>42.2</td>
<td>57.8</td>
<td>16.5</td>
</tr>
<tr>
<td>Fisher’s Exact Test</td>
<td>NS</td>
<td></td>
<td>p:0.045</td>
<td></td>
<td>p:0.007</td>
<td></td>
<td>NS</td>
</tr>
</tbody>
</table>

Table 3: Risk rates and statistical test results of all patients undergoing carotid artery endarterectomy (DM: Diabetes Mellitus, HT: Hypertension, NS: Non significant).

<table>
<thead>
<tr>
<th>Percentage%</th>
<th>Male</th>
<th>Female</th>
<th>DM</th>
<th>Non DM</th>
<th>HT</th>
<th>Non HT</th>
<th>Smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Source</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative screening</td>
<td>79.2</td>
<td>20.8</td>
<td>45.5</td>
<td>54.5</td>
<td>63.5</td>
<td>36.5</td>
<td>15.9</td>
</tr>
<tr>
<td>Referred from neurology clinic</td>
<td>72.6</td>
<td>27.4</td>
<td>26.3</td>
<td>73.7</td>
<td>42.2</td>
<td>57.8</td>
<td>16.5</td>
</tr>
<tr>
<td>Fisher’s Exact Test</td>
<td>NS</td>
<td></td>
<td>p:0.009</td>
<td></td>
<td>p:0.021</td>
<td></td>
<td>NS</td>
</tr>
</tbody>
</table>

Table 4: Distribution of statistically significant risk factors according to patient source and age group (DM: Diabetes Mellitus, HT: Hypertension, NS: Non significant).

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Risk Factors</th>
<th>&lt;65</th>
<th>≥65</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred from neurology</td>
<td>DM%</td>
<td>40.6</td>
<td>19</td>
<td>p&lt;0.005</td>
</tr>
<tr>
<td></td>
<td>No DM%</td>
<td>59.4</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HT%</td>
<td>56.3</td>
<td>34.9</td>
<td>p&lt;0.006</td>
</tr>
<tr>
<td></td>
<td>No HT%</td>
<td>43.7</td>
<td>65.1</td>
<td></td>
</tr>
<tr>
<td>Preoperative screening</td>
<td>DM%</td>
<td>48.4</td>
<td>43.5</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>No DM%</td>
<td>51.6</td>
<td>56.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HT%</td>
<td>56</td>
<td>52.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No HT%</td>
<td>44</td>
<td>47.8</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Age group rates and risk factors distribution of patients undergoing carotid artery endarterectomy (DM: Diabetes Mellitus, HT: Hypertension).
Discussion

Stroke risk incidence is 1-2% in coronary artery bypass patients with no pathology in the carotid artery system, whereas stroke risk is 14% in patients with stenosis in the carotid arteries. Carotid lesions cause cerebral hypo-perfusion and stroke because of stenosis, thrombosis or particle embolization due to plaque rupture in the perioperative and early postoperative period. In this study, the level of necessity of Colour Doppler ultrasonography of the carotid artery system during the preparation of patients before coronary bypass surgery was investigated. In some studies, the age limit was determined as 60 or 65 for routine pre-CABG carotid artery screening by Doppler ultrasonography was recommended. In the study of Ascher, routine Carotid-Doppler ultrasonography screening before coronary bypass surgery is recommended in patients older than sixty years, unless they have at least two risk factor: DM, HT and smoking. Cornily et al. have considered patients with cerebral or peripheral artery disease, carotid murmur, presence of DM and/or over 70 years as risky, and recommend carotid artery system imaging in this group of patients. Durand et al. suggest routine carotid system Doppler ultrasonography scan because of increased risk over 65 years old, and in patients under 65 years old Doppler scan should be done if there is a murmur in the carotid artery system with CVA history.

Another study, it has been stated that this is troublesome and not necessary, therefore there is no reason for routinely carotid artery screening for all age groups. At, our centre, carotid artery Colour Doppler screening is performed routinely in all patients who are preparing for CABG. All patients who have critical stenosis on carotid Doppler ultrasound are referred for vertebral and carotid artery CT angiography, and treatment options are determined according to these results. Our aim is; to update this issue because younger patients are frequently referring to undergoing either coronary artery bypass surgery or carotid artery endarterectomy. Carotid Duplex screening is generally determined according to the age limit of 60 or 65 years, so we have examined all the patients regardless of their age. In this study, 36% (31 of 86 patients) of the patients who underwent carotid artery endarterectomy were under 65 years old. And also among patients with critical CAS who referred for CABG surgery lower than 65 years constitute the high rate of 39.47% (15 of 38 patients).

When we compared the risk factors according to both age groups and referral centres together; we saw that the rate of DM and HT were significantly higher in <65 years who referred from neurology centre. But on the dark side of the moon; yes, the rate of risk factors was higher than group 2 but; almost 1/2 of the patients were non-DM and non-HT. In the statistical tests, DM and HT are more frequent risk factors for CAS in <65 age, however, this does not mean that there is no CAS in this population who has no DM or HT. As shown in (Table 2) and (Table 5), DM and HT are not detected in almost
half of the patients in <65 years old group. Patients <65 years old 55.6% had no DM and 36.5% had no HT. For this reason, the selection of patients under the age of 65 according to the presence of DM leads to the fact that more than 50% of this group cannot be diagnosed and missed. Therefore, routine screening criteria should be the same for both age groups. In patients over 65 years old, carotid colour Doppler ultrasonography screening is routinely recommended for patients without risk factors such as DM and HT. This recommendation should also apply to the <65 age patient group. Critical arterial stenosis can be detected in colour Doppler screening of the carotid artery system and atherosclerotic thickening can be detected at a considerable level even if not at the surgical margin. By knowing the level of CAS before the coronary artery surgery, even if not at the surgical level; indirect stroke risks could be reduced such as selecting the side of central vein catheterization to avoid trauma to the diseased carotid artery.

**Conclusion:**

Stenosis of the carotid artery was more common in patients with DM and HT. However, there is a substantial mass of non-diabetic and non-hypertensive patients who are treated surgically for critical CAS. We believe that, in the preoperative evaluation of CABG patients, colour Doppler ultrasonography should be routinely taken plus to the physical examination to avoid missing the critical CAS that we have encountered in the <65 age group patients.

**Ethical Approval:** The ethical committee of the, Faculty of Medicine, Jabir Ibn Hayyan Medical University.

**Funding:** No funding

**Conflict of Interest:** All authors stat they don’t have any conflict of interest.

**Declarations:** Ethical consent has been taken from all patients.

**References**


The Changes of Seminal Fluid Parameters Following Laparoscopic Varicocelectomy Versus Open Varicocelectomy

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Abstract

A varicocele is defined as a dilated pampiniform plexus, the network of small veins responsible for venous drainage from the testicle and deep tissues of the hemiscrotum. Two types of operative procedures were applied, i.e. laparoscopic varicocelectomy (LV) and open inguinal varicocelectomy (OIV). The aim of the present study is to compare LV and OIV regarding seminal fluid parameters following surgery. A prospective, comparative study conducted on 110 men with infertility and varicocele. Patients divided into 2 groups viz. LV group (n=50), OIV group (n=60). The LV group consist of 35 and 43 individuals with unilateral and bilateral varicocele, respectively. Similarly, OLV group showed 15 and 17 individuals with unilateral and bilateral varicocele, respectively. Grades of the varicocele in LV group was found to be 19 and 31 in unilateral and bilateral varicocele, respectively. Similarly, OLV group showed 22 and 38 individuals with unilateral and bilateral varicocele, respectively. An improvement, i.e. increased in the semen volume and sperm count while decreased in the abnormal sperm morphology were found to be more in the laparoscopic surgery as compared to the open inguinal surgery. LV is the technique requiring skills and experience. It is a same-day surgery procedure, resulting in rapid recovery, cost savings, and is well accepted by the patient compared to open varicocelectomy.

Keywords: Laparoscopic varicocelectomy, Varicocele, Open inguinal varicocelectomy, sperm count.

Introduction

Nowadays, the fertility is declining worldwide, with a rate of 25% among couples. The male contribution in declining fertility is conservatively at approximately 45%¹. While there are multiple causes in the male, one major cause is varicocele¹. The American Society for Reproductive Medicine and the American Urological Association have found that varicocele causes infertility. A varicocele is defined as a dilated pampiniform plexus, the network of small veins responsible for venous drainage from the testicle and deep tissues of the hemiscrotum. This plexus is contiguous with the ipsilateral gonadal vein, which drains into the renal vein on the left and directly into the inferior vena cava on the right. As a result of leakage, there is a backflow of renal blood down these veins. This renal reflux results in toxic damage to both spermatogenesis and male hormone production by the Leydig cell². The incidence of varicocele can vary between 19% and 41%. Varicoceles occur in approximately 15% of the general male population but are more common (25%-35% prevalence) in infertile men and are the most common physical abnormality in infertile men. Varicoceles typically develop during puberty³.

Various mechanisms have been proposed to explain infertility in men with varicocele⁴. These include hypoxia, stasis, testicular venous hypertension, elevated testicular temperature, increase in spermatic vein catecholamine, and increased oxidative stress. Also, the testes are damaged in varying progressive stages.
over time. There are hyperthermia, testicular shrinkage and atrophy, sperm membrane damage, spermatogenic arrest, Sertoli cell destruction, and germinal epithelial sloughing. In its earlier subclinical stages, varicocele is diagnosed by Doppler ultrasound, whereas in its later more advanced clinical stages, the swollen veins become palpable. The condition is bilateral, but may appear to manifest unilaterally.

When medically indicated for clinically significant varicoceles, many treatment options have been used over time. Varicocelectomy is by far the most commonly performed operation for the treatment of male infertility. The indications of varicocelectomy for clinically significant varicoceles includes infertility, particularly with impaired semen parameters or sperm quality etc. The surgical approach (high retroperitoneal, inguinal, subinguinal) is the gold standard in treatment of varicocele, where its aim is to ligate internal and external spermatic veins with preservation of the vas deferens and lymphatic vessels. In addition to open surgical approaches; laparoscopic surgery and radiologic embolization method are also used. The retroperitoneal high ligation technique, known as the Palomo approach utilises a horizontal incision medial to the anterior superior iliac spine. This approach enables identification of the internal spermatic vein before extensive branching, which theoretically could reduce the recurrence rate. This approach can be performed with or without arterial ligation. The laparoscopic intraperitoneal approach utilises a transperitoneal intra-abdominal approach, which offers several advantages including increased efficiency for bilateral surgery and relatively short operating times over open varicocelectomy. The approach involves placement of laparoscopic ports in the abdomen, identifying the inguinal ring and the spermatic cord contents, and selectively ligating the gonadal veins, whilst leaving the arterial blood supply intact. At this level, only one or two large veins are present and, hence, a fewer number veins are to be ligated. In addition, the testicular artery has not yet branched out and is often distinctly separate from the internal spermatic veins. LV is generally performed transperitoneally, but extra- or retro-peritoneal approaches have also been described. The persistence/recurrence rate of LV is in the range of 6–15%. With this background the aim of the study is to compare laparoscopic varicocelectomy and open varicocelectomy regarding seminal fluid parameters following surgery.

Material and Method

This was a prospective, comparative study conducted on 110 men with infertility and varicocele in Al Fayhaa teaching Hospital in Basra between May 2015 to September 2017. Patients divided into 2 groups viz. LV group underwent LV (n=50), OIV group underwent open inguinal varicocelectomy (n=60). The informed consent was taken from the patients before enrolled in the present study.

All patients evaluated for the other causes of infertility and seminal fluid were analyzed for the various parameters pre and post operative (3 months) procedure. The seminal fluid was evaluated for the semen volume, sperm count (million/ml), progression motility (%) and their morphology (% Abnormal form).

Inclusion Criteria:
1. Men aged 20-35 year varicocele grade 2 and 3
2. The female partner has normal fertility
3. Abnormal seminal parameters

Exclusion criteria: Patients varicocele and coexisting cause of infertility.

Statistical Analysis: Results were presented as mean ± standard deviation (SD). One way analysis of variance (ANOVA) and Dunnett multiple comparison test was done to estimate the statistical significance.

Results

In the present study, patients with infertility and varicocele was treated with two ways, i.e. LV (LV, n=50) and open inguinal varicocelectomy (OLV, n=60). LV group consist of 35 and 43 individuals with unilateral and bilateral varicocele, respectively. Similarly, OLV group showed 15 and 17 individuals with unilateral and bilateral varicocele, respectively.
Table 1: Side of varicocele in both groups

<table>
<thead>
<tr>
<th>Types of Surgery</th>
<th>Unilateral Varicocele</th>
<th>Bilateral Varicocele</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic varicocelectomy</td>
<td>35(70.00%)</td>
<td>15(30.00%)</td>
<td>50</td>
</tr>
<tr>
<td>Open varicocelectomy</td>
<td>43(71.66%)</td>
<td>17(28.34%)</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>78(70.90%)</td>
<td>32(29.10%)</td>
<td>110</td>
</tr>
</tbody>
</table>

Grades of the varicocele in LV group was found to be 19 and 31 in unilateral and bilateral varicocele, respectively. Similarly, OLV group showed 22 and 38 individuals with grade 2 and grade 3 varicocele, respectively.

Table 2: Grades of varicocele in both groups

<table>
<thead>
<tr>
<th>Types of Surgery</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic varicocelectomy</td>
<td>19(38%)</td>
<td>31(62%)</td>
<td>50</td>
</tr>
<tr>
<td>Open varicocelectomy</td>
<td>22(36.66%)</td>
<td>38(63.34%)</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>41(37.27%)</td>
<td>69(62.73%)</td>
<td>110</td>
</tr>
</tbody>
</table>

Semen parameters before and 3 months after surgery for LV and OLV are shown in the Table 3. The semen count was comparable in the both LV and OLV operated patients as compared to the before surgery. The sperm count found to be increased in the LV group (p<0.001) than the OLV group as compared before surgery count. Percentage progression motility was found to be increased in both the surgery. However, non-significant improvement was occurred in the LV group. The percentage morphology was decreased in the LV group as compared to the preoperative parameter.

Table 3: Semen parameters before and 3 months after surgery in both groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before Surgery</th>
<th>After Laparoscopic Surgery (LV)</th>
<th>After Open Inguinal Surgery (OLV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semen volume (ml)</td>
<td>2.67</td>
<td>2.83</td>
<td>2.72</td>
</tr>
<tr>
<td>Sperm count million/ml</td>
<td>7.85±2.3</td>
<td>13.43±3.21***</td>
<td>9.87±2.6</td>
</tr>
<tr>
<td>Progression motility (%)</td>
<td>33.6±12.5</td>
<td>43.54±23.2</td>
<td>37.85±21.53</td>
</tr>
<tr>
<td>Morphology (Abnormal form) (%)</td>
<td>52.82±11.65</td>
<td>30.29±7.48**</td>
<td>37.5±8.46*</td>
</tr>
</tbody>
</table>

The results are presented as mean ± standard deviation (SD). ***p≤0.001, **p≤0.01 and *p≤0.05 when compared with the before surgery (Dunnett multiple comparison test).

Discussion

In the inguinal approach (also known as Ivanissevich approach), an incision is made in the groin above and lateral to the ipsilateral pubic tubercle and extending laterally along the skin lines of the inferior abdominal wall. The external oblique fascia is sharply incised to expose the spermatic cord covered with the cremasteric fibers, which, along with the external spermatic fascia, are incised to provide access to the vascular structures within. Generally, the vas deferens along with its artery, vein and lymphatic vessels, should be identified and preserved. Venous structures, including the internal spermatic veins, cremasteric veins, external spermatic veins, gubernacular veins and periarterial veins (venae comitantes), have all been described to be part of the body of varicoceles and should be identified and dissected for ligation. Any arteries and lymphatic vessels should be clearly identified and preserved to avoid complications. The inguinal approach is a traditional surgical dissection in familiar anatomy, but the inguinal canal dissection requires fascial incision and increases the risk of pain...
and hernia formation, as well as inadvertent damage to the ilioinguinal nerve.

The subinguinal (Goldstein) approach has gained popularity as a safe and effective operation. Incision of the open subinguinal varicocelectomy is made at the level of the external inguinal ring to allow delivery of the spermatic cord without dividing any muscle or fascia of the abdominal wall. Benefits include a shorter recovery and less pain than the inguinal approach (probably due to the lack of fascial violation). However, all vessels branch out at this low level, resulting in a higher number of vessels, each of a smaller diameter, to be dissected. Thus, optical magnification is strongly recommended when performing a subinguinal varicocelectomy. Disadvantages include a longer operative time, presumably due to the slightly less intuitive anatomy. Due to a high rate of testicular artery damage and/or hydrocele formation, the scrotal approach is a historical operation that is rarely employed in the modern era and has been replaced by safer and more reliable approaches. In the present study also, the improvement i.e. semen volume, sperm count and abnormal sperm morphology were found to be more in the open inguinal surgery as compared to the laparoscopic surgery.

Although open varicocelectomy is commonly performed under general or spinal anesthesia on an outpatient basis, in selected patients, it can be performed under local/regional blockage with or without intravenous sedation. Conventional open varicocelectomy is associated with a wide range of variation in the surgical outcomes. Complications, occurring at a rate of 5-30%, include hydroceles, inadvertent arterial ligation, testicular atrophy, injury to the vas deferens, epididymitis, hematoma and wound infection. The recurrence/persistence rate, at 10–45%, is also significantly higher than other treatment options.

In order to understand changes in seminal fluid parameters post open varicocelectomy, various researchers has explored the correlation. In a study by Abdel-Kader et al. subinguinal varicocelectomy with loup magnification was successfully performed in 91 patients, with no intra-operative complications. After surgery, followup has been done for 7 months to perform semen analysis. Despite considerable changes were noted in sperm concentration, there wasn’t statistically significant difference in percentage of motility and normal sperm morphology post-varicocelectomy. In our study, the laparoscopic surgery operated patients showed increases in semen volume, sperm count, reduce sperm abnormality etc.

In another study by Al-Ghazo et al. the changes regarding preoperative and postoperative total sperm motility counts and spontaneous pregnancy rate were evaluated. Surgical varicocelectomy improves the total sperm motility counts in patients and improves the spontaneous pregnancy rates. In a retrospective study by Shamsa et al. evaluation of four parameters (sperm analysis, fertility, early ejaculation and spontaneous abortion among spouses) in relation to varicocele and varicocelectomy during a 13-year period was done. A total of 1,711 patients with varicocele underwent varicocelectomy by high inguinal method (251 cases), subinguinal method (1,375 cases), scrotal method (34 cases), and subinguinal method with local anesthesia (38 cases). Sperm count, motility and morphology increased three months post operation along with improvement in pregnancy rate, early ejaculation, and scrotal pain.

Efficacy of varicocelectomy and its influence on semen parameters, particularly sperm count, motility and morphology has been determined by Chhabra et al. in a study population of 50 men with varicoceles who had both preoperative and postoperative semen examination done. Macro and microscopic assessment of semen samples was carried out according to WHO guidelines. The surgical approach used for varicocelectomy was inguinal. Significant improvement in semen parameters viz sperm counts/ml, sperm counts/ejaculate and sperm motility were observed after varicocelectomy. Preoperatively, men with Grade III varicoceles had lower sperm counts and sperm motility, but significant improvement was observed post-operatively compared to men with Grades I and II varicoceles. In a study by Cakiroglu et al. comparison of preoperative and postoperative sperm parameters such as sperm count, motility, and morphology in patients with normal sperm concentration with teratozoospermia and asthenozoospermia has been done on 106 patients. The sperm motility of patients with normospermia showed a significant improvement postoperatively. In a retrospective study by Leonardo et al. to evaluate the improvement of seminal parameters after surgery of varicocele in 232 patients, 18 to 37 years old; it was observed general improvement of the seminal parameters (concentration, motility and morphology) to 150 of patients (64.65%) and another prospective study of 123 patients diagnosed with primary infertility with varicocele by Shabana et al. semen analyses were
completed preoperatively and 6 months postoperatively. Microscopic subinguinal varicocelectomy was done in all cases. Patient demographics, pre- and postoperative clinical data (varicocele grade and semen parameters) were statistically analyzed. Semen parameters were found to be improved after varicocelectomy. Complications of laparoscopic varicocelectomy, occurring at an overall rate of 8–12%, include air embolism, inadvertent arterial division, genitofemoral nerve injury, hydrocele, intestinal injury and peritonitis. Hydrocele, secondary to lymphatic congestion after accidental ligation of the lymphatic vessels, is the most commonly encountered post-operative complication. When the lymphatics are not intentionally identified and preserved, the post-operative hydrocele rate can be as high as 40%. Technically, with the optical capacity of laparoscopes at close distance to the tissues, magnification at 10–20x can be achievable, allowing skillful laparoscopic surgeons to visualize and spare lymphatic vessels using similar microsurgical principles and techniques as in microsurgical varicocelectomy. To further facilitate the identification of lymphatics, various authors described techniques of scrotal infusion of blue dyes (patent blue V, isosulfan blue or methylene blue) that could result in a significant reduction of the post-operative hydrocele LV should only be performed by experienced laparoscopic urologists. Other disadvantages of the procedure include the high cost, need of general anesthesia in all cases. The study by Chen et al. showed the feasibility and successful results of treating the varicocele using the video laparoscopic approach because of its bigger vascular vessels. The 4000 patients were treated for both left and right varicoceles. No morbidity and mortality were encountered in the study, with little likelihood of recurrence of the condition. The semen profile was improved, including a decreased sperm DNA fragmentation rate and successful pregnancy favor.

**Conclusion**

LV is the technique requiring skills and experience. It is a same-day surgery procedure, resulting in rapid recovery, cost savings, and is well accepted by the patient compared to open varicocelectomy. The important feature of the surgery is the degree of magnification obtained through the video laparoscopy, enabling a complete and thorough bilateral ligation of the testicular veins, without risk of injury to the testicular artery. In the present study, an improvement, i.e. increased in the semen volume and sperm count while decreased in the abnormal sperm morphology were found to be more in the laparoscopic surgery as compared to the open inguinal surgery.

**Ethical Clearance:** Ethical clearance taken from Al Fayhaa Teaching hospital.

**Funding Source:** Self

**Conflict of Interest:** Nil

**References**


13. Cakiroglu, B., Sinanoglu, O., Gozukucuk, R. The effect of varicocelectomy on sperm parameters in subfertile men with clinical varicoceles who have asthenozoospermia or teratozoospermia with normal sperm density. ISRN urology, 2013.


Impact of Food Allergy on Adolescent’s Quality of Life

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Abstract

Background: Food allergy is a major problem in both developed and developing countries and seems to increase over the past 10–15 years. Due to the incomplete understanding of the effects of food allergy on health-related quality of life (HRQL) among adolescents. This study aimed to identify the impact of food allergy on adolescent’s quality of life.

Method: In this cross-sectional study, 144 adolescents aged 12–18 years who objectively-diagnosed having food allergy were included. Adolescents were interviewed and completed questionnaire sheet consisted of two parts, the first part for personal data and the second part included questions about types of allergic foods, signs and symptoms and complications of allergy, also they completed specific food allergy quality of life questionnaire-teenager form.

Results: Shows that, the average score of the food allergies scale is (167.93), which is in the high range. The average quality of life measure for adolescents is 105.42 degrees, which is considered a low level of quality of life as a whole. There is a negative correlation between food allergies in adolescents and the quality of life dimensions at the level of significance p= 0.05, which highlights the importance of the current study.

Conclusions: The present study concluded that food allergy has a high impact on the quality of life of adolescents and there are negative correlations between adolescent food allergies and the quality of life from all dimensions.

Keywords: Adolescents, Food allergy, Quality of life, Health-related quality of life.

Introduction

Food is a crucial part of our lives; it is necessary to stay alive and it is an integral part of our cultural identity. Food allergy is an adverse reaction to the immune system that occurs shortly after exposure to some food.1,2 In developed countries, food allergy has increased and can have a dramatic impact on the quality of life as it causes fatal reactions.3,4 Around 4-6% of children and 2.3% of teenagers are diagnosed with food allergy, are allergic to one or more foods and have dietary restrictions that impair their quality of life.5

Food allergy can be fatal, and teens are at the highest risk of death due to food allergy.6 Symptoms may include swollen lips, tongue, or eyes; itchiness, rash, or hives; nausea, vomiting, or diarrhea; coughing, heavy speech, or swallowing disturbance; wheezing or breathing difficulty; dizziness, fainting, or loss of consciousness, change of mood, or confusion. Food reactions can range from mild to severe enough to be fatal (i.e. anaphylaxis).7,8 Quality of life (QoL) can also be characterized as well-being that is determined by both objective and subjective factors in many areas of life that are considered important in one’s culture and time.9

Fatal reactions3,4 Around 4-6% of children and 2.3% of teenagers are diagnosed with food allergy, are allergic to one or more foods and have dietary restrictions that impair their quality of life.5

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Though the health-related quality of life (HRQL) has three components: personal, psychological and physical\textsuperscript{[10]}. Evidence has shown that allergic diseases have a negative impact and deteriorations on the health-related quality of life of in children. Pediatric research suggests that food allergy can affect various aspects of (HRQoL) for children, adolescents, and their families as the risk of allergic reaction limits children in their autonomous social activities\textsuperscript{[11]} more often absent from school and less self-confident \textsuperscript{[12]}.

**The Aim:** The aim of the present research was to identify the impact of food allergy on adolescent’s quality of life.

**Research Question:** What are the effect of food allergy on adolescent’s quality of life?

**Subject and Method**

**Design:** Descriptive cross-sectional design used in this research

**Setting:** primary schools (six grade), preparatory and secondary schools of El Kassasen City, Ismailia Governorate, Egypt. And from faculty of nursing and education (first-year students) Suez Canal University, Egypt.

**Sample:** A random selection of 144 adolescents who have already been diagnosed with food allergy (12-18) years.

**Tools of data collection:**

**Tool (1):** Structured questionnaire sheet

**Part (I):** Socio-demographic data about adolescents and their parents.

**Part (II):** Questions about the type of food that causes allergy, signs and symptoms, complications, and allergy effects on educational achievement and family.

**Tool (2):** Food allergy quality of life questionnaire-teenager form\textsuperscript{[12]} was used. The questionnaire consisted of (64) questions distributed on three axes reflecting the quality of life dimensions (physical aspects, health aspects, and social relationships within and outside the family).

**Validity:** The tools were revised by three experts in pediatric nursing and community health nursing for clarity, relevance, applicability, and comprehensiveness.

**Pilot Study:** A pilot study was conducted on 15 adolescents.

**Procedure:** The data was collected during the second semester of the 2017-2018 academic year. Oral affirmative consent was obtained from adolescents after explaining the aim of study, each adolescent was interviewed individually in order to fill the research tools which take about 30 to 40 minutes.

**Statistical analysis:** The data was then imported into the statistical analysis program of the Statistical Package for Social Sciences (SPSS version 18). The SPSS software used to calculate the arithmetic mean, the standard deviation, the frequencies, the percentages, the coefficient of Pearson correlation, the variations between the measures using the T-test, and the one-way calculation using the F test.

**Results:**

<table>
<thead>
<tr>
<th>Items</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of allergic foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>89</td>
<td>62.0</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>31.0</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>7.0</td>
</tr>
<tr>
<td><strong>Types of allergic foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strawberry</td>
<td>114</td>
<td>79.3</td>
</tr>
<tr>
<td>Mango</td>
<td>87</td>
<td>60.3</td>
</tr>
<tr>
<td>Milk</td>
<td>72</td>
<td>50</td>
</tr>
<tr>
<td>Fish</td>
<td>22</td>
<td>15.5</td>
</tr>
<tr>
<td>Beans</td>
<td>15</td>
<td>10.3</td>
</tr>
<tr>
<td>Wheat</td>
<td>12</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>Complications of food allergy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>144</td>
<td>100</td>
</tr>
<tr>
<td>Dermatological</td>
<td>130</td>
<td>90.2</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>98</td>
<td>68.3</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>81</td>
<td>56.1</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>56</td>
<td>39.0</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>39</td>
<td>26.8</td>
</tr>
</tbody>
</table>

As shown in table (1) near two-thirds of study sample (62%) have an allergy to only one food. While 7% have an allergy to three types of food. Most of the sample (79.3%) have an allergy to strawberry followed by 60.3% have an allergy to mango. While the minority of them (8.6%) have allergy to wheat. All adolescents (100%) had respiratory complications due to allergy, followed by dermatological, gastrointestinal and anaphylaxis (90.2%, 68.3%, and 56.1%) respectively.
Table (2): Mean of effect of food allergy on quality of life among adolescents

<table>
<thead>
<tr>
<th>The quality of life for adolescents</th>
<th>Range (Degrees)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>physical aspect (22 items)</td>
<td>low level (22:36 Degree)</td>
<td>34.59±4.41</td>
</tr>
<tr>
<td></td>
<td>the middle level (37:51Degree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High level (52:66 Degree)</td>
<td></td>
</tr>
<tr>
<td>Health aspect (23 items)</td>
<td>low level (23:38 Degree)</td>
<td>37.16±4.58</td>
</tr>
<tr>
<td></td>
<td>the middle level (39:54 Degree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High level (55:69Degree)</td>
<td></td>
</tr>
<tr>
<td>Social relations (19 items)</td>
<td>low level (19:31 Degree)</td>
<td>33.67±4.33</td>
</tr>
<tr>
<td></td>
<td>the middle level (32:44Degree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High level (45:57 Degree)</td>
<td></td>
</tr>
<tr>
<td>Quality of life as a whole (64 items)</td>
<td>low level (64:106 Degree)</td>
<td>105.42±10.01</td>
</tr>
<tr>
<td></td>
<td>the middle level (107:149Degree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High level (150:192Degree)</td>
<td></td>
</tr>
</tbody>
</table>

Table (2) shows the aspects of quality of life among adolescents by the means as the follows: Physical aspects, health aspects and social relations (34.59±SD, 37.16±SD and 33.67±SD) respectively. The mean of the average quality of life measure for adolescents is 105.42±SD degrees which are considered a low level of quality of life as a whole.

Table (3): Correlation between food allergies among adolescents and the quality of life dimensions

<table>
<thead>
<tr>
<th>Food Allergy</th>
<th>Quality of Life</th>
<th>Physical aspect</th>
<th>Health</th>
<th>Social</th>
<th>Quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>The impact of food allergies on the family</td>
<td>-0.15**</td>
<td>-0.26**</td>
<td>-0.27**</td>
<td>-0.28**</td>
<td></td>
</tr>
<tr>
<td>The difficulties faced by adolescents because of food allergies</td>
<td>-0.13**</td>
<td>-0.37**</td>
<td>-0.41**</td>
<td>-0.38**</td>
<td></td>
</tr>
<tr>
<td>Adolescent fears of food allergies</td>
<td>-0.14**</td>
<td>-0.53**</td>
<td>-0.40**</td>
<td>-0.44**</td>
<td></td>
</tr>
<tr>
<td>Food allergies in general</td>
<td>-0.19**</td>
<td>-0.52**</td>
<td>-0.48**</td>
<td>-0.48*</td>
<td></td>
</tr>
</tbody>
</table>

**Significance at level 0.05

Seen from the table (3) that, there is a negative correlation between food allergies in adolescents and the quality of life from all dimensions at the level of significance 0.05, which highlights the importance of the current study.

Discussion

The current study found that over two-thirds of adolescents were girls and that less than two-thirds of adolescents were allergic to one food while less than 10% were allergic to three foods. These results in contradiction with[12] who studied “developed self-administered food allergy quality of life questionnaire for adolescents”, and found that less than two-thirds of adolescents were allergic to three and more food types. More than three-quarters of adolescents are allergic to strawberry, mango, and milk, respectively, in the current study. This is distinguished from[13] who studied “Interpretation of commercial food ingredient labels by parents of food-allergic children” and found that more than half, more than one fifth and less than ten percent of adolescents were allergic to soy protein, peanut, and milk respectively. On the other side[14] who studied “Food allergy in adolescents and adults” found that nuts and seafood were the main cause of adolescent’s food allergy. From the author’s point of view these variations may be due to differences in location, community or habits.

All adolescents reported respiratory problems in the current study, the majority of them had dermatological complications, more than two-thirds had gastrointestinal complications and more than half had anaphylaxis.
These findings are confirmed by [1] who found more than four-fifths of adolescents suffered from respiratory complications and more than two-thirds of adolescents had dermatological complications. The results of the study also showed that cardiac complications were the least common insignificantly more than one quadrant, and this is contrary to [1], who found that just under half of the adolescents had cardiovascular complications. From the point of view of the author, cardiovascular problems may occur due to accidental or careless adolescents and their families regarding food types that can cause allergy, careless reading of food ingredients and individual differences in food reactions.

The current study showed that all aspects of quality of life are affected by food allergy with an average of more than one-third for physical aspects, health aspects and social relations, and overall quality of life. Such findings were consistent with [12,15] who found that more than one-third of children with food allergy had an effect on school attendance and were socially isolated and had worse overall health. These results also supported by [16,17,18] all of these studies reported worse physical function, school, and social limitations and general health. Moreover [15] who found that children with nut allergy had poorer total HRQL.

The current study showed a negative correlation between adolescent food allergy and quality of life from all dimensions as physical aspects were -0.19, health aspects were -0.52, social aspects were -0.48 and quality of life were -0.48 in general. Such findings in line with [19] who find negative correlations as r = -0.4 with respect to general health and family activity and supported by [10] as well. However, in accordance with [1,6,12] who also found negative associations between adolescent food allergies and the quality of life from all dimensions as physical functions were -0.29 and general health was -0.31. More about [1] who found a negative correlation between adolescent food allergies and HRQL as a correlation (-.62). From the point of view of the author, this connection is negative due to the overall deficiency of the quality of life among adolescents and it also reflect the sever effect of food allergy on adolescent’s quality of life which highlights the importance of the current study.

**Conclusion**

The present study has shown that food allergy has a high impact on the quality of life of adolescents, and there are negative correlations between adolescent’s food allergy and the quality of life from all dimensions.

**Recommendations:**

1. More researches are needed to clarify gender differences in this field.
2. Further research is needed to highlight the impact of food allergy on the development of children.
3. Food allergy programs to help adolescents deal with their health problems and prevent complications and consequences
4. Program to enhance the socialization of food allergy adolescents

**Source of Funding:** Self

**Conflict of Interest:** Nil

**Ethical Clearance:** The Research and Ethical Committee of the Faculty of Nursing, Suez Canal University approved the study, and an ethical clearance was issued. Permissions were requested from school managers where the study was conducted. Participation in the study was voluntary and an informed consent was obtained from adolescents after explaining the aim of the study. The right to refuse to participate or to withdraw from the study was emphasized to adolescents. Confidentiality of participants was maintained.

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2. Centers for Disease Control and Prevention. Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Education Programs, (2013); Available at: www.cdc.gov/healthyyouth/foodallergies/.


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The Behavior of Visual Inspection with Acetate Acid (VIA) Test on Women of Childbearing Age in Bima City of West Nusa Tenggara

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Abstract

Cervical cancer is the third highest cause of women mortalities in the world; in Indonesia, it was estimated that every one hour one person died. State burden for handling cervical cancer is quite high. The biggest cause cervical cancer is late for early detection. Visual Inspection with Acetate(VIA) method is an effective and efficient method to be applied to countries with low social determinants and limited human resources. This study aims to obtain about the behavior of VIA test on the WCA who have been given counseling and the tendency of relationship among factors affecting. This research is a qualitative study used Rapid Assessment Procedure (RAP) on 14 people informants WCA who have been given counseling about the cervical cancer detection, married, aged 30 - 50 years, reside in Bima City of West Nusa Tenggara. The results show that 1. The decision to do VIA test tends to be influenced by method, process and evaluation of counseling. 2. Counseling on individual method tends to be more effective than mass counseling. 3. Counseling given when midwives provide counseling and IUD KB installation service tends to be more effective because it can be done simultaneously. 4. Counseling about VIA given tends to increase knowledge but does not necessarily change behavior in VIA test. 5. Other factors that tend to influence the behavior of VIA test on WCA who have been given counseling are perception, motivation, and husband support.

Keywords: VIA, WCA, early detection, cervical cancer, qualitative study.

Introduction

Cervical cancer is a major problem for women in developing countries. This disease is the third most common cancer among women worldwide, with the incidence of age standards in 2008 greater than 30/100,000/year in East and West Africa, 26.8/100,000/year in South Africa, 24.6/100,000/year in South-Central Asia, 23.9/100,000/year in South America, and 23.0/100,000/year in Central Africa.¹

In Indonesia, cervical cancer is the second most common cancer in women, with an estimated incidence and standard death rate in the age of 17.3 and 8.2 per 100,000 women per year.² The financial charge for cancer is increasing in developing countries.³ In Indonesia, the fund used for cancer treatment is high, in 2014 to 905 billion Rupiah.⁴ In addition, the diagnosis of cervical cancer has become a great burden for both patient and family. Most cancer patients with advanced stage have low life quality score, that indicates they have a problem. Family should take care of their loved ones dealing with the diagnosis, treatment, and side effects of cervical cancer.⁵

According to Rasjadi, Hartati et al, 2010 ‘Cervical cancer is a malignant tumor that grows in the cervix which is the lowest part of the uterus attached to the top of the vagina. The biggest cause of cervical cancer is infection of HPV (Human Papilloma Virus) which is transmitted through sexual contact. A woman can be
infected with this virus in the teenage years and newly known to have cancer in 20 to 30 years later after the infection spreads.  

Nowadays several methods of screening and early detection of cervical cancer have been known such as pap smear and VIA, VIA enlargement with gynecostasia, colposcopy, cervicography, thin prep, and HPV test. However, the one that suits the conditions in developing countries including in Indonesia is VIA method with the consideration of easy to do, relatively cheap cost, fast, high sensitivity and accurate enough to find abnormalities at the stage of cell disorders (dysplasia) or before pre-cancer. It is recommended to do VIA test for all women aged 30-50 years and women who have sexual intercourse.

Awareness and decision to do early detection is one of the most effective preventive measures. In Indonesia, low early detection is influenced by several factors, including demographic area, continuity of information delivery, and lack of human resources as screening agent, so the hope to find early stage cervical cancer is still difficult. According to (Emilea, ova, 2010) cervical cancer problem in Indonesia is constrained by social condition of society and social economy. Societal societies are related to taboo concept in the norms of society where cervical cancer screening is conducted on sensitive and closed part so it is not easy to encourage and ask women to open and allow the test.

Counseling is one of method to bring information access closer to society, based on Lawrence green theory (1980), access to information is one of the enabling factors that can influence a person’s behavior change. Some preliminary studies mentioned that one of the most influencing factors for a person to do VIA test is the exposure of information. A quite different phenomenon occurs in the field; researchers see quite different phenomena that occurred in the field. Preliminary study conducted in the working area of Female Cancer Program (FCP) Bima, West Nusa Tenggara, based on 2017 coverage report of total 64,215 targets, who have been given counseling as much as 14,918 and who did VIA screening was still very low at 4,433 (30%), find screening result with VIA (+) 254 people, cryotherapy 126, susp Ca cervical 7 people, cervical abnormalities 139 people.

To get the initial picture, the researcher then tried to find information through social media (Facebook) about the description of VIA test in Women of Childbearing Age. From the total of 104 people WCA who is married, 85% who had given VIA counseling about early detection cervical cancer. Only 45% are examining VIA test, 40% have not checked VIA when it can be information about VIA, and 15% have not checked VIA because it has not been able to information about VIA.

This study aims to obtain about the behavior of VIA test on the WCA who have been given counseling and the tendency of relationship among factors affecting.

**Method**

The design of this study is a qualitative method, with RAP research design (Rapid Assessment Procedure) or quick research aimed at obtaining in-depth information about mothers’ decisions for VIA test and trends in the relationship of the factors that influence them. Population of this research was all WCA which have been given counseling of cervical cancer early detection in work area of FCP Bima with 64,215 people. The concepts of sample selection in qualitative research were suitability, adequacy and saturation. The selection of the sample was then based on the inclusion criteria of women of childbearing age who have been given counseling about the cervical cancer detection, married, aged 30 - 50 years. The number of samples in this study was 14 people and for triangulation of data 2 midwives as key informants who had given counseling about cervical cancer early detection were used. The study was conducted in April 2018 in Bima City, West Nusa Tenggara.

<table>
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<th>No</th>
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<td>Already</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Mass counseling</td>
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<td>3</td>
</tr>
<tr>
<td>3.</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td>12</td>
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Result

Overview Counseling Cervical Cancer: The results of in-depth interviews conducted with informants showed that 6 informants were given counseling during integrated service post, 3 informants at the midwife practice place, and 3 others during social service activity.

The statements of all informants above were justified by the midwife as a key informant that the counseling about cervical cancer detection by VIA method in its working area was carried out according to integrated service post schedule, during social service activity and also done at the independent midwife practice place.

All informants given counseling during integrated service post it was found the descriptions of the counseling process by showing the pictures, in a busy atmosphere, lack of focus and listening in a hurry. From the 3 informants given individual counseling, it was said that the counseling was clear enough, showed the pictures, was done during the consultation of family planning issues and the development of their children and was not in a hurry. Similar things were found in 3 other informants who said that the counseling was quite clear, showed pictures, listened somewhat in a hurry because of the crowded queue.

Statement from WCA informants about counseling method was justified by midwives as key informant that “The counseling during integrated service post was still done in the yard where the integrated service post joined with other integrated service post activities. The counseling used the back sheet of cervical cancer early detection, with limited time because midwives who worked down to the field were only 2 people and must perform VIA test after giving counseling”.

All informants who have been given counseling about cervical cancer early detection bVIA method (12 informant) said there was no specific evaluation from midwives after counseling. Follow-up contact with the midwives according to informants occurred during the VIA test. The statement from the informants was justified by the midwife: there has been no specific post-counseling evaluation conducted, especially for WCA who did not directly do VIA test. Follow-up was still limited to the participants who wanted to check by providing VIA test service, then if the VIA result was positive or suspicion of any abnormal, the referral to the hospital for follow-up would be done.

Knowledge Overview of VIA: In-depth interviews conducted to the informants who have been given counseling either have done the VIA test or not, which about the knowledge overview of VIA and purpose of check VIA. From 12 informants as many 9 informants have good knowledge by saying that “VIA test was a check to determine the cancer in the uterus by using acetate acid”. While the 3 informants still have less good knowledge by saying that “VIA test was a test to determine whether there was a disease or not in the uterus”. Statements from all above informants were justified by midwives that VIA test was a test by inspection to know whether there was pre-cancer lesion in the cervix.

Behavior of VIA Test: From 6 informants who conducted VIA test after being given counseling, that all stated “did VIA test for the first time”. The reasons why informants did VIA test were different, the informant (P1) said that “VIA test was done because of complaints on the utility part such as vaginal discharge, irregular menstruation”, while the informant (P3) said that “doing a VIA test was because of the fear of incident experienced by an artist”. The informants (P4, P5) said that doing a VIA test at the same time during the installation of the spiral contraceptive device (IUD), while the informant (P6) did do VIA test because it was requested by the husband while accompanying the consultation.

From 6 informants who did not do a VIA test after the counseling was obtained, the informants (P7, P8, P9) by saying that “did not do VIA test because they were still afraid and embarrassed that their utility part needed to be opened in front of many people”. The informant (P10) said that after being given counseling, there was a willing to do VIA test but it did not happen because of menstruation, while the informants (P11, P12) said they did not do VIA test because there was an important matter. Informant (P10, P11, P12) who are unable to check VIA at the time of extension do not go back to the midwife or Puskesmas to check the VIA because there is no contact back.

Discussion

Health education including counseling is a planned series of lessons, based on logical theories and to equip individuals, groups and communities to influence others, obtain information and skills to make quality health decisions in order to improve healthy living standards and wellbeing society. To obtain optimum
results counseling should pay attention to various aspects such as the method, the tools, the background and the needs of the audiences. Cervical cancer early detection counseling tends to be more effective to be done by individual method; this is in line with the theory: according to Notoatmojo, this health counseling method is more used to foster new behavior or someone who has become interested in a behavior change or innovation. The basis of this individual approach is used because everyone has different problems or reasons in connection with acceptance or new behavior.\textsuperscript{10} If due to limited human resources and time for individual counseling, it should be chosen a method that can combine elements of education, counseling, involvement of family roles and continuous evaluation such as the Wish and Drive method which is a method that has more value than conventional learning method, because this method is a method that combines education and counseling, seeks to generate perception, motivation of respondents in doing cervical cancer early detection by involving external support and by using various stimulation.\textsuperscript{15}

In counseling early detection of cervical cancer tend to be more effective if done by individual method, this is in line with the theory, according to Notoatmodjo (2013) this individual health counseling is better used to foster new behavior or someone who has become interest in a behavior or innovation. The basis of this individual approach is used because everyone has different problems or reasons in relation to the acceptance of a new behavior.\textsuperscript{10}

Due to the limited human resources and time for individual counseling, it should be chosen a method than can combine elements of education, counseling, involvement of family roles and continuous evaluation, which combines education and counseling, seeks to generate perceptions, respondent motivation in early detection of cervical cancer by using various stimulation.\textsuperscript{15}

**Conclusions and Recommendations**

Research on the behavior of VIA examination concluded as a bit: a). Counseling about VIA given tends to increase knowledge but does not necessarily change behavior in VIA test. b). Counseling by using individual counseling method tends to be more effective than mass counseling. c). Post-counseling evaluation is very important to be done by the midwife to inventory any participants who have not done VIA test in order to be followed-up. d). Counseling given when the midwife provides counseling and IUD KB installation service tends to be more effective because it can be done follow-up. e). Other factors that tend to influence the behavior of VIA test on WCA who have been given counseling are perception, motivation, and support from the husband.

Research on the behavior of VIA examination recommend as follows: a). Post-counseling evaluation is very important to be done by the midwife to inventory any participants who have not done VIA test in order to be followed-up. b). Related limited human resources and time for individual counseling, it should be chosen a method than can combine elements of education, counseling, involvement of family roles and continuous evaluation, which combines education and counseling, seeks to generate perceptions, respondent motivation in early detection of cervical cancer by using various stimulation.

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12. FCP Bima. Laporan Deteksi Dini Kanker Leher Rahim Tahun 2017


HIV and Zonke-bonke Syndrome in Mthatha Region of South Africa: Case Reports

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Abstract

Background: South Africa is described as an African rainbow nation, not only in the color of its population, but also in the mixture of HIV infection. Three varieties of HIV infection have been distinguished: HIV-1, HIV-2, and a combination of the two. This is a matter of concern.

Objective: To highlight the problem of HIV-1 and HIV-2 (combined) infection in the Mthatha region of South Africa.

Case History: The first four cases of HIV-1/2 mixed infection were reported within a period of one year (2009). These cases were reported at Sinawe Center when people were examined after being sexually assaulted. HIV screening tests were carried out for HIV infection. Four patients were found to be positive for both HIV1 and 2. Surprisingly, one was a child of eight years old. Multiple sexual partners who were involved at some or other time with West Africans who harbored type 2 HIV could be the cause of this mixed infection. This kind of promiscuous behavior with multiple partners is called “Zonke-bonke syndrome”. The history, mode of transmission of HIV infection, and the consequences of mixed HIV infections are discussed in this case report.

Conclusion: HIV-1 and HIV-2 (mixed) infection occurs in the Mthatha region of South Africa. It is a matter of serious concern.

Keywords: HIV type 1 and 2, promiscuous behavior, multiple partners.

Introduction

South Africa has one of the highest rates of sexual assault in the world, as well as one of the highest prevalence rates of HIV infection. In Transkei young people are allowed to engage in free sexual experimentation. Young women actively seek partners who are willing to spend money and often initiate relationships with older men. The girl goes out and positions herself in a place where she knows she will encounter men. They do not see themselves as victims. This is all about power and authority, with teenage boys and girls involved in these relationships on an unequal footing. The “sugar daddy or mommy” is in a better position and is therefore able to entice the young girl or boy into a relationship. Even those who talk about it are reluctant to be identified because “people will think we are doing these things” Although everyone agrees it is common practice, cross-generational relationships are not often addressed in HIV/AIDS prevention campaigns, despite growing awareness that they are driving much of the epidemic.

HIV-2 infections are predominantly found in Africa. West African nations with a prevalence of HIV-2 of more than 1% in the general population are Cape Verde, Côte d’Ivoire (Ivory Coast), Gambia, Guinea-Bissau,
Mali, Mauritania, Nigeria, and Sierra Leone. Other West African countries reporting HIV-2 are Benin, Burkina Faso, Ghana, Guinea, Liberia, Niger, São Tomé, Senegal, and Togo. Angola and Mozambique are also African nations where the prevalence of HIV-2 is more than 1\%.\textsuperscript{4}

Differentiating between HIV-1 and HIV-2 infection is the first step to understanding HIV transmission, epidemiology and pathogenesis in geographical areas where both viruses circulate.\textsuperscript{5} HIV is a highly variable virus, which mutates very readily. This means there are many different strains of HIV, even within the body of a single infected person. Both types (HIV-1 and HIV-2) are transmitted by sexual contact, through blood, and from mother to child, and they appear to cause clinically indistinguishable AIDS. However, it seems that HIV-2 is less easily transmitted, and the period between initial infection and illness is longer in the case of HIV-2. Worldwide, the predominant virus is HIV-1 and generally, when people refer to HIV without specifying the type of virus, they will be referring to HIV-1. The relatively uncommon HIV-2 type is concentrated in West Africa and is rarely found elsewhere.\textsuperscript{6} HIV-2 is intrinsically resistant to nonnucleoside reverse transcriptase inhibitors. Therefore, it is mandatory to discriminate between HIV types before initiating antiretroviral treatment. Guinea-Bissau has the world’s highest prevalence of HIV-2 and HIV-1/HIV-2 dually infected individuals.\textsuperscript{7} The purpose of these case reports is to highlight the problem of HIV1 and HIV-2 (combined) infection in this community (Transkei), and to create awareness among health care professionals about its management.

**Methodology**

This is a retrospective study done in Sinawe Center over year (January to December, 2009). This unit is part of Nelson Mandela Academic Hospital and caters for a population of about 400 000 in the OR Tambo municipality area. All cases of rape and sexual assault are reported to this center. It is now a ‘One Stop Center’, providing multidisciplinary management of victims of rape and sexual assaults. It is open from Monday to Friday from 08:00 to 16:00. On weekends and after hours, victims are examined in the Accident and Emergency section of Nelson Mandela Academic Hospital. It is the policy of the center to provide HIV testing after counseling to all victims of sexual assault and rape. Blood for HIV screening is taken with the consent of the victims. Results are later confirmed by ELISA test in the laboratory. HIV1 and HIV2 (combined) infection has been found in four cases presented to the center for examination. Post-exposure prophylaxis was started at the beginning of 2003 and is offered to all victims except those who report later than 72 hours after the incident.

**Case History 1:** AM, a 19-year-old female, presented with a history of sexual assault by a known person, her boyfriend’s cousin. It happened in the morning hours. She was with her boyfriend, who was intoxicated in his aunt’s home in the guest room. The perpetrator pushed open the door, entered the room, and dragged her outside the bedroom. She tried to resist but the perpetrator assaulted her. He forcefully undressed her and raped her. He used a condom.

The victim had a boyfriend who worked in Cape Town and they had consensual sex in August 2008. She wanted sex, as she had met her friend again after a long time, but he was drunk. The perpetrator took advantage of her. The victim had multiple injuries, such as lacerations on her left knee and bruises on her left hand and back.

On genital examination, an old ruptured hymen was found, with fresh tears in the 9 o’clock position. There was increased friability with bruised introitus. A rapid test was reactive to both HIV1 and 2. HIV Ag/Ab combination assay was reactive, suggestive of both HIV antibodies and antigen (p24).

**Case History 2:** PM, a 26-year-old single woman, lived 40 km from Mthatha. A known person sexually assaulted her on 26.03.2009. This happened in the perpetrator’s bedroom at Qumbu. She was talking to a colleague. The perpetrator showed her a knife and pinned her to his bed. She had a boyfriend and had consensual intercourse about two weeks before. She had two children of nine and four years old.

On genital examination, there was no sign of any injury. There was increased friability, but no whitish discharge was visible. A rapid test was reactive to both HIV1 and 2. HIV Ag/Ab combination assay reactive was suggestive of both HIV antibodies and antigen (p24).

**Case History 3:** The police brought in BB, an 18-yearold female, with a history of sexual assault, on 10.04.2009. She was a learner in standard 10. She was waiting for transport to go to an Easter church service. Four unknown men approached her and asked her name.
One of them started assaulting her, dragged her into nearby bushes and raped her. He robbed her of R15. BB had a boyfriend and had consensual sex on 20-03-2009. She had two earlier boyfriend as well. They did not use a condom. She was menstruating at the time. No injury was identified. She was counseled about an HIV test in January, but she tested negative. HIV screening test was conducted on 10-04-2009 at Sinawe Center, and she was found to be HIV positive for both HIV1 and HIV 2. She had had only one boyfriend in the last three years.

**Case History 4:** IT, an eight-year-old learner, was referred from Ngangelizwe Health Center with a history of being sexually abused by a known eight-year-old boy on 03.04. 2009 at about 15:00. Her grandmother brought her to Sinawe Center on 24.04.2009. Her mother lived in Johannesburg. She was coming from school, and on the way she was overpowered by the perpetrator, who raped her. Counseling and reassuring therapy were given.

During examination it became obvious that the child was scared of her mother. There was a yellowish, offensive dark, vaginal discharge and a ruptured hymen was found. Pus swabs were taken for microscopy and culture. A gram stain showed on microscopy gram-positive cocci, yeast cells with neutrophils. Culture revealed klebsiella pneumoniae extended spectrum ß-lactamase producer and proteus mirabilis. A rapid HIV test found her to be positive for both types HIV-1 and HIV-2.

**Discussion**

These cases are believed to be the first evidence of HIV-2 infection in this region. No similar cases have been found in literature reported in South Africa. These reports provide important information that justifies expanded efforts to initiate and develop a program for HIV-2 screening in this region. Mthatha (Umtata) was the capital of the former Republic of Transkei. The Mthatha region is the least developed of the former black homelands. It is a region where the majority of workers go to earn their living in far-flung richer areas of South Africa. This has contributed directly to the spread of HIV in the rural areas of South Africa.

The most important cause of HIV transmission is poverty. Older men, who use their power and money in return for sex from younger women, are among the drivers of the HIV and AIDS infections in this region. Several studies have shown that there was a positive correlation between HIV prevalence and poverty globally, especially in sub-Saharan Africa. The rate of infection is increasing. Research organizations dealing with testing and counseling say it is not only men but women, too, who are out to attract younger partners. The fact is that older, affluent professionals, previously thought to be at low risk of HIV infection, are increasingly becoming vulnerable to infection because of risky sexual behavior with younger partners.

Changes in sexual behavior among the wealthy have led to a worrying swell in HIV and AIDS infections among those who had previously been considered at low risk. Several behavioral factors have been aligned to this development, among others inter-generational sex, where older, affluent men and women are having sex with the higher-risk younger group. It is arrogance, not ignorance, which is contributing to the spread of HIV infection. In the United States (US), HIV-2 infection was diagnosed in 1987. Since then, the Centers for Disease Control and Prevention (CDC) have worked with state and local health departments to collect demographic, clinical, and laboratory data on people with HIV-2 infection. Of the 79 infected people, 66 were black and 51 were male. Fifty-two were born in West Africa, one in Kenya, seven in the US, two in India and two in Europe. The region of origin was not known for 15 of the people, although four of them had a malaria-antibody profile consistent with residence in West Africa. AIDS-defining conditions had developed in 17, and eight died. Similar information is not known in the Transkei area, but nationals of almost all African countries reside in South Africa. There should be a screening system in place before they immigrate to South Africa. These case counts represent minimal estimates because the completeness of reporting has not been assessed. Although AIDS is reported uniformly nationwide, the reporting of HIV infection, including HIV-2 infection, differs from state to state according to state policy. Hardly any estimates are available in South Africa despite the fact that the incidence of HIV-2 infection is increasing.

Because epidemiologic data indicate that the prevalence of HIV-2 in the US is very low, CDC does not recommend routine HIV-2 testing at US HIV counseling and test sites or in settings other than blood centers. However, when HIV testing is to be performed, tests for antibodies to both HIV-1 and HIV-2 should be obtained if demographic or behavioral information suggests that HIV-2 infection might be present. The first victim in the current study reported that her boyfriend, who could have been the source of infection with HIV-2,
was working in Cape Town. The second case was that of a multipara young woman who had a history of having multiple sexual partners, one of whom was a West African. The third victim was a schoolgirl who had a relationship with a boyfriend without using a condom. Most surprising was the case of a child (case 4) who was only eight years old and had been sexually abused. She had a history of having a foul-smelling discharge from the vagina. This was noticed by her grandmother. The perpetrator could be a close relative of this child, as the mother was staying in Johannesburg.

Among all HIV-infected people, the prevalence of HIV-2 is very low compared with HIV-1. However, the potential risk of HIV-2 infection in some populations may justify routine HIV-2 testing for all people for whom HIV-1 testing is warranted. The decision to implement routine HIV-2 testing requires consideration in view of the number of HIV-2-infected persons whose infection would remain undiagnosed without routine HIV-2 testing, compared with the problems and costs associated with the implementation of HIV-2 testing. The development of antibodies is similar in HIV-1 and HIV-2. Antibodies generally become detectable within three months of infection. Since 1992, all US blood donations have been tested with a combination HIV-1/HIV-2 enzyme immunoassay test kit that is sensitive to antibodies to both viruses. This testing has demonstrated that HIV-2 infection in blood donors is extremely rare. All donations detected with either HIV-1 or HIV-2 are excluded from any clinical use, and donors are deferred from further donations.

Little is known about the best approach to the clinical treatment and care of patients infected with HIV-2. Given the slower development of immunodeficiency and the limited clinical experience with HIV-2, it is unclear whether antiretroviral therapy significantly slows progression. Not all of the drugs used to treat HIV-1 infection are effective against HIV-2. In vitro (laboratory) studies suggest that nucleoside analogs are active against HIV-2, though not as active as against HIV-1. Protease inhibitors should be active against HIV-2. However, non-nucleoside reverse transcriptase inhibitors are not active against HIV-2. Whether any potential benefits would outweigh the possible adverse effects of treatment is unknown. Monitoring the treatment response of patients infected with HIV-2 is more difficult than monitoring people infected with HIV-1. Viral load assays used for HIV-1 are not reliable for monitoring HIV-2. Response to treatment for HIV-2 infection may be monitored by following CD4+ T-cell counts and other indicators of immune system deterioration, such as weight loss, oral candidiasis, unexplained fever and the appearance of a new AIDS-defining illness. More research and clinical experience are needed to determine the most effective treatment for HIV-2.

In conclusion, there is lack of knowledge regarding HIV-2 infection in the Mthatha region of South Africa. It needs surveillance study to know the population infected with HIV-2. This will help in the management of patients as well as curbing the infection at grassroots levels. Physicians caring for patients with HIV-2 infection should be empowered to initiate antiretroviral therapy after discussing with their patients what is known, what is not known, and the possible adverse effects of treatment. Continued surveillance is needed to monitor HIV-2 in the population, since its further spread is possible. Programs aimed at preventing the transmission of HIV-1 may also help to prevent and control the spread of HIV-2.

**Ethical Consideration:** Prior consent for HIV testing was obtained from all the victims of sexual assaults. Their names and identity were kept confidential and were not divulged to anybody. The author has also taken ethical permission for collecting case history and publication (approved project No. 4114/1999) from the Ethical Committee of the University of Transkei, South Africa.

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**Conflict of Interest:** None

**References**


Prevalence of Hearing Loss among Former Mine Workers of the former Black Homeland of the Transkei, South Africa

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Abstract

Objective: To study the prevalence of loss of hearing among the retired mineworkers of the Transkei region of South Africa.

Method: Between May 1997 and May 2011, 2 027 ex-mineworkers were examined at the Benefit Examination Clinic, which is located in the Chest Section of Umtata General Hospital (UGH), the teaching hospital of the University of Transkei Medical School in the Eastern Cape province of South Africa.

Results: Hearing loss was indicated by 219 (54%) of the respondents, of whom 72 (33%) were between 40 and 59 years of age. Of the 182 (45%) of workers who had worked for between 10 to 19 years in the mines, 40 (22%) indicated experiencing a loss of hearing. A strong association between hearing loss and years spent mining was detected.

Conclusion: Many (54%) of the ex-mine workers from the Transkei were found to be afflicted with hearing loss. Such a health problem demands much attention from occupational hygienists and the compensation authorities.

Keywords: Noise, hearing loss, mineworkers, occupational health, compensation.

Introduction

Noise exposure, which is the commonest preventable cause of hearing loss in both developing and developed countries, causes much of the global burden of disability. More than 20 million people in the United States have some type of hearing impairment, with at least half of those cases probably being due to noise exposure. A survey conducted from 1985 to 1988 in the Australian New South Wales coal industry showed that 41.5% of underground coal miners had a compensable level of NIHL. Therefore, there is a great need to reduce the levels of NIHL among mineworkers. Noise is one of the commonest of all occupational hazards. The progress of NIHL is insidious, in that it develops gradually, staying largely unnoticed until it is discernible as a handicap. The harmful effects of noise exposure vary according to the level of exposure endured, as well as the individual susceptibility to it. An auditory system that is exposed to noise might undergo reversible auditory alterations that are not detected by the method normally employed for testing hearing.

Occupational hearing loss is a common work-related problem, which result from an offending workplace agent. As there are different preventable causes of occupational hearing loss, physicians should remain alert to the development of such a problem. By assessing employees’ hearing, it can be determined whether the preventative measures are effective. In order to minimise the costs involved and the amount of time taken off work, such testing can be effectively carried out in the workplace, as long as certain conditions are met.
Interviews conducted in the past with men with NIHL have revealed their lack of awareness that exposure to excessive noise can harm their hearing. Most men interviewed were unwilling to acknowledge, or denied, their hearing problems. Interviews with the spouses of men with NIHL showed that the husband’s hearing loss often caused misunderstandings and irritation within the family, which had a negative impact on the couple’s relationship. The group rehabilitation programme referred to in this article, which was designed for men with NIHL and their spouses, is intended to provide psychosocial support and adequate information relating to NIHL and practice in the use of effective coping strategies. A professional approach to treating men with NIHL involves taking a patient-centric global perspective on the patient, encouraging him to identify, describe and acknowledge problems related to his impaired hearing. Such a patient needs professional help for coping with his hearing-related problems. In identifying and solving such problems, family involvement is important and vital. 

All mining companies have been requested to perform baseline-hearing tests on all current mineworkers. Such testing will enable an equitable apportionment of the awarding of claims for hearing deterioration to be made between the previous and successive employers. The implementation of NIHL baselining has increased the awareness of the need to continue to implement measures aimed at preventing the development of NIHL among mineworkers.

In industrial environments, where workers are exposed to high noise levels, which are likely to induce hearing loss, hearing conservation programmes must be implemented. In South Africa, as in many other countries, the implementation of such programmes is a legal obligation on employers. Where engineering methods are aimed at reducing ambient noise levels to below the prescribed level fail to do so, personal protection method should be used. Under such circumstances, audiometry may serve as a valuable tool for monitoring the effectiveness of environmental and personal control method.

The Transkei is a former black homeland to which most mineworkers from the area returned home when they became disabled. Insufficient attention has, so far, been paid to the needs of retired mineworkers who have hearing loss, which is recognised as a major problem in the mining industry. The objective of the present study was to estimate the prevalence of NIHL among former mineworkers who were exposed to noise in the underground mines, as well as to correlate their years of working underground with their age.

**Method**

Between May 1997 and May 2011, 2 027 retired mineworkers were examined at the Benefit Examination Clinic, a clinic located in the Chest Section of Umtata General Hospital (UGH), the teaching hospital of the University of Transkei Medical School in the Eastern Cape province of South Africa. The retired mineworkers presented themselves voluntarily for examinations related to compensation claims for their lung-related conditions.

A questionnaire with 17 direct questions was distributed among 677 randomly selected ex-mineworkers. The clinical records of the mineworkers were numerically arranged from 1 to 2 027, with every third record being selected as that of a designated participant in the study. Each designated participant was sent the questionnaire (see Appendix 1). The questionnaire, which was in the local Xhosa language, was returned by 480 of the designated participants. Of the responses, 74 (11%) were incomplete. The data from the completed questionnaires, which numbered 406 (60%) in total, were compiled and analysed using the Epi 6 Info computer program.

**Results**

In the current study, 60% of the mineworkers were aged between 40 and 59 years (see Fig. 1). Hearing loss was indicated by 220 (54%) of the respondents (Table 1). Of those experiencing hearing loss, 73 (33%) were between 50 and 59 years of age (Table 1). Those who had worked between 10 and 19 years on the mines numbered 183 (Table 2), of whom 91 (41%) indicated experiencing hearing impairment (Table 2). A strong association was noted between hearing loss and years spent in mining, with \( p < 0.05 \) (Table 1). However, no association was found between hearing loss and the different age groups (Table 2), pulmonary tuberculosis (Table 3), and compensation claims (Table 4) in the current study.
Discussion

In the mining industry, the worker often accepts noise as an inevitable part of his working conditions. However, the existence of such noise concerns the occupational hygienist, due to the various health risks that it holds. NIHL is by far the most common health risk with which the industry has to contend.  

In the current study, 60% of the ex-mineworkers were between the ages of 40 and 59 years (see Table 1). During a period of about 20 years from 1967 onwards, 128 575 mineworkers were certified as having acquired occupational diseases. The actual number of mineworkers who have contracted such diseases is certainly much higher, due to their under-assessment among migrant workers who have returned to their rural homes in any one of several labour reservoirs in South Africa, as well as in the neighbouring countries. Practically nothing is known about the fate of those with a certified occupational disease.  

In the current study, 220 (54%) of the mineworkers indicated some degree of hearing impairment (see Table 1). Demko (2003) reported that 90% of coal mineworkers had a hearing impairment, compared to 9% of the general population. Developing a hearing impairment in coal mining is comparable to contracting black lung in such mining, or to developing a stiff-silicotic lung, or PTB, in gold mining. PTB is curable, while NIHL is a lifelong permanent disability. Some mineworkers were compensated for having contracted PTB but have been awarded very little compensation for having developed NIHL. Steps have been taken to control the level of dust in mines, but no steps seem to have been taken to control noise. Noise has been underrated as a health risk, due to its being insidious and not considered as life-threatening. NIHL is a chronic disease that detracts from the quality of life of those suffering from it. Despite innovations in the mining industry, some mineworkers are still required to drill blast holes underground, which, by generating noise, is an ongoing hazard to such workers.  

Noise is one of the most pervasive health hazards in mining and results in the development not only of NIHL, but of serious physical, emotional, psychological, and social problems in their families. In the current study, of those mineworkers who were found to have impaired hearing, 73 (33%) were between the ages of 40 and 59 years (see Table 1), hence falling in a productive age group. For most of the families concerned, such individuals are the sole breadwinners. Disabled mineworkers find it difficult to get alternative work in the poverty-stricken areas in which they live.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Hearing YES</th>
<th>Hearing NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 to 39 yrs</td>
<td>40</td>
<td>23</td>
<td>63</td>
</tr>
<tr>
<td>40 to 49 yrs</td>
<td>53</td>
<td>62</td>
<td>115</td>
</tr>
<tr>
<td>50 to 59 yrs</td>
<td>58</td>
<td>73</td>
<td>131</td>
</tr>
<tr>
<td>60 to 69 yrs</td>
<td>26</td>
<td>41</td>
<td>67</td>
</tr>
<tr>
<td>70+</td>
<td>9</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>220</strong></td>
<td><strong>406</strong></td>
</tr>
</tbody>
</table>

Chi-Square not valid p value 0.01

Table II. Association between years of mining with hearing among ex-mineworkers of the Transkei (n=406)

<table>
<thead>
<tr>
<th>Yrs. mining</th>
<th>Hearing YES</th>
<th>Hearing NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 9 yrs</td>
<td>30</td>
<td>21</td>
<td>51</td>
</tr>
<tr>
<td>10 to 19 yrs</td>
<td>92</td>
<td>91</td>
<td>183</td>
</tr>
<tr>
<td>20 to 29 yrs</td>
<td>41</td>
<td>61</td>
<td>102</td>
</tr>
<tr>
<td>30 to 39 yrs</td>
<td>16</td>
<td>34</td>
<td>50</td>
</tr>
<tr>
<td>40+</td>
<td>7</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>220</strong></td>
<td><strong>406</strong></td>
</tr>
</tbody>
</table>

Chi-Square 11.03 p value 0.026

In the current study, 183 (45%) of the respondents were found to have worked in the mines between 10 to 19 years (see Table 2). About half (91) of those subjects indicated a hearing impairment (see Table 2). Apart from the greater intensity of the levels of noise endured, the duration of the exposure to noise was found to be almost 5 to 10 times higher than average in cases of hearing impairment. It is well documented that hearing loss due to noise exposure progresses more rapidly during the first 3 to 5 years exposure, then levelling off almost parallel with the normal presbycusis (age-related hearing loss) curve. The median hearing loss experienced by those workers exposed to 105dB is expected to be about 25dB after the first 5 years, but only about 7dB after the following 5 years. Hetu (1979) formulated two predictions for populations at risk. For noise exposure at 85dB, a significant loss is likely only to be detected at about 25dB after the first 5 years, but only about 7dB after the following 5 years.  

Table I. Association between age groups with hearing among ex-mineworkers of the Transkei (n=406)
detected. For a noise exposure of 95dB, a significant loss is likely to be measurable after 1 year in less than 10% of workers. Only after another 4 years is it likely that a deterioration of another 10dB in all the affected workers might be detected. A survey of Canadian workers found that the average decrements in the hearing threshold were in the order of 1dB per year at 1000Hz and 1.5dB at 4000Hz. A non-exposed control population showed an average annual loss of 0.5dB per year among participants. Younger subjects (<30 years) showed higher decrements, in the order of 3dB per year at 4000Hz when exposed to excessive noise.

A survey of Canadian workers found that the average decrements in the hearing threshold were in the order of 1dB per year at 1000Hz and 1.5dB at 4000Hz. A non-exposed control population showed an average annual loss of 0.5dB per year among participants. Younger subjects (<30 years) showed higher decrements, in the order of 3dB per year at 4000Hz when exposed to excessive noise.

**Table III. Association between Hearing and PTB (n=406).**

<table>
<thead>
<tr>
<th></th>
<th>Hearing YES</th>
<th>Hearing NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTB YES</td>
<td>115</td>
<td>148</td>
<td>263</td>
</tr>
<tr>
<td>PTB NO</td>
<td>71</td>
<td>72</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>186</td>
<td>220</td>
<td>406</td>
</tr>
<tr>
<td><strong>p = 0.2</strong></td>
<td><strong>X² = 1.3</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the current study, there is a strong association between hearing loss and years spent in mining. Therefore, the length of exposure to the noise in the mines appeared to be the most important single risk factor for the development of NIHL (p < 0.05) (see Table 2). However, no association was established between the different age groups of mineworkers, PTB, compensation claims and hearing loss (see tables 2 to 4). The current preliminary study has no explanation for such a lack of association.

**Table IV. Association between compensation with hearing (n=406).**

<table>
<thead>
<tr>
<th></th>
<th>Hearing YES</th>
<th>Hearing NO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation YES</td>
<td>22</td>
<td>164</td>
<td>186</td>
</tr>
<tr>
<td>Compensation NO</td>
<td>28</td>
<td>192</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>356</td>
<td>406</td>
</tr>
<tr>
<td><strong>p value &gt;0.05 Chi square not significant</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exposure to excessive noise is the major avoidable cause of permanent hearing impairment worldwide. In developed countries, such exposure is at least partially the cause of impairment in more than one-third of those with such impairment, with, in many countries, its being the most frequently encountered compensatable occupational hazard. According to the Occupational Health and Safety Administration (OHS), between 5 and 10 million Americans are at risk of developing NIHL, due to their exposure to sounds louder than 85dB on a sustained basis in the workplace. In Africa, despite the levels of exposure to noise in the mining sector being high, the awareness of hazards among employees, employers and the public is low. Most countries on the continent do not have effective NIHL prevention programmes in place. There is a need for strict regulatory control requirements, enforcement policies, and measures, including an increase in the use of hearing protection devices in the workplace. A study conducted by Joy and Middendorf showed that noise exposure reduction was accompanied by an increase in shift length, as represented by dosimeter sample duration. For coal miners exposed above the permissible exposure level, the use of hearing protection devices increased from 61% to 89% during the said period.

Hearing loss, due to presbycusis, is eventually present in most individuals. Occasionally, a physician is asked to assess the percentage of hearing loss experienced due to noise exposure, as distinct from the percentage due to other causes. The diagnosis of NIHL should rarely be made on the basis of the audiometric pattern alone. Information about the level of noise exposure should be a part of the diagnosis. What percentage of presbycusis is a consequence of a lifetime of socioacusis, and how much is due solely to the physiologic aging process, is still a matter of contention. By means of the age correction of audiograms, such instruments can be used to assess the proportion of hearing loss due to the noise-induced permanent threshold shift. The age correction of audiograms should be considered appropriate for compensation assessment purposes in the current situation, in those cases where mineworkers have failed to claim during the stipulated timeframe (<1 year). The mineworkers in South Africa, especially in the Transkei region, are not currently claiming what is due to them on account of their NIHL status, as they are illiterate and lack the appropriate facilities for making such claims.

The International Labor Organization (ILO) advocates the monitoring of the health of all workers exposed to noise (with 85 dB being given as the warning level and 90 dB as the danger limit value). A pre-employment audiogram should be used to determine the
baseline record of the workers concerned, who should all undergo periodic medical examinations to detect any signs of occupational disease or any abnormal sensitivity to noise. As the reliability and validity of audiometry in the industry in South Africa is currently questionable, under the Machinery and Occupational Safety Act, 1983 (Act No. 6 of 1983), the Chief Inspector of Factories may require employers in specified activities to arrange audiometric testing to be conducted on workers exposed to excessive amounts of noise.

The Chamber of Mines in South Africa, which was established over a century ago, has not yet been able to reduce the noise levels in mines. Such a failure is despite the fact that the World Health Organization programme for the prevention of deafness and hearing impairment is concerned with developing and promoting strategies for the prevention of hearing impairment and deafness.

Despite the limitations on the current study, it has provided a baseline picture of the prevalence of hearing impairment among mineworkers in the Transkei.

Conclusion

As most (54%) ex-mineworkers living in the Transkei suffer from NIHL, the attention of both the relevant occupational hygienists and the compensation authorities is urgently required in this regard.

Ethical Issue: The author has ethical permission for collecting data and publication (approved project No. 4114/1999) from the Ethical Committee of the University of Transkei, South Africa.

Conflict of Interest: None

Source of Funding: It is self-funded.

References


Metabolic Disturbance in Women with Polycystic Ovary Syndrome and its Impact on Bone Turnover

Rana Ali Hamdi¹, Ammar Adil Jasim¹, Safana Ali AL-Rawi²

¹Department of Biochemistry, College of Medicine, University of Baghdad, ²Ministry of Heath

Abstract

Background: Insulin resistance and abdominal obesity are main characteristics of polycystic ovary syndrome, women with this syndrome at high risk for prolong term metabolic disorders. Obesity, insulin resistance, and hyperinsulinemia affect the hormones that control calcium homeostasis. Lower levels of serum vitamin D and higher levels of serum parathyroid hormone were found in women with polycystic ovary syndrome. However, high levels of parathyroid hormone can reduce bone mineral density and increase bone turnover.

Objectives: The present study aimed to measure the parameters of bone metabolism including parathyroid hormone, calcium, and phosphorous in serum of women with polycystic ovary syndrome and compare their levels with healthy controls. Also, investigate the possible impact of metabolic alterations in polycystic ovary syndrome on bone turnover.

Material and Method: This case-control study included 82 women from 20 to 37 years of age. All women were selected from Infertility Center in Baghdad Teaching Hospital during the period from 1 June 2019 to 30 August 2019. Women were divided into two groups: group (1) involved 42 women with polycystic ovary syndrome and group (2) involved 40 healthy women (act as controls). Each Serum specimen was analyzed for the measuring of parathyroid hormone, calcium, phosphorous, fasting insulin, fasting glucose, and homeostasis model assessment of insulin resistance (HOMA-IR).

Results: Significantly higher serum levels of parathyroid hormone, calcium, fasting insulin, and fasting glucose with lower levels of serum phosphorous in women with polycystic ovary syndrome as compared with healthy women. In addition, significant positive correlation was found between serum parathyroid hormone and waist circumference (r=0.609, p=0.00001) as well as between serum parathyroid hormone and HOMA-IR (r= 0.781, p=0.00001).

Conclusion: The metabolic disturbance found in polycystic ovary syndrome tend to support the relation between this syndrome and defective bone metabolism. High prevalence of obesity and high levels of insulin, HOMA-IR, and parathyroid hormone were found in women with this syndrome which in turn affect bone turn over. Thus, women with polycystic ovary syndrome are at risk for the development of metabolic bone disease.

Keywords: Polycystic ovary syndrome, parathyroid hormone, bone turn over.

Introduction

Polycystic ovary syndrome (PCOS) is a common endocrinopathy among female between 18 and 44 years of age¹. It characterized by high androgen levels, menstrual abnormalities, and multiple immature follicles seen by ultrasound ². Insulin resistance (IR) and abdominal obesity are
main characteristics of this syndrome, PCOS women at high risk for metabolic disorders.

Obesity, IR, and hyperinsulinemia affect the hormones that control calcium homeostasis. Lower levels of serum vitamin D and higher levels of serum parathyroid hormone (PTH) was found in obese people as well PCOS women. However, high levels of PTH can reduce bone mineral density and increase bone turnover. In bone, PTH stimulate calcium release from the large stores contained in the bones by enhancing bone resorption (a process of bone degradation by osteoclasts). It has been shown that PTH has an indirect effect on osteoclasts via binding to nearby osteoblasts. High PTH levels enhance expression of receptor activator of nuclear factor-κβ ligand (RANKL), which interacts with its receptor (RANK) on osteoclast precursor cells causing stimulation and formation of osteoclasts, which ultimately stimulate bone degradation. According to previous information, the present study aimed to measure the parameter of bone metabolism including PTH, calcium, and phosphorous in women with PCOS and compare their levels with healthy controls. Also, investigate the possible impact of metabolic alterations in PCOS on bone turnover.

**Material and Method**

This case-control study included 82 women from 20 to 37 years of age. All women were selected from Infertility Center in Baghdad Teaching Hospital during the period from 1 June 2019 to 30 August 2019. Women were divided into two groups: group (1) involved 42 women with PCOS and group (2) involved 40 healthy women (act as controls).

Women with PCOS were diagnosed according to Rotterdam criteria in the availability of two or three following criteria: oligoovulation and/or anovulation, clinical and/or biochemical hyperandrogenism, and polycystic ovaries detected via ultrasound.

Women with hyperprolactinemia, androgen secreting tumors, Cushing’s syndrome, congenital adrenal hyperplasia, and impaired thyroid, renal, and liver functions were excluded from the present study.

Each Serum specimen was analyzed for measuring PTH by enzyme linked immunoassay (ELISA) using kit provided by (Euroimmun, Germany), fasting serum insulin by ELISA kit (Monobind Company, USA), and fasting serum glucose, calcium, phosphorous by spectrophotometer using kits supplied by (Human Company, Germany). In addition, homeostasis model assessment of insulin resistance (HOMA-IR) calculates the IR according to following equation:

\[
    \text{HOMA-IR} = \frac{\text{Fasting plasma glucose (mg/dL)} \times \text{Fasting plasma insulin (μU/mL)}}{405}
\]

Women considered to have insulin resistance when HOMA-IR equal to or more than 2.5.

The body mass index (BMI) of each woman was calculated as weight in kilograms per height in square meter. Normal weight women when BMI (18.5-24.9 kg/m²), overweight women when BMI (25-29.9 kg/m²), and obese women when BMI ≥30 kg/m². Waist circumference (WC) also was estimated by measuring the midpoint between the lower border of the rib cage and the iliac crest, which provide a practical information about abdominal lipid accumulation and related disease. Central obesity was considered when waist circumference of women equal to or greater than 88 cm.

**Statistical Analysis:** Data analyses were performed by using computer facility of SPSS-20 (Statistical Package for Social Science – version 20). The results were presented as numbers, range, mean, and standard deviation (SD). Student-t test was used to assess the significance of difference between two independent means. Also, the correlation between two quantitative variables was assessed by using Pearson correlation with t-test for determining the significance of correlation. Statistical significance was detected when the p value was equal to or less than 0.05.

**Results**

Significant increase in mean value of BMI, WC, fasting serum insulin, fasting serum glucose, HOMA-IR in women with PCOS as compared with healthy controls as demonstrated in Table 1.
Table 1: General and clinical parameters of studied population.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Women with PCOS (n=42)</th>
<th>Healthy controls (n=40)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean± SD</td>
<td>Range</td>
<td>Mean± SD</td>
</tr>
<tr>
<td>Age</td>
<td>29.29 ± 5.19</td>
<td>(20-37)</td>
<td>28.9 ± 3.89</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>33.02 ± 2.13</td>
<td>(29.3-37.72)</td>
<td>27.83 ± 1.75</td>
</tr>
<tr>
<td>WC (cm)</td>
<td>99.29 ± 5.18</td>
<td>(92-112)</td>
<td>87.78 ± 3.24</td>
</tr>
<tr>
<td>s.insulinμU/ml</td>
<td>15.3 ± 1.26</td>
<td>(13.62-18.64)</td>
<td>5.57 ± .86</td>
</tr>
<tr>
<td>s.glucosemg∕dl</td>
<td>96.1 ± 2.03</td>
<td>(94-103)</td>
<td>86.8 ± 3.35</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>3.63 ± .37</td>
<td>(3.16-4.6)</td>
<td>1.22 ± .24</td>
</tr>
</tbody>
</table>

S = significant, NS = non significant.

Moreover, significantly higher serum levels of PTH and calcium with lower levels of phosphorous in women with PCOS compared to healthy controls as illustrated in Table 2.

Table 2: Bone parameters of studied population.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Women with PCOS (n=42)</th>
<th>Healthy controls (n=40)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean± SD</td>
<td>Range</td>
<td>Mean± SD</td>
</tr>
<tr>
<td>PTH (pg/ml)</td>
<td>68.48 ± 1.77</td>
<td>(65.2-72.3)</td>
<td>45.15 ± 1.55</td>
</tr>
<tr>
<td>Calcium (mg∕dl)</td>
<td>9.39 ± .17</td>
<td>(8.9-9.71)</td>
<td>9.03 ± .27</td>
</tr>
<tr>
<td>Phosphorous (mg∕dl)</td>
<td>3.39 ± .13</td>
<td>(3.21-3.7)</td>
<td>3.88 ± .28</td>
</tr>
</tbody>
</table>

S= significant, NS= non significant

Significant positive correlations were found between PTH and WC (r=0.609, p=0.00001) as well as between PTH and HOMA-IR (r=0.781, p=0.00001) in women with PCOS as shown in Figure 1 and 2, respectively.

Figure (1): Significant positive correlations between PTH and WC (r=0.609, p=0.00001) in women with PCOS.
Discussion

This study was planned to investigate the impact of the metabolic modifications in PCOS on serum PTH which in turn affect bone metabolism. The results found that women with PCOS had higher levels of PTH as compared with healthy controls. Also, serum PTH levels positively correlated with both waist circumference and HOMA-IR in PCOS women.

In this context, parathyroid hormone is a peptide hormone important in the regulation of calcium homeostasis through its effect on bone turnover\textsuperscript{15}. Women with PCOS had significantly higher PTH levels compared to healthy women\textsuperscript{5}. PCOS patients are at high risk of IR. Insulin resistance in turn has been correlated with high PTH amounts\textsuperscript{16,17}. It is assumed that insulin has anabolic impact on bone. It decreases the capacity of PTH to stimulate protein kinase C in bone formation cells and suppress bone degradation\textsuperscript{18}. Moreover, insulin act to stimulate collagen synthesis by osteoblasts (cells responsible for the bone synthesis and mineralization)\textsuperscript{18}.

Some evidence showed that insulin may act to enhance osteoblast differentiation\textsuperscript{19}. However, high levels of insulin and IR in PCOS women causing deterioration of bone mineral density and impaired bone turnover\textsuperscript{20}.

Wang et al.\textsuperscript{21} found that insulin influences both the expression RANKL via MG63 osteoblast and osteoclastogenesis. These effects similar to PTH action\textsuperscript{21}. So, increased insulin levels influence the osteoclast recruitment and differentiation via impairment of the RANKL signaling pathway (RANKL is a molecule identified to have a major role in osteoclastogenesis and bone remodeling process)\textsuperscript{21}. Another study by Huang et al. which showed that diminished in the number of tartrate resistant acid phosphatase-positive cells after adding of insulin to the ex vivo osteoclast cell culture. Therefore, it is probable that elevated insulin levels in women with PCOS could bind to insulin receptor in osteoblast leading to decrease bone formation and influence bone degradation\textsuperscript{22}.  

Figure (2): Significant positive correlations between PTH and HOMA-IR ($r=0.781$, $p=0.00001$) in women with PCOS.
Likewise, calcium homeostasis is linked with obesity and metabolic syndrome. Modifications in both vitamin D and PTH amounts occur due to increased body fat content. In addition, PTH itself may enhance adiposity due to the physiological elevation of PTH associated with increase intracellular calcium ion amounts, which in turn enhance accumulation triglyceride in adipose tissue via its role in the control of both lipogenesis and lipolysis.

Conclusion

The metabolic disturbance found in PCOS tend to support the relation between this syndrome and defective bone metabolism. High prevalence of obesity and high levels of insulin, HOMA-IR, and PTH were found in women with this syndrome which in turn affect bone turnover. Thus, women with PCOS are at risk for the development of metabolic bone disease.

Conflict of Interest: Nil

Ethical Clearance: Informed written consent was taken from each individual. The present study was approved by the Ethical Committee of the College of Medicine/ University of Baghdad.

Source of Funding: The work were supported by authors only.

References


Active Learning Practices for First-grade Science Teachers and their Relationship to Students’ Successful Intelligence

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¹Department of Higher Education, College of Basic Education, University of Babylon, Babylon, Iraq

Abstract

The paper aimed to identify the active learning practices of the teachers of science for the first grade and their relation to the successful intelligence of their students. The descriptive approach was used to suit the nature of the study. The researcher presented the study tools to a group of experts and arbitrators for the purpose of verifying the validity of the research tools. The data were also statistically processed using Holistic equation, arithmetic averages, standard deviations, The results of this study found that active learning practices were weak, while successful intelligence was medium. Results showed a statistically significant positive correlation between active learning practices among science teachers and between In the light of the previous results, the researcher recommended several recommendations, including the preparation of training programs for teachers of science in general and for the first grade teachers in particular the average of active learning practices and the need to hold seminars for science teachers to identify successful intelligence and provide a classroom environment that works on development.

Keywords: Active Learning-Science Teachers-Successful Intelligence.

Introduction

In view of what the Ministry of Education in Iraq aspires to keep pace with the educational system and the elements of the educational process for the progress made whether in the role of the teacher or the role of the learner through the use of teachers educational practices focused on making the student the focus of the educational process and active-active with the intelligence and abilities The researcher finds the need to reveal the level of active learning practices among the teachers of science and the level of intelligence in their students and the relationship between active learning and successful intelligence. Therefore, the problem of research can be formulated by the question: Is there a correlation between active learning practices The teachers of science and the successful intelligence of their students? The current era has witnessed great development in all aspects of life. We reflect this development in the field of education and teaching method¹. Moreover, teachers do not care about strategies used with students in learning and accordingly, they follow certain modes of teaching and thinking that encourages auto-memorization². As education is a social necessity and enjoys a value and importance because it has a practical effect in all societies and educational institutions ³. There are several modern teaching method and strategies that pay attention to the learners and deem them as the focus of the education process. The education process has been shifted from the dependence on the teacher to dependence on the learner’s themselves, with minimal contribution of the teacher as a director in the education process⁴. Modern education has to keep up with the tremendous developments that happened in all aspects of life, so the teacher is no longer just a teacher but a learner of knowledge, the learner has an important role in the process of education and learning, and the teacher became organizer and guide of those processes⁵. Teachers have to choose method, strategies and teaching method which are intended to reach the aim in educational programs, the selection of these things
depends on the suitability of the students’ characteristics, needs, the nature of the academic content, educational aims and the available financial and human means as the use of modern strategies was not accidental, but came in response to the needs of the educational system to achieve its objectives. Hence, teaching concept indicates the intentional and regulated process by which the teaching elements (teacher, learner and material) interact, and which is done according to pre-planned procedures aiming at fulfilling desirable destinations and ends. The process of teaching science is fertile ground in information, facts, concepts, skills and educational values towards the students in the intermediate stage, which may contribute to the improvement of the level of students’ achievement in science, but recently showed a lot of educational and scientific data such as previous studies and conferences towards the educational process

In the current period, the information technology revolution has started at a rapid and rapid pace in the technological field, which still leaves clear imprints in the lives of individuals and reflects broad challenges in all areas of life. Science has played a major role in change and scientific development. It has brought with it the interest of educationalists and their partners in the hands of innovation, development, and modernization in terms of content, teaching method and teaching aids. In this sense, it is the responsibility of teachers to choose the method, strategies and teaching method intended to achieve the goal to be achieved in programs. Some experts in the field of science teaching believe that the method of teaching the dominant sciences and the sciences, The traditional method is often effective in achieving the goals of science teaching, and effective science education can produce effective independent learners who are able to organize their everyday life, be productive, cooperative and have the ability to make good decisions. The teacher in general and the science teacher, in particular, should be able to have all the modern method and teaching practices to choose the appropriate educational situation. The successful middle school teacher is especially able to make the student involved in the educational process. Not a passive recipient. This can only be achieved by activating active learning within the classroom, which makes the learner the focus of the learning process, participating in achieving his or her learning goals, making him active in the classroom, practicing experimentation, and conversing with the discussions within him. Which makes the learner the focus of the educational process and makes him an active, active and participatory, has a role in the management of the educational process in terms of identifying some of the activities that address and commensurate with the wishes and potentials, and this type of learning is based on learning by practice and participation and research and exploration, P. In the classrooms, today’s learners are faced with the problem of teaching them with learning and teaching practices that do not match their mental abilities. This leads to a lack of learning. At the same time, these learners and their teachers may reach the conclusion that they have a lack of learning ability and the fact that many of them have amazing abilities to learn if taught in a way that suits them, and Sternberg believes that this claim was reached only through one case is that the success of many learners in certain circumstances and failure In other circumstances, Sternberg developed the theory of successful intelligence for the order. This is done only through the development of a set of teaching and assessment method and practices to help learners reach their maximum potential and success in life. Successful intelligence is one of the key cognitive processes that can outweigh information and knowledge in facilitating the adaptation and uncontrolled of individual resources and resources within the context of the learner in different life situations, whether these resources are in the form of information, experiences or tools available in the learner’s daily life situation. The learner’s ability to achieve the goals according to certain criteria or special within the social and cultural context in which the learner, that is, the learner sets goals and works to achieve them in line with the social and cultural context, which is the ability to achieve success in life by the expression of personal standards within the social context, The intellectual of the learner and consists of successful intelligence (analytical intelligence, practical intelligence, and creative intelligence).

There are previous studies similar to the current research variables: Al-Rawashdah and Walid (2015). The degree of active learning practice in science classes in the primary classroom in the North Eastern Bedouin schools in Jordan. And the study (happiness and Dalal) 2018 Degree of the practice of primary school teachers of active learning elements from the point of view of mentors and managers in Kuwait City. And Ahmed, Nahla (2016). The relationship between the intelligence of three-dimensional and mental alertness among middle school students. The study (Zoubi, Ahmed) 2016 The relationship between the assessment of successful intelligence and its practice in the education of private school teachers Jordan.
Methodology

The researcher used the descriptive (associative) approach as the appropriate method for the purpose of research aimed at identifying the active learning practices of the first-grade middle school teachers and their relation to the successful intelligence of their students. The sample of the research was randomly selected by 13% of the research community. The sample of the teachers was 15 teachers and the sample was 42% of the research community. (1691) Students for the purpose of collecting data To answer the study questions and achieve their objectives, the researcher prepared a note card to observe the active learning practices after reviewing the previous studies and literature concerning active learning if the observation card consisted of (40) Which includes (9) paragraph and field (implementation), which includes (23) paragraph and area (calendar) (High, high, medium, low, very low). The researcher presented a note of active learning practices in their initial form on a group Of teachers specialized in the field of teaching method and the quality of education in various Iraqi universities to express their views on the clarity and integrity of its formulation and has been modified in accordance with their observations. The researcher also prepared a successful intelligence test to measure the successful intelligence of first-grade students. The Sternberg test, which was prepared for the secondary stage, consisted of (36) multi-choice questions on the three abilities of successful intelligence (analytical ability, practical ability, creative ability) With (10,14,12) question, respectively, the researcher presented the test with instructions to a group of professors specialized in teaching method in different Iraqi universities and according to the opinions and observations, the researcher modified the test.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Conclusion

The results showed a positive correlative relationship at the level of significance between the active learning practices of the science teachers and the successful intelligence of their students Pearson correlation coefficient (0.67).

Ethical Clearance: All experimental protocols were approved under the Department of Graduate Studies - Method of Teaching General Sciences, Faculty of Basic Education, University of Babylon, Iraq and all experiments were carried out in accordance with approved guidelines.

References

Comparison the Tensile and Transverse Strength between the Biostar Machine Sheets and Heat-Cure Acrylic Resin

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Abstract

The Biostar foils (Duran®) used a substitute material to the heat cure acrylic in splint therapy. Dentists often prefer to make and deliver a splint shortly (1 to 2 hours) rather than having them fabricated in a laboratory when treating temp or mandibular joint disorders patients. The Duran® became widely used and popular, the wear resistant and strength of the splint materials are the most important properties that improve the splint therapy. The study compared the tensile and transverse strength of the (Duran®) Biostar foil and heat-cure acrylic resin. 40 samples were constructed in total, 20 samples for heat cure acrylic resin and 20 samples for Biostar foils. The result showed Duran sheets have the greatest mean values of transverse strength and tensile strength compared to heat cured resin

Keywords: Splint therapy, Biostar foils, Acrylic, Duran.

Introduction

Duran® is used as occlusal splints, and it is a kind of Biostar foil occlusal splint after construction. Generally, Occlusal splints can be constructed from several materials and could be partially or completely coverage for maxilla or mandible. Acrylic resins are reasonably hard materials which could be easily adjusted and are durable enough to serve as a protective night guard. As well, the use of Vacuformed vinyl splints is useful but has some limitations[1]. They are characterized by improved physical characteristics such as volume stability, good form, and low sensitivity to moisture. In addition, these materials are easy to use and save time. The dental assistant can use such materials in the clinic to make splints that can be used immediately after processing and that are suitable for patients[2]. Duran® is a hard-elastic, highly transparent plates, odorless, of 1.27 g/cm³ density (ISO 1183) and water absorption about 0.2% after 24h at 23°C, bond to acrylic, can be used in many applications (i.e. bite guards, retainer splints, invisible retainers, temporary crowns and bridges). Duran® is made from Polyethylenterephthalat-Glycol Copolyester (PET-G)[3]. Poly methyl methacrylate (PMMA) polymers were introduced in the markets as dental materials in 1930s[4]. This study compared the transverse and tensile strength between heat cured acrylic resin and Duran® Biostar foil.

Materials and Method

Heat cure acrylic resin (Spofadental, Czech Republic) and Biostar sheets (Scheu, Germany were used to evaluate tensile and Transverse strength. 

Biostar (Duran®) specimen preparation: One sheet of the Duran® foil was selected (of 3mm thickness) and placed on the pressure chamber of a Biostar machine and clamped it tightly by a special ring to prevent any movement then heat the foil by setting the code according to the instructions. When the machine has been operated, the temperature began to rise until it reached to the required temperature of 220°C by an infrared heater until the foils reached the working temperature and can be plastified, such as Figure(1) then heater is removed, and the pressure chamber (with foil) is closed down and clamped down tightly, the Pressurized air is blown down over the foil to further distribute the thermoform material and it remain over it until the cooling phase ended, finally evacuation of pressure and opening the machine cover was done. By using a permanent pen a rectangular shape has drawn over the processed foil of required dimensions for transverse strength test (65 mm
length X 10mm width X 3 mm thickness) which later has been cut by a special Biostar bur to obtain the specimens, no finishing needed for these specimens(Figure 2). For tensile strength test, the permanent pen has also drawn over the processed foil. Also, these specimens would be used as a plastic pattern for the construction of the heat-cure samples.

Heat-cure Specimen Preparation: Heat-cure samples were constructed using plastic patterns with dimensions of (65mm length X 10 width X 3 mm thickness) for transverse strength(5). As well, plastic patterns with dimensions of (75mm length X 12.5 width X 3 mm thickness) were used for tensile test(5). The lower portion of dental flask was separated with a Vaseline, and then filled with creamy stone according to the manufactured instructions (i.e. 30ml/100mg). After stone has set, the stone surface and metal patterns were coated with separating medium. Next, the upper half of the flask was placed on lower portion and then filled with stone. Then the flask was left to set for one hour before opening. The flask was opened and metal strips removed from the mold carefully (figure 3).

The acrylic powder and liquid were mixed according to manufacturer’s instructions (24g: 10 ml). When the mixture reached the dough stage, It was packed in the mold, and the two halves of the flask were put in contact and placed under the hydraulic press and then in a flask clamp. The flask was cured in water bath machine according to manufacturer instructions. Following curing, the flask was taken away from water bath and left to cool. The acrylic samples were removed from the flask, finished and polished (figures 4 and 5).

Tensile Strength: The instron testing machine was used for tensile strength test. The applied force was 100kg with cross head speed (0.5) and chart speed (20 mm/min). The recorded force was recorded in kg and then converted into (N)(6).

The values of tensile strength were calculated by the following formula (7).  

$$T.S. (N/mm^2) = \frac{F}{A}$$

Where:

- The T.S represents the tensile strength
- The letter F represents the Force at failure (N).
- The letter A represents the section area at failure (mm).

Transverse strength:  

Testing Procedure: The transverse strength of acrylic and Duran resin samples were measured on an instron testing machine by three points bending (figure 7). Each specimen was positioned at each end of 2 supports. The constant cross head speed was 2mm per min and the applied load was (50 kg). The transverse strength values (N/mm²) were measured by the following formula(8).

$$S. = \frac{3P. I}{2bd^2}$$  Where the letter S. = Transverse strength.

The letter P represents the Maximum force.

The letter I represents the distance between the supports.

The letter b represents the specimen width.

The letter d represents the specimen width.

Results

The results showed that Duran sheets have the greatest mean values of transverse strength and tensile strength compared to heat cured resin as demonstrated in table 1. There were, however, no significant differences between Duran and heat cured resins in terms of both tensile and transverse strength (P> 0.05) as illustrated in table 2 and figure 8.

This study compared the transverse and tensile strength of two different materials (Duran® Biostar foil and heat cured acrylic resin). The results of this study showed that the Duran® material has the greatest mean value of transverse strength because of the modification of the poly(ethylene terephthalate), which is considered as the main component of the Duran by Glycol, leading to better enhancement in the mechanical properties(9). Another reason might be that the Duran was a thermoplastic material of fine particles and this material is ready to use just after remolding by high temperature and pressure. This might had a direct impact on the flexural strength. Our result was in agreement with (Emco)(9) and (cheric)(10) who found that transverse strength of Duran 88.30 N/mm² and tensile strength of Duran is 51.60 N/mm². The high values of tensile strength and transverse in specimens at 100psi might be related to first, higher pressure with elevated temperature with concentration of reinforcement of acrylic resins causes increase tensile strength and transverse strength, second prevention of
the porosity and water sorption which leading to increase tensile strength and transverse strength. This agreed with Craig and Powers(7); Brauer(11); Anusavice(12) and McCabe(13).

**Table (1): Statistics parameters of descriptive data for tensile and transverse strength between biostar sheets and heat cure acrylic resin**

<table>
<thead>
<tr>
<th>Statistics Parameters</th>
<th>Tensile (Duran)</th>
<th>Transverse Strength (Duran)</th>
<th>Tensile (Acrylic)</th>
<th>Transverse Strength (Acrylic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mean</td>
<td>51.60</td>
<td>88.30</td>
<td>45.90</td>
<td>70.70</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>4.962</td>
<td>6.250</td>
<td>4.332</td>
<td>14.967</td>
</tr>
<tr>
<td>Minimum</td>
<td>43</td>
<td>78</td>
<td>39</td>
<td>51</td>
</tr>
<tr>
<td>Maximum</td>
<td>56</td>
<td>94</td>
<td>52</td>
<td>90</td>
</tr>
</tbody>
</table>

**Table (2): Paired Samples t-Test for tensile and transverse strength**

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>P-Value</th>
<th>C.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile (Duran) - Tensile (Acrylic)</td>
<td>1.610</td>
<td>P&gt; 0.05 (0.142)</td>
<td>(NS)</td>
</tr>
<tr>
<td>Transverse strength (Duran)-transverse strength (Acrylic)</td>
<td>2.621</td>
<td>P&gt; 0.05 (0.028)</td>
<td>(NS)</td>
</tr>
</tbody>
</table>

**Figure (1) Duran specimen preparation**

**Figure (2) Duran specimen**

**Figure (3) Heat cure specimen preparation**

**Figure (4) Heat cure specimen after curing**

**Conclusion**

The current study concluded the following points: Duran® showed a highest value of tensile strength and flexural strength, and that mean this type of splint material is recommended for short time use in patients suffer from acute pain and/or dysfunction. Duran biostar is considered as the first choice material used as removable orthodontic retainer because of their suitable mechanical properties.

**Financial Disclosure:** There is no financial disclosure.

**Conflict of Interest:** None to declare.

**Ethical Clearance:** All experimental protocols were approved under the Middle technical university/College of Health & Medical Technology/Prosthodontic department and all experiments were carried out in accordance with approved guidelines.
References


Are Emergency Services the First Place of Diagnosis for Juvenile Pregnancies?

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Abstract

Objectives: Child marriage is a situation that varies based on the country and region in which it is found, and it is the name given to marriages under the age of 18. We aim to learn in the study we planned of the places where juvenile-child pregnancies are first diagnosed.

Method: The study was conducted over the health data in the Kars province, found in eastern Turkey, between the dates of January 2012 and January 2017, and approval was obtained from the provincial health directorate.

Results: 260 pregnancies were detected under the age of 18. The age, place of residence, upon which referral the diagnosis was made of the pregnant women, the health institution and department that made the request, and the reason for examination were recorded. 142 of the patients (54.6%) come from rural regions.

Conclusions: All healthcare professionals, primarily emergency care doctors, must be educated about juvenile pregnancy, and social programs must be organized to monitor pregnant juveniles.

Keywords: Juvenile pregnancy, emergency, marriage.

Introduction

Child marriage is a situation that varies based on the country and region in which it is found, and it is the name given to marriages under the age of 18. 700 million women around the world are being married as children, and a third of this number are under the age of 15. This situation is often seen in regions where marriage is almost a necessity and where extramarital pregnancy-sexual relationships are not accepted. At the same time, these regions are noted as being low socio-economic regions, for example, while this rate is observed as 4% in the United States and 2% in the United Kingdom, it rises up to 62% in Niger. South Asia (48%) and Africa (42%) are the higher rates, and Turkey is around 15%. The reason for this can be seen as the relatively strict implementation of laws. In short, juvenile-child marriages and pregnancies are a multidisciplinary subject that concerns families, healthcare workers, educators, state officials, and youths themselves.

Pregnancy develops as a natural result of juvenile-child marriages seen in a certain proportion in developed nations. Even if the situation of pregnant juveniles-children due to socio-economic depression, traditional perspectives and lifestyles, and focusing on causal situations is the subject of numerous studies, they are not issues that enable consensus. Although pregnancies are seen at younger ages, according to a study, the mortality rate in pregnancies between the ages of 15-19 was three times greater than pregnancies between the ages of 20-24, and complications like premature birth, low birth weight, and fistula are frequently encountered. With awareness campaigns, legal regulations, and the efforts
of human rights advocates, this rate generally tends to decrease.\textsuperscript{13}

In the situation of a pregnancy with this severe of results, medical care is also in a position to be attentive. Juvenile-child marriages and pregnancies are hidden from government records due to legal necessity or government records remain insufficient. For this reason, the place at which the diagnosis of pregnancy is given might be the place at which health services are received for the first and maybe the last time throughout the juvenile-child pregnancy. Therefore, by enabling the healthcare professionals and necessary infrastructure at the health centers that most provide diagnoses, both the diagnosis of pregnancy won’t be delayed and may be relatively protected from complications. We aim to learn in the study we planned of the places where juvenile-child pregnancies are first diagnosed.

**Method**

The study was conducted over the health data in the Kars province, found in eastern Turkey, between the dates of January 2012 and January 2017, and approval was obtained from the provincial health directorate. 260 pregnancies were detected under the age of 18. The age, place of residence, upon which referral the diagnosis was made of the pregnant women, the health institution and department that made the request, and the reason for examination were recorded.

The parameters were analyzed with SPSS 15.0 for Windows version. In the descriptive statistics of continuous variable, average and standard deviation were stated with numbers and percentages. The significance of difference between the groups was evaluated with chi-square test. In the analysis of normally distributed parameters, parametric tests were used. In the analysis of not normally distributed parameters, non-parametric tests were used. In comparison of binary groups, Mann Whitney U test was used. For the groups more than two, Kruskall Wallis test was used. p<0.05 value was accepted to be statistically significant.

**Results**

Table 1 shows which referral the diagnosis of pregnancy was made of the patients.

<table>
<thead>
<tr>
<th>Number of Referral</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>197</td>
<td>75,77</td>
</tr>
<tr>
<td>2</td>
<td>39</td>
<td>15,0</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>6,15</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>1,15</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>0,77</td>
</tr>
<tr>
<td>5+</td>
<td>3</td>
<td>1,15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>260</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2 shows the age status of the pregnant juveniles-children.

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>0,4</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>0,8</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>0,8</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td>1,2</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>5,8</td>
</tr>
<tr>
<td>16</td>
<td>60</td>
<td>23,1</td>
</tr>
<tr>
<td>17</td>
<td>177</td>
<td>68,1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>260</td>
<td>100</td>
</tr>
</tbody>
</table>

142 of the patients (54.6\%) come from rural regions.

Table 3: shows the department that made the diagnosis of pregnancy.

<table>
<thead>
<tr>
<th>Requesting Section</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Medicine</td>
<td>54</td>
<td>20,8</td>
</tr>
<tr>
<td>Emergency Department (State Hospital)</td>
<td>113</td>
<td>43,5</td>
</tr>
<tr>
<td>Gynecology (State Hospital)</td>
<td>74</td>
<td>28,5</td>
</tr>
<tr>
<td>Pediatric (State Hospital)</td>
<td>3</td>
<td>1,2</td>
</tr>
<tr>
<td>Internal Medicine (State Hospital)</td>
<td>3</td>
<td>1,2</td>
</tr>
<tr>
<td>Other (Private Hospital)</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>260</td>
<td>100</td>
</tr>
</tbody>
</table>

Suspicion and observation of pregnancy (22.69\%), general medical examination (21.92\%), irregular menstruation (10\%), and upper abdominal pain (8.46\%) were among the most frequent health institution referrals.

**Discussion**

Poverty and inability to reach health services are an important factor in the referrals to emergency services.\textsuperscript{14,15} It is greater, especially in regions of low socioeconomic levels, due to availability and...
convenience of the use of emergency services and lack of advance financial demand in most regions.\textsuperscript{14,16,17} Another problem in regions with low socioeconomic levels is juvenile pregnancy, and the rate of involuntary pregnancy among women referred to emergency services is greater compared with other pregnancies.\textsuperscript{18} When these two factors are combined, the referral of undiagnosed juvenile pregnancy to emergency services in regions with lower socioeconomic levels is more likely. Our study found emergency services to be, at 43.5\%, the first place where juvenile pregnancy is diagnosed. In a study conducted in a region similar to that in which we conducted our study, one-third of juveniles referred to emergency services become pregnant within one year.\textsuperscript{19} Therefore, referrals of juveniles to emergency services should be evaluated for suspicion of pregnancy or for future potential of pregnancy.

The literature qualifies women between the ages of 15–44 as fertile and specifies that suspicion of pregnancy must be prioritized.\textsuperscript{20} But our study found that there are diagnosed pregnant women under the age of 15. It is obvious in regions with low socioeconomic levels that suspicion of pregnancy must be kept within a wider age range.

The rate of pregnancy at the age of 17 was the most common, with 68.1\%. The reason for this value can be interpreted as marriage at the age of 17 being allowed in certain situations with a court decision and as an increase in religious marriage, referred to as “imam marriage” as age progresses, in countries in which the study was conducted.\textsuperscript{21,22} In the region where we conducted the study, however, the proportion of only religious marriage being held was 11\%, consanguineous marriage was 40.1\%, and arranged marriages, the highest rate, was 66.2\%.\textsuperscript{21} At the same time, child abuse outside of religious-official marriage is found with young mothers or having a young mother, and this creates a vicious cycle and increases and increases the risk for juvenile pregnancy.\textsuperscript{23,24} Apart from this, that the religious values of religiously married individuals is prioritized and birth control being considered sacrilegious according to most Muslims are also risk factors.\textsuperscript{25} Another factor, however, is that women who carry a risk of pregnancy in adolescence refrain from going to hospital checkups, despite the special policies of hospitals.\textsuperscript{15}

The diagnosis of pregnancy being 95\% at state institutions is another indicator of the socioeconomic level of this population. According to 2015 data, 19\% of outpatient clinic examinations and 12\% of emergency examinations were conducted at private hospitals; our study, however, found this rate to be lower among juvenile pregnancies.\textsuperscript{26}

When examinations are organized based on ICD codes, it is seen that most applicants have pregnancy-related diseases. But abdominal pain and the general request of the examination is greater than 30\%. Similarly conducted studies have shown that pregnant juveniles are referred to emergency services, reporting their symptoms related to pregnancy.\textsuperscript{19} Therefore, all physicians, especially emergency services physicians working in regions with low socioeconomic levels, must be educated and informed about juvenile pregnancy. No matter how often pregnancy is detected at the first two referrals with a rate above 90\%, it can be considered that the subject mortality is insufficient when there is such high juvenile pregnancy. Another reason for this rate is thought to be the classes that physicians represent being different from that region of society, and pregnancy under the age of 15 might be though of as taboo or impossible by physicians.\textsuperscript{27,28}

**Conclusion**

In regions where epidemiological studies and socioeconomic levels are low and where juvenile pregnancy is seen frequently, all healthcare professionals, primarily emergency care doctors, must be educated about juvenile pregnancy, and social programs must be organized to monitor pregnant juveniles.

**Ethical Clearance:** Taken from Kars Provincial Health Directorate.

**Source of Funding:** Self

**Conflict of Interest:** None declared.

**References**


Physostigmine in Hyoscyamus Niger Intoxication: Is it an Antidote Myth?

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Abstract

Introduction: Hyoscyamus niger intoxication (HNI) is usually seen in children and its diagnosis is based on history and clinical symptoms. Approach to intoxication: physostigmine therapy is an alternative to general approach in the treatment of intoxicated patients. However, physostigmine is a generally accepted antidote; it is not always accessible in every region or place. This retrospective study aimed to evaluate HNI cases in which physostigmine were not administered. The study examined the clinical outcomes, the follow-ups after discharge, and the laboratory analyses in order to see the impact of presence and absence of physostigmine administration in the treatment of HNI.

Method: 27 patients who presented to the hospital because of HNI intake were included in the study. Laboratory values, hospitalizations and outcomes of the patients were recorded. Patients’ clinical status and admissions to E.R. in the following three-month period after the discharge were examined by having contact with the patients.

Results: Although blood values of all the patients were in the normal reference ranges, direct bilirubin and ALT values were higher in the patients hospitalized to intensive care unit. Stomach lavage was applied to all patients and supportive care was started. Any complications including death, intubation and mechanic ventilation were not developed in the patients. All the hospitalized patients were discharged in four days. After the discharge, all the patients were contacted and questioned about whether they had any admissions to E.R., and had any complications or not. It was seen that none of them had a hospital admission associated with HNI.

Concerning the findings in our study and the literature in which patients were not administered physostigmine, we can state that instead of administering physostigmine in HNI patients, applying supportive toxicology approach is more accurate.

Keywords: Intoxication, pediatrics, antidote.

Introduction

Intoxication from herbs is one of the major intoxication reasons in rural areas and at a great scale affects children.¹ Hyoscyamus niger (HN) is a kind of herb whose root, leaves and fruits include alkaloids such as atropine, scopolamine and hyoscyamine, and which is a herb from solonacea family and is named in variant ways in different languages (Henbane, Stinking nightshade, Khurasani ajwain). It is known as “Batbat out” in our region.²,³ This plant, which has a two-year life cycle, has 50-60 cm height and usually grows up at rocky and rough fields.⁴ Every year in spring and summer, it causes accidental intoxications in children.⁵ HNI, which causes paralysis of parasympathetic nerve
system because of the alkaloids that it includes, results in memory disorders named as central anticholinergic symptoms, hallucinations, ataxia, hyperpyrexia, dry skin, flushing, tachycardia, mydriasis and a decrease in intestinal.\textsuperscript{6,7} Hyoscyamus niger intoxication (HNI) can be diagnosed with the help of those obvious symptoms and the history of the case. The treatment includes stomach lavage, supportive care and physostigmine therapy in selected cases. Even though HNI is commonly seen around the world, physostigmine, the antidote for the treatment, does not have that much prevalence.\textsuperscript{8} This study evaluated the outcomes of patients who did not have physostigmine administration, their hospitalization period, their laboratory findings, and their additional symptoms which occurred during the three-month period after the discharge. Although any patients were not administered physostigmine but were given standard supportive care, death or any complications were not observed. There was seen no death or complications when supportive care was administered to uncomplicated HNI patients instead of the recommended therapy physostigmine.

**Material and Method**

This study examined the findings of 27 patients who presented to E.R. in Kars Harakani State Hospital between the dates January 2017 and January 2018, and who were diagnosed with HNI. In the protocol of Kars Harakani State Hospital in herbal intoxications the image of the herb is shown to the patients and the local name of the herb is confirmed by the patients. The parameters were analyzed with SPSS 15.0 for Windows version. In the descriptive statistics of continuous variable, average and standard deviation were stated with numbers and percentages. The significance of difference between the groups was evaluated with chi-square test. In the analysis of normally distributed parameters, parametric tests were used. In the analysis of not normally distributed parameters, non-parametric tests were used. In comparison of binary groups, Mann Whitney U test was used. For the groups more than two, Kruskall Wallis test was used. \( p<0.05 \) value was accepted to be statistically significant. Parameters which belong to the patients; their age, symptoms, clinical findings, laboratory findings, treatment protocols, hospitalization status, complications and outcomes were evaluated. They were also contacted to learn about whether they had an admission to any medical institution or not during the three month-period after their discharge.

**Results**

Table 1: Includes demographic parameters, symptoms and findings of the patients. As displayed in the table, classical HNI (atropine intoxication) is seen in all patients. The age of the patients ranges from 2 to 15.

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>15</td>
<td>55.6%</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>44.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hospitalisation</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>7</td>
<td>26.0%</td>
</tr>
<tr>
<td>Intensive care unit</td>
<td>10</td>
<td>37.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge</td>
<td>25</td>
<td>92.6%</td>
</tr>
<tr>
<td>Denial of medical care</td>
<td>1</td>
<td>3.7%</td>
</tr>
<tr>
<td>Referral to an advanced health institution</td>
<td>1</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking disorder</td>
<td>21</td>
<td>77.78%</td>
</tr>
<tr>
<td>Irritability</td>
<td>16</td>
<td>59.25%</td>
</tr>
<tr>
<td>Nausea- vomiting</td>
<td>7</td>
<td>25.92%</td>
</tr>
<tr>
<td>Somnolance</td>
<td>3</td>
<td>11.11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Findings</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilated pupil</td>
<td>23</td>
<td>85.18%</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>22</td>
<td>81.48%</td>
</tr>
<tr>
<td>Somnolance</td>
<td>20</td>
<td>74.07%</td>
</tr>
<tr>
<td>Flushing</td>
<td>20</td>
<td>74.07%</td>
</tr>
<tr>
<td>Xerostomia</td>
<td>14</td>
<td>51.85%</td>
</tr>
<tr>
<td>Pyrexia</td>
<td>10</td>
<td>37.04%</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>10</td>
<td>37.04%</td>
</tr>
</tbody>
</table>

The average hospitalization duration of the patients was 1.1 (1-2) days. The average hospitalization in the intensive care unit was 2.2 (1-4) days. The duration of the hospitalization in the intensive care unit was longer than the hospitalization period in the clinic (\( p<0.022 \)).

All patients were applied gastric lavage and administered intragastric activated charcoal suspension and intravenous fluid (1500 ml/m2/day, 1/3 saline solution). The patients with agitation and convulsion were treated with diazepam (0.25 mg/kg/dose).

Even though the first blood results of the patients were in the normal reference ranges, direct bilirubin and ALT levels were found to be higher in the normal reference ranges in the patients hospitalized to the intensive care unit (respectively \( p=0.047, p=0.023 \)).
One patient with mild symptoms refused to have medical care so he was discharged from the hospital after taking his written consent. However, the follow-up after the discharge was done.

Of the patients, only two had a hospital admission in the following three-month period after the discharge. One of those patients were diagnosed with urinary system infection, the other one underwent an operation because of acute appendicitis. Both of those patients’ admissions were not associated with HNI.

Discussion

All the patients had typical symptoms. After HNI was clinically confirmed, intoxication was diagnosed as it is stated in the literature.9 HNI and intoxications with other herbs may affect the health in a negative way. For that reason, gastric decontamination, gastric lavage, activated charcoal application were recommended to be applied to the intoxicated patients as the first step of the treatment. Our hospital’s protocol includes 1 mg administration of activated charcoal to 1 kg, so the treatment of the patients was performed in this way. Higher dosages of activated charcoal were given to HNI patients in a study in the literature. However, the study showed similar rates of death and complications to our study results. In other words, it displayed that administration in higher dosages did not affect the process of the treatment much. For that reason, we think that the dosage of the activated charcoal in our treatment is convenient.9 Besides, children with active vomiting have a risk of aspiration, and children with diarrhea have a risk due to the ready-made drugs that contain sorbitol. For that reason, high doses should be cautiously used.10 On the other hand, for the reason that atropine and alkaloids decelerate both gastric passage and lavage, both lavage and the use of activated charcoal are recommended. Ipeka syrup should not be definitely used.11,12 For that reason, our all patients were administered gastric lavage and activated charcoal.

Physostigmine is a safely used agent which is an antidote of atropine and similar alkaloids. It also antagonizes both the central and the peripheral effects of atropine and similar alkaloids.13-15 Physostigmine has mild effects such as vomiting.16 Physostigmine is gradually administered as infusion when symptoms start to disappear or until cholinergic effects start to appear. When anticholinergic findings such as tachycardia, somnolance, coma and respiratory arrest develop without any contradiction, physostigmine administration is recommended.17,18 Despite of being a specific antidote, every health institution does not have physostigmine with various reasons.9

Even though, of our 27 patients, 22 had tachycardia (81.48%), 20 had somnolance (74.07%), physostigmine was not administrated. In spite of this, all the patients were discharged from hospital at the end of the 4th day. In the literature in a study performed in the same region, patients with tachycardia and somnolance were not administered physostigmine and all of them were discharged from the hospital without any sequela in 48 hours.9 In an earlier study in which 216 HNI cases were examined, all the patients including the ones in coma were given supportive care and all of them came around without any sequela at the end of the 3rd day.19 In another study performed on 31 cases in the same region, all the patients who were not administered physostigmine were discharged from the hospital without any sequel.20 HNI was discussed in only one of those studies as it was discussed in our study.9 In cases reported in Canada, two elderly patients with HNI were watched to come around without physostigmine administration.8

In our study, the patients were given follow up after their discharge. They were also contacted to learn about whether they had an admission to any medical institution or not during the three month-period after their discharge from the hospital.

Of our patients, only two were learned to have hospital admission during the following three-month after their discharge; one of those two patients was diagnosed with urinary system infection; the other one underwent an operation because of acute appendicitis. Both of those patients’ admissions were not associated with HNI. In the earlier studies, there is not information about the patients’ clinical status after the discharge.

Even though laboratory values of the all patients were in the normal reference ranges, ALT and direct bilirubin levels were found to be significantly different. As those values were in the normal range, we do not think that it has a clinical significance.

Additionally, we saw that hospitalization duration in the ones in intensive care unit was longer than others. The reason of this can be thought as more severe cases were taken to intensive care unit. However, in the earlier studies, the differentiation of the patients according to the departments they were hospitalized was not done.9,19,20
As a result; even though physostigmine is recommended to be administered to HNI patients with dyspnea and in coma, our study in the light of the literature showed that convenient supportive care without physostigmine provided perfect outcomes on both HNI patients and HNI patients with dyspnea and in coma.

**Ethical Clearance:** Taken from Kars Provincial Health Directorate

**Source of Funding:** Self

**Conflict of Interest:** None declared

**References**


Differences in Consumption of Flavonoid Phytochemicals toward Total Cholesterol and LDL-Cholesterol Levels in Dyslipidemia and Non-Dyslipidemia Groups of Minangkabau Ethnic Women

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Abstract

Introduction: Dyslipidemia is the primary risk factor for cardiovascular disease. Prevalence of dyslipidemia in Indonesia is still high, which is related to lifestyles such as unhealthy diet. Flavonoids are one type of phytochemical that is abundant in fruits, vegetables, nuts, and flavors that have a preventive effect on degenerative diseases.

Purpose: To determine differences in flavonoid phytochemical consumption of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) in dyslipidemia and non-dyslipidemia groups of Minangkabau ethnic women.

Method: The study design was comparative cross-sectional, examination of lipid levels of TC and LDL-C was carried out to determine dyslipidemia status. Subjects consisted of 72 women with dyslipidemia and 74 women with non-dyslipidemia. Interviews on food consumption used a food consumption frequency questionnaire (semi-quantitative food frequency questionnaire).

Results: The mean TC and LDL-C were higher in the dyslipidemia group, there was an inverse correlation between flavan 3-ols, flavones, flavonols, antocyanidins and isoflavones with TC and LDL-C. There were significant differences in flavonols and antocyanidin consumptions among the dyslipidemia and non-dyslipidemia groups (p < 0.05).

Conclusion: The flavonoid consumption can improve dyslipidemia status (TC and LDL-C).

Keywords: Dyslipidemia, flavonoid, total cholesterol, low-density lipoprotein cholesterol.

Introduction

Dyslipidemia is a disorder of lipid metabolism which is characterized by an increase or decrease in lipid fraction in plasma, which is the primary risk factor for cardiovascular diseases such as coronary heart disease.¹,² The prevalence of dyslipidemia in Indonesia is still high, based on the 2013 National Basic Health Research survey results, that prevalence of dyslipidemia in people over 15 years old obtained total cholesterol (TC) above normal at 35.9%. Low-density lipoprotein (LDL) is not optimal at 60.3%. Based on sex, LDL cholesterol (LDL-C) in females is higher than in males.³

The cause of dyslipidemia consists of factors that cannot be modified such as age, sex, family records, and modifiable risk factors including food intake. Unhealthy
diet is associated with abnormal lipid profiles such as increases in LDL-C and TC which can be at risk for cardiovascular disease. From various studies, a high-fiber consumption from vegetables, fruits, nuts, and seeds⁴⁻⁹, consumption of antioxidant vitamins and flavonoids are related to the reduced risk of cardiovascular disease¹⁰⁻¹³.

Food phytochemicals are commonly found in plant foods such as fruits, vegetables, grains, and tea. Consumption of flavonoids is consistently associated with protection from chronic diseases, including cardiovascular disease, cancer, and neurodegenerative diseases. A large group of phytochemicals is polyphenols, mostly consisting of flavonoids which are secondary metabolites of plants found in cereals, vegetables, fruits, flavors, and spices.¹⁴⁻¹⁷

In recent years, flavonoids have been recognized as compounds with a strong biological activity which also play a role in the prevention of chronic diseases including cardiovascular diseases.¹⁸ Food flavonoids have biological effects, such as anti-oxidant and anti-inflammatory properties. Flavonoid types such as flavan-3-ols and proanthocyanidins have been associated with a reduced risk of cardiovascular disease by increasing the release of endothelial nitric oxide and inducing vasodilation.¹⁷ Several epidemiological studies have found a relationship between flavonoid intake and lower risk of cardiovascular disease. Flavonoids can also prevent damage and oxidation of LDL.¹⁸ This study aims to determine the differences in flavonoid phytochemical consumption toward TC and LDL-C levels in the dyslipidemia and non-dyslipidemia groups of Minangkabau ethnic women.

Materials and Method

The design of this study was a comparative cross-sectional study, which compared phytochemical consumption between groups with dyslipidemia and non-dyslipidemia. The study was conducted on Minangkabau ethnic women in Koto Tangah District, Padang City, West Sumatra Province, Indonesia. Prior to the study, screening lipid levels (TC and LDL-C) was carried out to determine dyslipidemia status. The number of samples in each group were 72 women with dyslipidemia and 74 women with non-dyslipidemia. The inclusion criteria consisted of women aged 20-44 years who came from Minangkabau ethnic based on the ethnicity of their parents coming from the Minangkabau tribe without any mixed marriages with other ethnic groups; exclusion criteria were women who were pregnant, suffering from chronic diseases (heart disease, diabetes mellitus, and kidney disorders), and those taking anti-cholesterol medicines regularly.

Data collection included interviews, and laboratory tests, namely examination of TC and LDL-C levels. Interviews on food phytochemical consumption used a semi-quantitative food frequency questionnaire (FFQ) in the last three months. The dyslipidemia status was determined based on the National Cholesterol Education Program (NCEP) Adult Treatment Panel III classification guide, which is a total cholesterol level of > 200 mg/dl and/or an LDL cholesterol of > 130 mg/dl. A database for Indonesian food composition was in accordance with the Indonesian Food Composition Table in 2017, while a flavonoid database was added from USDA. Data processing of consumption patterns applied the modified Minang cuisine FFQ program and the 2007 Nutri Survey program. The independent t-test and Mann Whitney were taken to determine differences in the average consumption of flavonoid phytochemicals in the dyslipidemia and non-dyslipidemia groups. Pearson’s and Spearman’s correlation tests were used to determine the relationship between phytochemical consumption with TC and LDL-C. The results were stated statistically significant if the two-way test got p-value ≤ 0.05.

Results

Of the number, the total of those who met the inclusion criteria and were willing to voluntarily participate in the study were 146 people consisting of 72 people as the dyslipidemia group and 74 people as the non-dyslipidemia group. The normality test showed that TC and LDL-C levels were normally distributed. The mean TC and LDL-C levels in both groups can be seen in Table 1.

Table 1. The Mean TC and LDL-C Levels of Minangkabau Ethnic Women

<table>
<thead>
<tr>
<th>Group</th>
<th>The Mean Cholesterol Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TC (mg/dl)</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>213.38±33.63</td>
</tr>
<tr>
<td>Non-dyslipidemia</td>
<td>167.68±19.77</td>
</tr>
</tbody>
</table>

Based on the lipid fraction in Table 1, the mean TC and LDL-C levels in the dyslipidemia group were higher than the non-dyslipidemia group.
Table 2 shows the average consumption of flavonoids in the non-dyslipidemia group was higher (117.7 mg) than the dyslipidemia group (107.27 mg), except in the flavanones class. Statistically, there were significant differences in the average consumptions of flavonols and anthocyanidin between the two groups (p-value < 0.05). However, overall, there was no difference in flavonoid consumption between the two groups.

**Table 2. Differences in Flavonoid Phytochemical Consumption in Dyslipidemia and Non-dyslipidemia Groups of Minangkabau Ethnic Women**

<table>
<thead>
<tr>
<th>Flavonoid Phytochemical</th>
<th>Dyslipidemia</th>
<th>Non-dyslipidemia</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavan-3-ols (mg)</td>
<td>19.7</td>
<td>20.0</td>
<td>NS</td>
</tr>
<tr>
<td>Flavones (mg)</td>
<td>1.7</td>
<td>1.9</td>
<td>NS</td>
</tr>
<tr>
<td>Flavonols (mg)</td>
<td>9.5</td>
<td>12.7</td>
<td>0.000 *</td>
</tr>
<tr>
<td>Flavanones (mg)</td>
<td>35.9</td>
<td>34.9</td>
<td>NS</td>
</tr>
<tr>
<td>Antocyanidin (mg)</td>
<td>10.4</td>
<td>14.6</td>
<td>0.001 *</td>
</tr>
<tr>
<td>Isoflavon (mg)</td>
<td>29.9</td>
<td>33.6</td>
<td>NS</td>
</tr>
<tr>
<td>Total flavonoid (mg)</td>
<td>107.27</td>
<td>117.7</td>
<td>NS</td>
</tr>
</tbody>
</table>

*significant at p-value < 0.05

Table 3 shows that there is a match between the theory and the results of the study, namely an inverse correlation between the consumption of phytochemical flavonoids with TC and LDL-C, except for flavanones. Statistically, there is a significant relationship between flavonols with TC and LDL-C, while flavones are associated with LDL-C.

**Table 3. Relationship of Flavonoid Consumption with TC and LDL-C**

<table>
<thead>
<tr>
<th>Flavonoid Phytochemical</th>
<th>TC (r)</th>
<th>p-value</th>
<th>LDL-C (r)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavan-3-ols (mg)</td>
<td>-0.042</td>
<td>NS</td>
<td>-0.042</td>
<td>NS</td>
</tr>
<tr>
<td>Flavones (mg)</td>
<td>-0.131</td>
<td>NS</td>
<td>-0.168</td>
<td>0.043*</td>
</tr>
<tr>
<td>Flavonols (mg)</td>
<td>-0.197</td>
<td>0.017</td>
<td>-0.288</td>
<td>0.000 *</td>
</tr>
<tr>
<td>Flavanones (mg)</td>
<td>0.073</td>
<td>NS</td>
<td>0.379</td>
<td>NS</td>
</tr>
<tr>
<td>Antocyanidin (mg)</td>
<td>-0.113</td>
<td>NS</td>
<td>-0.143</td>
<td>NS</td>
</tr>
<tr>
<td>Isoflavon (mg)</td>
<td>-0.005</td>
<td>NS</td>
<td>-0.156</td>
<td>NS</td>
</tr>
<tr>
<td>Total flavonoid (mg)</td>
<td>107.27</td>
<td></td>
<td>117.7</td>
<td>NS</td>
</tr>
</tbody>
</table>

*significant at p-value < 0.05

**Discussion**

A study conducted on four ethnic groups in Indonesia found that the prevalence of dyslipidemia in the Minangkabau ethnic group was higher than that of the other. Another study stated that consumption pattern of Minangkabau ethnic likely uses coconut milk as a source of saturated fat, but also uses various flavors and spices which are a source of antioxidants.

Antioxidants can be obtained from various food phytochemical sources, one of which is from abundant flavonoids found in vegetables, fruits, flavors, and spices. Based on its chemical structure, food flavonoids are generally categorized into the main subclasses: flavonols, flavones, flavanones, flavan-3-ols, anthocyanidins and isoflavones. Many epidemiological studies show that food flavonoids are associated with lower incidence of degenerative diseases such as cardiovascular disease. Flavonols shows a protective effect against type-2 diabetes in the Framingham Offspring cohort study, and anthocyanidins, flavan-3-ols, flavones and flavonols individually are associated with lower mortality caused
by cardiovascular disease in the Cancer Prevention Study II Nutrition Cohort.\textsuperscript{21,22}

In this study, the mean TC and LDL-C was higher in the dyslipidemia group. Flavonoid consumption in the non-dyslipidemia group was higher than the dyslipidemia group, except for flavanones whose consumption was almost the same between the two groups. The types of flavonoids with the highest average consumption in both groups were flavanones whose main source in this study were citrus fruit. Most types of Hesperetin and Naringenin flavanones are found in citrus fruit.\textsuperscript{14} The mean isoflavones are also high in the non-dyslipidemia group, which in this study the main source is mainly from tofu and tempeh. Isoflavonoids are a very distinct subgroup of flavonoids. Isoflavonoids are mostly found in soybeans and other leguminous plants.\textsuperscript{14}

Table 2 shows that, statistically, there are differences in the consumption of flavonoids in the flavonols and antocyanidin groups in both groups (p-value < 0.05). In this study, the flavonols group with the highest average was from quercetin flavonoids found in lettuce, and from the onion, garlic, and turmeric flavors; while, kaempferol flavonoids are obtained from spinach. Flavonol intake is found to be associated with a variety of health benefits that include antioxidant potential and a reduction in the risk of vascular disease.\textsuperscript{14} Quercetin and its derivatives can prevent oxidative damage in various systems, including those with clear relevance to atherosclerosis.\textsuperscript{24}

The most consumed group of antocyanidin is delphinidin flavonoids obtained from eggplant. Qui et al reported that anthocyanidin supplements (160 mg) compared to the placebo group given for 12 weeks improved LDL and HDL levels from 120 subjects with hypercholesterolemia.\textsuperscript{17}

Overall, the average consumption of flavonoids was 112.56 ± 37.16 mg, which results are higher compared to other studies on antioxidants in Minang cuisines with an average consumption of flavonoids at 105.0 ± 48.0 mg.\textsuperscript{11} In this study, there was no difference in total flavonoid consumption in both groups, which were also supported by previous studies.

In this study, there were significant differences in phytochemical consumption in the flavonols and antocyanidin groups with dyslipidemia. From the fraction of the lipid profile, there was an inverse correlation between consumption of flavonoids with TC and LDL-C levels, meaning that increased consumption of flavonoids was associated with lower TC and LDL-C levels.

A study conducted between Mediterranean and non-Mediterranean groups found no significant difference in the average total flavonoid intake between non-MED countries (373.7mg/day) and MED countries (370.2mg/day) observed. In non-MED areas, the main contributors were proanthocyanidins (48.2%) and flav-3-ol monomers (24.9%) and the main food sources were tea (25.7%) and fruits (32.8%). In the MED region, proanthocyanidins (59.0%) are by far the most abundant contributors and fruits (55.1%), grapes (16.7%) and tea (6.8%) are the main food sources. This study showed similar results for total food flavonoids intake, but a significant difference in the intake of flavonoids, food sources and some characteristics between MED and non-MED countries.\textsuperscript{25}

A study conducted on Japanese women found that total flavonoid intake was inversely correlated with plasma TC concentration (TC) ($r = -0.236$, $P <0.05$) and plasma LDL-C concentration (LDL-C) ($r = -0.220$, $P <0.05$), the main source of flavonoid is onion and the isoflavone is tofu.\textsuperscript{22} A population study in Australia also show an association between consumption of flavonoids and the risk of coronary heart disease.\textsuperscript{23}

At the molecular level, flavonoids can contribute to the reduction of the risk of coronary heart disease by affecting oxidation of LDL, fat plaque, and hypercholesterolemia.\textsuperscript{22} Studies in Haitian-American and African-American ethnic groups show that increased consumption of flavan-3-ols and flavanone is associated with lower LDL in the group with no diabetes.\textsuperscript{17} Flavonoids from old garlic extract flavor can reduce TC and LDL-C by 5-10% in hypercholesterolemic patients.\textsuperscript{24}

A meta-analysis study shows that turmeric and curcumin which contain a high level of flavonoids have an effect on decreasing LDL-C and TC levels.\textsuperscript{25} A study shows that orange juice (750 mL/day), which was also high in flavonoid level, improved blood lipid profile in hypercholesterolemic subjects.\textsuperscript{26} Naringenin-type flavonoids given in supplement form during the 8-week trial were found to reduce LDL concentrations by 17% in the hypercholesterolemic group compared with the healthy control.\textsuperscript{17}

**Conclusion**

There are differences in the consumption of...
flavonoids for the flavonols and antocyanidin groups in the dyslipidemia and non-dyslipidemia groups of Minangkabau ethnic women. The consumption of flavonoids is inversely correlated with TC and LDL-C levels, then it can be concluded that consumption of flavonoids can improve the status of dyslipidemia (TC and LDL-C). The next researcher is suggested to analyze the flavonoid phytochemical consumption directly through blood test.

Acknowledgment: The author would like to thank all the subjects involved in this study, cadres, the Government of Padang City, West Sumatra Province. Thanks also to the enumerators who have helped collect data in conducting the study.

Ethical Approval: Ethical clearance was received from The Ethical Committee for Research and Community Development, Faculty of Public Health Universitas Indonesia No.660/UN2.F10/PPM.00.02/2018.

Conflict of Interest: We declare that we have no conflict of interest.

Funding: Ministry of Health of the Republic of Indonesia.

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Histological Assessment of Anti-inflammatory Effectiveness of 940 Nanometer LLLT on Carrageenan Induced Arthritis in Temporomandibular Joint in Wistar Albino Rats

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Abstract
Low level laser therapy is very promising method to treat temporomandibular joint disorders, the aim of this study was to assess the effectiveness of different energy density of 940nm diode laser, 120 Westar albino male rats (250g weight, three months old) were used in this study, divided randomly into four experimental groups; negative control group injected with saline, positive control group injected with carrageenan solution with no treatment, study group injected with carrageenan and treated with 171J/cm² LLLT group, and study group injected with carrageenan and treated with 74J/cm² LLLT group, animals were euthanized in day;1,3, and 7, histological slides obtained and examined under light microscope for assess acute and chronic inflammatory infiltrations. It was concluded that LLLT using 74J/cm² energy density had a very efficient anti-inflammatory effect.

Keywords: Anti-inflammatory, effectiveness, carrageenan, arthritis.

Introduction
Temporomandibular disorder can be defined as the clinical conditions involving the masticatory muscles, temporomandibular joint, or both of them¹. Temporomandibular disorder affects important percentage of the population in general and many of these disorders have an inflammatory component² many types of non-surgical treatments are usually used to treat TMDs to improve and enhance function and to reduce or cure symptoms³ such as physical therapy⁴, drug therapy⁵, various types of occlusal splints⁶, acupuncture ⁷ and low level laser therapy³ which is very promising method to treat TMDs³⁵⁸. Low-level laser therapy (LLLT) is the treatment that utilize light-source of a single wavelength (laser), with low power that will not generated heat in tissue so act with reaction which is non-thermal and photochemical⁹. Most studies in LLLT recommend using laser systems in the red to infrared spectrum of light⁵ biostimulation, which is a stimulatory effect of laser light on biochemical and molecular processes that normally occur in tissue, such as healing and repair. Examples of this are pain relief, wound healing, and collagen growth. Biostimulation increases circulation, collagen, and osteoblastic and fibroblastic formation, which initiates healing¹⁰. Some “biostimulation” is actually a matter of inhibition. Relief of acute pain requires inhibition of neural activity, and even though the patient feels “stimulated,” the pain response has actually been inhibited¹¹. Carrageenan is a sulphated mucopolysaccharide which has been used in the rat for inflammation models: footpad inflammation or paw edema model¹², air pouch model¹³, and to induce acute arthritis¹⁴, either alone or in conjunction with other agents¹⁵ and in the enhancement of inflammatory arthritis in other models¹⁶. Carrageenan causes well documented inflammatory effects after injection in joint¹⁷, thus it was chosen to induce arthritis in this study. The aim of this study was to evaluation of the effectiveness of 940nm LLLT on carrageenan induced arthritis as anti-
inflammatory agent in Wistar albino rats TMJ, using two different energy density (171J/cm² and 74J/cm²).

**Materials and Method**

**Subjects:** Following approval by the Committee of the college of Dentistry of the University of Baghdad, 120 male Wistar rats (150-200g) obtained from the animal house of the higher institute of infertility diagnosis and research assisting production of the University of Al-Nahrain were used in this study. Animals kept in acrylic cages lined with wood chips and maintained at 24 °C in a day/night light cycle with limitless access to food and water. Procedure was carried out in the animal house during light period of the day from 8:30 a.m. to 12:30 p.m.

**Method**

**Preparation and calibration of laser device:** Epic X diode laser device and deep tissue handpiece were used in this experiment, the handpiece was covered with tin foil diaphragm with central 10mm radius circular opening, the tin foil diaphragm was used to cover and protect eyes and ears from laser beam.

**Formation of the experimental groups:** Animals were randomly assigned to four experimental groups as following:

- Negative control group: injected by normal saline into TMJ area and applying deep tissue handpiece with 0 J/cm².
- Positive control group: injected with carrageenan solution into TMJ area with and applying deep tissue handpiece with 0 J/cm².
- LLLT with 171 J/cm² group: injected with carrageenan solution into TMJ area with and applying deep tissue handpiece with 171 J/cm².
- LLLT with 74 J/cm² group: injected with carrageenan solution into TMJ area with and applying deep tissue handpiece with 171 J/cm².

Injection of saline and applying 0 J/cm² were made to ensure that all animals undergo the same circumstances and stressful procedures.

**Carrageenan Injection:** Freshly prepared 1% carrageenan solution was made by dissolving carrageenan powder (Modernist, USA) in normal saline (Pioneer Co. IRAQ). The animals were anesthetized by inhalation of Diethyl ether (stab/BHT, Netherlands) in close plastic container then hair on TMJ area were removed using hair removal cream and plastic spatula. The postero-inferior border of the left zygomatic arch was palpated and a needle of an insulin syringe was inserted immediately below this point and then advanced in the anterior direction until reaching the postero-lateral aspect of the condyle. Then, 50 µL of the carrageenan solution was injected into the left TMJ²,⁵,¹⁸,¹⁹

**LLLT Procedure:** Low level laser therapy procedure was made transcutaneously in one contact point facing the central position of left TMJ, immediately after carrageenan injection while the animal is under anesthesia, using diode laser device (Biolase epic X, USA) and deep tissue handpiece (Biolase epic, USA), using wavelength 940 nm, spot radius 10mm, irradiation time 90 second and energy density for first experimental group was 171J/cm² and 74 J/cm² for the second experimental group, the procedure were repeated every 48 hours for the next seven days (four session of irradiation).

**Histological Procedure:** Ten animals of each group were euthanized using over dose of ketamine hydrochloride, on day 1,3 and 7 after initial injection of carrageenan solution, head decapitated and skin removed, the area of temporomandibular joint was cut using surgical disk, then kept in formalin foe 24 hours for fixation of tissue followed by storing in formic acid for 48 hours to decalcify the hard tissue, finally mount in paraffin wax, cut in microtome then stained using H&E stain to be examined under light microscope²,⁵.

**Histological Analysis:** Histological analysis was done by two examiners, blindly, under light microscope with magnification power of 400X, scoring for chronic and acute inflammatory cells of five randomly selected areas on each slide,

Scoring criteria as following⁵,²⁰

0 Absent or very few inflammatory cells

1. **Mild:** average number less than 10 inflammatory cells
2. **Moderate:** average number 10-25 inflammatory cells
3. **Severe:** average number greater than 25 inflammatory cells

**Statistical Analysis:** Data were analyzed using SigmaStat for Windows version 4.0 build 4.0.0.37,
Systat, USA. and the figures were made using Microsoft office 2016. Comparison between study groups were made using one-way ANOVA and multiple post hoc comparisons were performed using the Tukey test. A probability level of less than 0.05 was considered to indicate statistical significance.

Results and Discussion

A cute inflammatory cells analysis: First autopsy of rat TMJ was taken after 24 hours from induction of inflammation by carrageenan, second one at day three and the last at the end of the experiment at day seven. All study groups showed sever to moderate infiltration of acute inflammatory cells except negative control group which was injected with normal saline instead of carrageenan solution (Figure 1), statistically highly significant differences between study groups when compared using one-way ANOVA in day one and day three (P<0.001), this differences continued but to lesser extend in day seven of the experiment with significant differences and P=0.011. Post hoc analysis was done to reveal the differences between each pairs of study groups, the results for day one showed highly significant increasing in positive control, 171J/cm² LLLT group and 74J/cm² and when compared to negative control and P values were <0.001 in all three comparisons, which indicate severe acute inflammation in these groups, but there was significant decrease in acute inflammatory scoring of 74J/cm² LLLT when compared to positive control which meant the inflammation was much lower in former (P= 0.036), regarding 171J/cm² LLLT group there was non-significant decrease in the score when compared to positive control group (P=0.072) and the acute inflammation was non-significantly suppressed in this group. Day three post hoc analysis showed that acute inflammatory scoring was still highly significantly higher in all study group compared to negative control group with P value <0.001 indicating that acute phase inflammation still active 96 hours after initial induction. Although there was significant acute inflammation in LLLT group treated with 171J/cm² and 74J/cm² but there was highly significant decrease in the scoring when compared to positive control group (P=<0.001) indicating a good suppression of acute inflammation in these group at this stage. Last day of the experiment 192 hours after carrageenan solution injection the histopathological picture dramatically changed, acute inflammatory scoring differences were decreased in all groups, inflammation were still obvious to some extend in positive control and 171J/cm2 LLLT groups and when compared them with negative control group there were statistically significant increasing with P value 0.021 for the former and 0.014 for the later.

Analysis chronic inflammation score: Analysis of chronic inflammatory scoring was done using one-way ANOVA, there were statistically high significant differences among all study groups in all days of the experiment and the P value <0.001, thus post hoc analysis was performed to distinguish the differences among each pairs of the study groups in every day of the experiment. Post hoc analysis of day one of the experiment revealed highly significant increasing in chronic inflammatory cells infiltrations in all study groups when compared to negative control group (P =<0.001), comparing positive control group with 171J/cm² LLLT group showed highly significant increasing in chronic inflammatory cells in 171J/cm² LLLT group (P value =0.001), comparison of positive control group with 74J/cm² LLLT group there was non-significant differences (P value =0.235), similar non-significant differences between both LLLT treated group (P value =0.234). Comparison the data of negative control group with other study groups in the third day revealed highly significant increase in chronic inflammatory cells infiltration in positive control, 171J/cm² and 74J/cm² LLLT group, both LLLT groups showed highly significant increase in chronic inflammatory cells infiltration when compared to positive control group. Picture of the seventh day had major changes (table 3.29), negative to positive groups comparison still maintain the statistical differences but to lesser extent (P value= 0.017) thus the chronic inflammatory cells infiltration was still significantly higher in positive control group, comparing 74J/cm² LLLT to negative control group showed non-significant differences (P=0.376) which meant suppression of chronic inflammation in this group, interestingly unexpected highly significant increase in the scoring of 171J/cm² LLLT in comparing to negative control and 74J/cm² LLLT group (P= <0.001) and similar significant increase in comparing to positive control (P =0.048) which meant sever chronic inflammation in this group. Chronic inflammatory cells analysis for the seven day can be summaries in figure (2), negative control group as it was expected maintain baseline scoring through the experiment, all other groups showed increasing from day of induction till day three with more intense and earlier chronic infiltration in both LLLT group then the inflammation start to suppress from this point to the end of the experiment in 74J/cm² LLLT group as
well as in positive control group, while 171J/cm\(^2\) LLLT group maintain the chronic inflammation till experiment ending. Induction of arthritis was made using the most common method used to evaluate the effects of different types of treatment protocols on inflammatory arthritis which is induction of arthritis using carrageenan solution injected directly into TMJ, carrageenan is polysaccharide obtained from sea weed, it have potent pro-inflammatory effect in animal joint when injected into the joint space\(^{21}\), previous studies had proof the carrageenan effectiveness in arthritis induction in TMJ of rats\(^{18,19,22,23}\). As it was expected there was sustained level of chronic inflammation in 171J/cm\(^2\) LLLT group until the last day of the experiment when compared to positive control group, and this can have explained by the new invasion of inflammatory cells from skin burns which effect most of rats in this group\(^{29}\), or might be due to exceed the critical window of biostimulation to bio-inhibition\(^{30,31}\).
Conclusion

The results of this study demonstrate that LLLT using 74J/cm² have a very powerful anti-inflammatory effect on TMJ induced arthritis.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Department of oral diagnosis, College of Dentistry, University of Baghdad, Baghdad, Iraq and all experiments were carried out in accordance with approved guidelines.

References


The Impact of the Method of Teaching the Mediator Different Speed and Mental Training to Teach Some of the Offensive Skills for Beginners in Handball

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¹University of Anbar, Faculty of Physical Education and Sports Sciences, Iraq

Abstract

The aim of this study is to compare the effect of the teaching method (the explanation and the typical presentation) carried out by the control group and the method of the mediator according to the speed of presentation of the motor model and mental training conducted by the pilot group in the education of beginners.

The experimental method was used to design the two groups of pre-and post-test tests. The study was conducted over a period of five weeks. After processing the data of the pre and post measurements, the results were obtained. The most important results were: The presentation of the motor model along with the mental training results in superior learning for beginners as a result of the use of the video presentation with different operating speeds of performance, providing learners with an ideal mental vision and integrated mental training before they go to the playroom to apply it practically.

Keywords: Teaching method, technological medium, speed training, mental training, and handball.

Introduction

We all aspire to reach the beginner learner to the best level of knowledge and skills and requires that continue to search for the best teaching method that fit the capabilities of learners and their needs and the content of education and its objectives, “The adherence to one method or method of learning may not achieve all the objectives and the existence of variance in the level of individual differences And the difference of learners in the ability and comprehension on the perception and perception of motor performance “¹ and that the best method of teaching are that are very influential and leave the impact of learning in the learner and make it involved and interacting in the educational process, recalling,”A positive only if the learner or interactive“².

It is noticeable in our work as teachers that we do the dynamic model or to show it using video, the performance is fast and negatively affects the formation of the first image of the learner to hide the fine details, the novice gets a mental image is incomplete and does not achieve the main purpose in education.

In our review of the teaching literature in the Faculty of Physical Education - Anbar University we found missing rings in teaching using the method of order (explanation and presentation of the model) and the model is presented by the same teacher and in the best case is used video tutorial and the speed of the normal presentation, which is equal in how fast the performance of the model from In both cases, the speed of motor performance exceeded the perceptions of junior learners with no interest in mental training, which reflected negatively on the levels of learners when evaluating them. The researchers suggested an assessment of the levels of learners for the last three years and after obtaining them officially from the results of the evaluation were divided between the six official levels of assessment (acceptable, intermediate, good,
very good, excellence) and the largest dispersion ratio (mean - acceptable - average).

The importance of the research is to suggest a method of teaching the different technological medium as well as mental training as a new contribution to teaching as well as in solving the problems of teaching mentioned above.

**Research aim:** To identify the effect of the method of teaching using the technology of different speed and mental training and compare its results in a way teaching the matter (explanation and presentation of the model).

**Hypothesis:**
1. There were significant differences in favor of post measurements of control and experimental research groups.

2. There are significant differences in favor of the results of the experimental group using the different speed and mental training technology.

**Research Methodology:** The researchers used the experimental approach.

**The research sample:** A random sample of (35) non-practicing students of the handball game from the second stage in the Faculty of Physical Education-Anbar University for the academic year 2017-2018 (23 of Division A - 12 of Division B) by 58.333% of the total research community (60) Learned.

**Table (1). Shows the amount of dispersion in the levels of the second stage students in the handball course**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of learners</td>
<td>Ratio</td>
<td>Number of learners</td>
</tr>
<tr>
<td>Good-Excellence</td>
<td>7</td>
<td>30.4%</td>
<td>15</td>
</tr>
<tr>
<td>Failed-intermediate</td>
<td>16</td>
<td>69.6%</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>100%</td>
<td>28</td>
</tr>
</tbody>
</table>

**Homogeneity of the sample:** The values of homogeneity were examined and the values of the torsion coefficients within the level (±3) were an acceptable indicator of homogeneity as shown in Table (2).

**Table (2). Shows homogeneity of the research sample**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Basic variables</th>
<th>Mean</th>
<th>Medium</th>
<th>SD</th>
<th>Skewness*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>20,685</td>
<td>21</td>
<td>0,932</td>
<td>0,233</td>
</tr>
<tr>
<td>2.</td>
<td>The weight</td>
<td>66,714</td>
<td>65</td>
<td>4,950</td>
<td>1,121</td>
</tr>
<tr>
<td>3.</td>
<td>Length</td>
<td>174,514</td>
<td>174</td>
<td>4,434</td>
<td>0,096</td>
</tr>
</tbody>
</table>

**Variables affecting performance**

| 1.     | The explosive power of the arms | 5,072 | 4,950 | 0,682 | 0,157 |
| 2.     | The explosive power of the legs  | 30,771 | 30    | 5,380 | 0,024 |
| 3.     | Special compatibility in handball| 12,628 | 13    | 1,848 | 0,779 |
| 4.     | Accuracy of handball shoot       | 6,257 | 6     | 1,291 | 0,792 |

* Moderate (±3)

**Tests used:**

1. Push a medical ball for the farthest distance to measure the explosive force of the arm
2. Vertical jump of stability to measure the explosive force of the upright legs.
3. Test the numbered circuits to measure your compatibility in the handball.
4. Test the accuracy of the shoot of the jump to measure accuracy.
Procedures of the experiment:

Pre Test: Carried out during the period from 11-18/2/2018 recorded homogeneity data and evaluate the pre performance of the main research variables

Execute the experiment: Control group: The Spectrum of Teaching Styles introduced by Muston and Ashworth" method was used over a five-week period with two teaching units per week (90 minutes).

Experimental group: The technological medium used the different speed to display the kinetic model to the Gantt training program over a period of 5 weeks and two learning units per week (90 minutes).

Post-test: Was carried out in the period 18-21/4/2018 and recorded the data of performance evaluation skills and the same method of pre testing.

Results

View, analyze, and discuss results:

Table (3). Shows the results of the pre and post performance evaluation of the control group

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Performance evaluation</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
<th>Mean diff.</th>
<th>SD.diff.</th>
<th>(t) calculated</th>
<th>Sig.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Handling from above shoulder level</td>
<td>10 Min.</td>
<td>2.782</td>
<td>1.085</td>
<td>5.739</td>
<td>1.214</td>
<td>2.956</td>
<td>0.976</td>
<td>14.528</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>Simple deception</td>
<td>10 Min.</td>
<td>2.347</td>
<td>0.486</td>
<td>3.782</td>
<td>1.277</td>
<td>1.434</td>
<td>1.471</td>
<td>4.675</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>Complex deception</td>
<td></td>
<td>2.217</td>
<td>0.735</td>
<td>3.347</td>
<td>1.495</td>
<td>1.130</td>
<td>1.217</td>
<td>4.453</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>Shoot from above the shoulder level</td>
<td></td>
<td>2.826</td>
<td>1.114</td>
<td>6.782</td>
<td>1.380</td>
<td>3.956</td>
<td>1.021</td>
<td>18.575</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* Morality below error level (0.05) in front of the degree of freedom (23-1 = 22)

Table (4). Shows the results of the evaluation of the pre and post-performance of the experimental group

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Performance evaluation</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
<th>Mean diff.</th>
<th>SD.diff.</th>
<th>(t) calculated</th>
<th>Sig.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Handling from above shoulder level</td>
<td>10 Min.</td>
<td>2.750</td>
<td>0.965</td>
<td>6.682</td>
<td>0.728</td>
<td>3.932</td>
<td>1.205</td>
<td>11.300</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>Simple deception</td>
<td></td>
<td>2.500</td>
<td>0.674</td>
<td>5.900</td>
<td>0.960</td>
<td>3.400</td>
<td>0.722</td>
<td>16.305</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>Complex deception</td>
<td></td>
<td>2.250</td>
<td>0.452</td>
<td>4.933</td>
<td>1.263</td>
<td>2.683</td>
<td>1.120</td>
<td>8.294</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>Shoot from above the shoulder level</td>
<td></td>
<td>2.500</td>
<td>0.904</td>
<td>7.091</td>
<td>0.473</td>
<td>4.591</td>
<td>0.748</td>
<td>21.239</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*Morality below error level (0.05) in front of the degree of freedom (23-1 = 22)

Table (3) and (4) show that there are significant differences between the evaluation of the pre and post performance of the control group as well as the experimental group and the evaluation of the post-performance of both groups.

The positive results of the effectiveness of both method in teaching are attributed to the fact that each method of teaching has its administrative and organizational aspects and its tools that influence the teaching and motivating the learners. the learners interact with each other according to their ability and inclination to accept the appropriate method in education. They are all aimed at improving the learner’s level and imparting the experience and practical knowledge of the that “method and method of teaching are very important in the educational process and that these method and method affect the speed of learning and the degree of saturation in learning". and agree with the results of the research that the method of teaching physical education “regulate the interaction of learners in educational situations to acquire educational and educational experiences related to the goals of physical education”.
and also agree with the view in “The successful method of teaching is to reach the desired goal and achieve the purposes of the lesson with the least time and effort and the most appropriate means”.

Table (5). Shows the values of the computational environment, the standard deviations and the calculated value (t) and the significance of the differences between the results of the control and experimental research groups to evaluate the post-performance in the main search variables

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Performance evaluation</th>
<th>Control group</th>
<th>Experimental group</th>
<th>(t) calculated</th>
<th>Sig.*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Handling from above shoulder level</td>
<td>10 Min.</td>
<td>5.739</td>
<td>1.214</td>
<td>6.682</td>
<td>0.728</td>
</tr>
<tr>
<td>2.</td>
<td>Simple deception</td>
<td></td>
<td>3.782</td>
<td>1.277</td>
<td>5.900</td>
<td>0.960</td>
</tr>
<tr>
<td>3.</td>
<td>Complex deception</td>
<td></td>
<td>3.347</td>
<td>1.495</td>
<td>4.933</td>
<td>1.263</td>
</tr>
<tr>
<td>4.</td>
<td>Shoot from above the shoulder level</td>
<td></td>
<td>6.782</td>
<td>1.380</td>
<td>7.091</td>
<td>0.473</td>
</tr>
</tbody>
</table>

* Moral and below error level (0.05) in front of the degree of freedom (23 + 12-2 = 33)

Table (5) shows that there are significant differences in the evaluation of the post-performance between the control and experimental groups and in favor of the results of the experimental group for the large arithmetic mean of their research variables. Thus, the hypothesis of alternative research was achieved: “There are significant differences in favor of experimental group results using the different speed and mental training medium”.

Table (6). Shows the magnitude of the effect

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ETA Square</td>
<td>ETA Square</td>
</tr>
<tr>
<td>1.</td>
<td>Handling from above shoulder level</td>
<td>0.46</td>
<td>0.50</td>
</tr>
<tr>
<td>2.</td>
<td>Simple deception</td>
<td>0.22</td>
<td>0.90</td>
</tr>
<tr>
<td>3.</td>
<td>Complex deception</td>
<td>0.45</td>
<td>0.73</td>
</tr>
<tr>
<td>4.</td>
<td>Shoot from above the shoulder level</td>
<td>0.65</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Table (6) show that Effect size of the teaching method of the control group (0.22-0.65) means that (22-65%) of the effect on the teaching of the search variables is explained by the effect of the order method (explanation and typical presentation) The ratio is not explained by strange factors. It is clear from the same table and shape that Effect size of the experimental group teaching method (0.50-0.90) means that (50-90%) of the effect on the teaching of the search variables is explained by the effect of “The remainder of the ratios are unexplained and due to strange factors and the observed effect size data finds a significant increase in the proposed method And his superiority”.

The researchers attributed the positive results of table (5) and (6) to the method of teaching the experimental group to the effectiveness of the administrative and organizational aspects. The effective tools harnessed the available resources for teaching in accordance with the content of the lesson and the requirements of the educational situation and the needs, tendencies and attitudes of the learners. (0.70X) (0.30X). It provided a clear, meaningful and integrated picture of the parts of the skill and its sections. The learner was able to understand the small parts of the skill and to connect them to each other and to form the correct motor image of the performance. Where he confirms whenever the information provided with meaning and purpose has diminished the need for repetition to save them and the division of information displayed becomes a catalyst to increase the learner’s capacity to address them and absorbed through the organization of such information.
The positive results of the method of teaching the experimental group are attributed to the good organization and implementation of mental training in terms of the time it is given and the number of times it is implemented in proportion to the learner’s need to take the right mental perception and training, thus strengthening and strengthening the mental motor program to show in the form of the correct motor behavior of the performance when performing it that mental training is one of the method used in the educational process of motor skills, which affect positively through the effectiveness of mental training factors in relaxation and training through observation, thus proved an unquestionable success in raising the level of Disease. The results also agree with the reference that “mental training is closely related to learning in general and in the field of learning locomotion in particular, where mental training adds a cognitive aspect of performance in terms of seeing the full performance and then recall the image to return it fully or fragmented and training to correct Performance or increased arousal for optimal performance “."12

Conclusions
1. The effectiveness of both the teaching method (explanation and presentation model) and the method of teaching using the medium different speed of the presentation of the motor model and mental training in the education of beginners some of the offensive skills in handball.
2. The emergence of a difference in the results of the evaluation of the post-performance of the control and experimental research groups and for the benefit of the pilot that uses the mediator according to the speed of presentation of the model and motor mental training.
3. The method of teaching using the mediator is different than the speed of presentation of the motor model and the proposed mental training in the differential difference in the size of the positive effect.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

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Biochemical Studies of Extract of Rosmarinus Officinalis on Oxidative Stress Induced Cerebral Ischemic

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Abstract

Ischemic stroke may happen in different combinations of clinical ailments and these residues represent a major problem. Reactive oxygen species (ROS) have been shown to act a main action in cerebral ischemia-reperfusion injury (IRI). Where reperfusion is defined as the action of restoring the flow of blood to an organ or tissue after a heart attack or stroke. Diverse therapeutic effects have been substantive for Rosmarinus Officinalis (Rosemary). In addition, it has been offered that Rosmarinus Officinalis has covering impact versus I/R stimulate cerebral damages to diverse organs. For this cause, it sounds conceivable that the administration of Rosmarinus Officinalis might keep the brain versus the ischemia reperfusion injury. The study included knowledge the chemical components of the Rosmarinus Officinalis leaves in the watery extract and determine whether Rosmarinus Officinalis prevents ischemia-reperfusion induced stroke. Thirty rats were divided into three groups as control Group 1, IRI group Group2, and Rosmarinus Officinalis treatment group Group3. All animals underwent stroke for 30 min followed by 60 min period of reperfusion. Animals were internal infused with only 0.9% saline solution in group 2. Rats in group3 received Rosmarinus Officinalis (1 mL/kg) for two weeks with the same diet intraperitoneally, before ischemia and before reperfusion. We were the estimation of the biochemical parameters: Blood samples were taken from the rats. Serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH) oxidative stress levels of nitric oxide (NO) and lipid peroxidation (LPO) and blood was used for the estimation of enzyme immunoassay: Interleukin-8 (IL-8), tumor necrosis factor Alpha (TNF-α), interleukin-1β (IL-1β). The results showed that the extract contains several species. The levels of enzymes and Oxidative stress in group3 were significantly lower than those in the group2. Our results suggest that Rosmarinus Officinalis treatment protects the rat brain against ischemia-reperfusion induced Cerebral injuries.

Keywords: Rosmarinus Officinalis, Ischemia/reperfusion, Cerebral injuries, Oxidative stress, Antioxidant.

Introduction

Ischemia disease remains the leading cause of death world-wide, intracerebral stroke is most common type of stroke, accounting for almost 87% for all stroke. The goal of therapy of ischemia is to improve the blood flow (Reperfusion), that reperfusion is 50-70% after injury occur normally.2 Reperfusion the type of treatment depend on type of stroke either by procedure called an endovascular (physical removal of a large blood clot), or a mechanical thrombectomy, using wire-caged device called a stents retriever to remove the large blood clot and thrombus disruption using stents. Medical treatment with recombinant tissue plasminogen activator that given intravenously is only FDA-approved drug thrombolytic treatment for acute ischemic stroke therapy. Tissue plasminogen activator only used within three hours of having stroke, but recent studies have long that time window of tissue plasminogen activator thrombolysis treat to 4.5 hours after injury time onset.3 Patients in

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last year’s, so many clinical trial for patients that need embolotomy surgery by stent retrievers done in US and the result was benefit to patients in all that lead us to use this type of treatment widely in clinic in future. However, there something called reperfusion injury, despite we want the reperfusion to reoccure and oxygen restoration but it that happen very rapid many cause effect on brain function and lead to harmfull effect on brain, that worse in certain type of stroke, the reperfusion injury was significantly, has been clearly reveal from both experiential studies and clinical guide damage effect of reperfusion injury after stroke. For example, the infract volume clearly increased during 6-24 hr., in rat model of stroke with middle cerebral artery occlusion, subsequent the start reperfusion compared continual occlusion, which is a firm evidence of reperfusion injury following stroke.6

Therapeutic properties of herbs have been traditional applied in the therapy of different human’s illness and therapeutic characteristics and their pharmacological have been related to various chemical components particular from their raw extractor. Specially chemical constitutive of antioxidant action can be found in high concentration in herb and can be responsible for their barring effects in different degenerative diseases, including cardiovascular, neurological and cancer, diseases. So, the antioxidant properties of herbs have prolong academic usage applications in humane verdure sponsorship.7

Since common medical therapy have side effects, especially in association with their long-term use, and have high costs enjoined on these patients, trend towards traditional and alternative treatments is increasing. A major amount of investigate has been done on plants to test their effects on oxidative stress.8 Rosemary (Rosmarinus officinalis), plant belongs to the Lamiaceae family is an aromatic herb that is utilized as a food additive.9 Although this plant is mostly known for its antioxidant properties in medicine, it possesses anti tumorigenic, anti-inflammatory, antidiabetic, anticancer, antiproliferative, and neuroprotective effects, as well.10 Various studies have shown that rosmarinus officinalis is a mediator of apoptosis and inflammatory activities. It has a diversity of properties, including expectorant, antispasmodic and diuretic11 rosemary inhibits the production of free oxygen radicals, lipid peroxidation (LPO) and suppresses inflammation.12

### Materials and Method

**Plant Material:** The purpose in this treatise was to fluid watery offprints from Rosmarinus officinalis L. The desiccated rosemary blades were gained from (Baghdad, Iraq).

**Chemical detection of the plant components:** The aqueous extract of rosemary was prepared by using the chemical compounds which were listed at Table 1. These listed compounds were glycosides, phenolic compounds, tannins, saponins, resins, proteins and flavonoids.13

**Experimental Design:** At experimental project research were used thirty (Wister) rats with weight 200-230g which were kept at standard circumstances. These rats were prevented from eating and water for 24hours before the surgery was achieved on rats under tested. These rats were spilted to 3 sets which were nourished the same nourishment: sham group (Group 1), IRI group (Group 2), and IRI with aqueous extract of Rosmarinus Officinalis handling combination. All these sets of rats were doped by giving amount of 40-50 mg/kg of thiopental sodium. Watery extract of Rosmarinus Officinalis was granted to the rats of treatment set type, prior IRI of a potion with a concentration of 1 mL/kg by intraperitoneal track.

**Surgical Procedure:** The tested cerebral ischemia caused by obstruction of the two carotid arteries for 30 mins. Reperfusion was entered by releasing the cord sweetly for duration of 60mins. In control rats group proliferated anesthesia, skin incision and separation of the arteries without subsequent ligation of vessels. All surgical procedures were carried out under general anesthesia [intra introduction of thiopental sodium at a dose of 40-50 mg/kg]. During ischemia, the animal’s body temperature was maintained at normal levels (37°C) using warm table lamp. After, decapitation of rats was used to study.14

**Biochemical analyses:**

a. Heart enzymes: Plasma was used to measure ALT, AST and LDH as indicative parameters of heart function. The plasma activities of ALT, AST and LDH were estimated by commercially available kits using an autoanalyser [aerose® Abbott Laboratories, Chicago, IL].

b. Oxidative stress indices: The left hemisphere was used to detect nitric oxide (NO) measured as total...
nitrite\(^{15}\) and lipid peroxidation (LPO) as Thio Barbituric Acid Reactive Substances.\(^{16}\) IL-8, TNF-\(\alpha\), IL-1\(\beta\) levels were measured using commercial enzyme immunoassay kits (Endogen, Woburn, MA, USA).

**Results**

The chemical components tests of the hydrous extracts of rosemary are listed in Table 1, which were showed that carbohydrate, saponins, proteins, tannins, flavonoids and various phenolic compounds are leaves components.

**Table 1: Qualitative chemical analyses for aqueous extract of Rosmarinus Officinalis leaves**

<table>
<thead>
<tr>
<th>Components</th>
<th>Reagents</th>
<th>Note</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>Molish indicator, Benedict indicator, Iodine indicator</td>
<td>Violet coterie, Orange ppt., Blue ppt.</td>
<td>+Ve, +Ve, +Ve</td>
</tr>
<tr>
<td>Saponins</td>
<td>Fast stirring, Mercuric Chloride</td>
<td>Dense foam for long time, White ppt.</td>
<td>+Ve, +Ve</td>
</tr>
<tr>
<td>Protein</td>
<td>Folin-Ciocalteau reagent</td>
<td>Blue color</td>
<td>+Ve</td>
</tr>
<tr>
<td>Tannins</td>
<td>%1 Ferric chloride, %1 Lead acetate</td>
<td>Green ppt., Preface yellow ppt.</td>
<td>+Ve, +Ve</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>1% Ferric chloride, Ethanol hydroxide alcohol</td>
<td>Green ppt., Yellow ppt.</td>
<td>+Ve, +Ve</td>
</tr>
<tr>
<td>Phenolic components</td>
<td>%1 watery, Ferric chloride</td>
<td>Green ppt.</td>
<td>+Ve</td>
</tr>
</tbody>
</table>

As it was expected, ischemia reperfusion for the group (I/R) led to rise producing of the oxygen free radicals which has been recorded in ischemic reperfused heart and led to tissue harm as indicated by boost percent of concentration for AST, ALT, beside of LDH (in the I/R set). With the compare to the percent of concentrations or levels for AST, ALT, and LDH in the Rosmarinus Officinalis, it showed curing set recorded lower standards of LDH, ALT than those in the ischemia reperfusion set. They were significantly senior in the ischemia reperfusion set than those in the control type. The gained results are illustrated as shown at Fig. 1.

![Fig. 1: Showed enzymes of Heart at control set I/R and I/R+Rosmarinus Officinalis, rats (n=10, mean± SD)](image)

AST: Aspartate aminotransferase enzyme; ALT: refer to alanine-aminotransferase; LDH: refer to Lactate–dehydrogenase. Significances with controls: is *\(P<0.01\).

As it is clarifying by rising of the levels for the oxidative exertion for LPO and NO (Fig. 2) whilst oxidative stress standards for LPO and NO in the Rosmarinus Officinalis curing set were recoded decreasing to be lower than those in the ischemia reperfusion kind. Ischemia reperfusion group showed increasing in the levels of oxidative stress of LPO and NO with the comparison of their levels at control group.

![Fig. 2: Showed the Oxidative overwork in control group, I/R and I/R Rosmarinus Officinalis, rats (n=10, mean± SD)](image)

NO: nitric oxide, LPO: lipid peroxidation. Significances contra controls: *\(P<0.01\).
The results which were on recorded in Figure 3 clarified that blood IL-8, TNF-α and IL-1β standards in remedy set (Group 3) were remarkable lower (p<0.001) than their levels in I/R set.

![Fig. 3: Showed the Effect of Rosmarinus Officinalis on IL-8, TNF-α, IL-1β standards in rats. interleukin-8 (IL-8), tumor necrosis agent Alpha (TNF-α), interleukin-1_ (IL-1β). Significances versus controls: *P<0.01](image)

**Discussion**

The first part of this study is to evaluate the qualitative chemical analyses of the aqueous extracts (Table 1). These are quite similar to that reported by Martinez et al.\(^{17}\) The second part of the work involves study the influence of Rosemary extract on Cerebral Ischemic. The results of this estimation revealed that pretreatment with Rosemary extract significantly decreased the blood–brain barrier permeability disruption and injuries, and more importantly, relieved brain infarction and neurological deficit scores after focal ischemia reperfusion.

Results demonstrated *Rosmarinus Officinalis* could protect Cerebral injuries in a rat. Furthermore, it also decreased cognitive deficits induced by ischemia.

Oxidative strain is one of the more remarkable mechanization that engaged in pathogenesis of ischemic injuries and results in blood–brain barrier disruption and neuronal death.\(^{18}\) It has also been reported that Rosemary extract decreases LPO and OH radical, and H\(_2\)O\(_2\) activities in rat serum, brain, liver, kidney and heart tissues.\(^{19}\) Based on the mentioned proofs, it can be said that Rosemary extract has strong antioxidant properties,\(^{20}\) even more than the phenolic compounds.\(^{21}\)

The data showed that the administration of Rosemary extract caused to an effective betterment of cerebral edema, as well as of neurological scores, over and above, too it is ambidextrous to successfully attenuate blood–brain barrier permeability which in turn lead to the rebate of brain infarction. Consequently, Rosemary extract safeguard with blood–brain barrier limited disruption by acute Cerebral ischemic through limiting intracranial pressure, brain infarction,, restoring energy and cerebral blood flow.

Recent studies have showed that the phenolic components from Rosmarinus officinalis L. reduce oxidative stress.\(^{22,23}\) Brain inflammation has newly emerged as an important role in the pathogenesis of Cerebral Ischemic injury.\(^{24}\) It shown that ROS extract can prevent or decrease of phosphorylation of MAPKs, then blocking NF-kB activation, and ultimately decreased expression of Cyclooxygenase-2 and iNOS.\(^{25}\) Similarly, pro-inflammatory enzymes, leukocytes activities and mediators such as TNF-α, IL-1β, and NO were suppressed by Rosemary extract during inflammation.\(^{26}\)

**Conclusion**

The present investigation demonstrated that brain infarction tolerance induced by Rosemary extract pretreatment leads to a prevention or reduction of ischemic stroke lesion. Therefore, Rosemary extract could markedly improve stroke outcome. Based on the mentioned proofs, cerebral ischemic tolerance induced by Rosemary extract can be useful as a practical therapeutic in related other diseases.

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**Conflict of Interest:** There are no conflicts of interest.

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The Effectiveness of National Early Warning Score (News) as Predictor of Mortality in Heart Failure Patients in Emergency Department

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Abstract

Introduction: Heart failure is one of the global health problems for society characterized by a high mortality rate, increased hospitalization and rehospitalization. National Early Warning Score (NEWS) is one who has the EWS development of physiological parameters include pulse rate, systolic blood pressure (SBP), respiratory rate, body temperature, level of consciousness (AVPU), oxygen saturation and the use of supplemental oxygen in the range of 0-3 on each parameter.

Objective: This study aimed to analyze NEWS effectiveness as a predictor of mortality of heart failure patients in the Emergency Department (ED) of General Hospital of Dr. Slamet Martodirdjo Pamekasan.

Method: This study using observational analytic design with prospective cohort approach. The respondents in this study were 64 patients in quota sampling. The research instrument is observation sheet. ROC analysis and multivariate used multiple logistic regression test.

Results: ROC test showed that NEWS has value of p=0.000 and AUC of 0.856 which describes NEWS can be a strong predictor related mortality in heart failure patients with CI of 95%, sensitivity value of 0.85 (85%) and specificity of 0.818 (81.8%). Logistic regression analysis explained the SBP became independent variables that most associated with mortality of heart failure patients with Exp(B) of 10.208 which describes the high score of SBP has greater risk 10.208 times to death compared with a normal score of SBP after controlled by SPO2.

Conclusion: NEWS is an effective predictor of mortality of heart failure patients.

Keywords: National Early Warning Score, heart failure, mortality, ED.

Introduction

Heart failure is one of the global health problems for society characterized by a high mortality rate, increased hospitalization and rehospitalization1. Patients with heart failure who have the condition decompensation come with a return visit to the installation of emergency and have high rates of hospitalization, resulting in an increase in health care costs2. WHO (2016) recorded more than 17.5 million people in the world die of cardiovascular disease3.

Based on data from basic medical research in 2013, the prevalence of heart failure are diagnosed by a doctor or symptoms by 0.3%, or about 530 068 people, with a prevalence of heart failure is based on the highest diagnosis in Yogyakarta (0.25%), followed by East Java (0.18%), while the prevalence of heart failure in North Sulawesi (0.14%), the prevalence of heart failure...
increases with age and the highest prevalence occurs at age 65-74 years (0.5%) and are more prevalent in urban areas.

The treatment of patients with heart failure remains a problem for doctors and nurses in the ED, in terms of setting priorities, monitoring and assessing on an ongoing basis on the condition of the patient, and provide support to patients and families in a limited time. One of strategy for detecting deterioration of non-trauma patients in the ER is the implementation of Early Warning Score (EWS). National Early Warning Score (NEWS) is one of the development of EWS by the Royal College of Physicians that have physiological parameters include pulse rate, systolic blood pressure, respiratory rate, body temperature, level of consciousness (AVPU), oxygen saturation and the use of supplemental oxygen in the range 0-3 on each parameter. NEWS recommended to assess patients in acute pain conditions. Currently there are limited studies that address the application NEWS in heart failure patients in the ED. EWS research in the ED just focused on predicting mortality and referral to the ICU and the study was conducted retrospectively.

Based on preliminary studies, the number of visits a patient in the ED of General Hospital of Dr. Slamet Martodirdjo Pamekasan in 2017 as many as 15,689 patients, while in 2018 until September as many as 111.276 patients. Heart failure among the 10 major diseases in the ED in 2017 until 2018. Interviews with ED nurse that there are some patients with heart failure who suddenly experience worsening and nurses require early detection system to predict the deterioration of the patient so that they can be addressed early and prevent death. Therefore, this research needs to be carried out.

Methodology of Research: This study used observational analytic design with prospective cohort approach. The respondents in this study were 64 patients in quota sampling. The research was conducted in the ED of General Hospital of Dr. Slamet Martodirdjo Pamekasan. The research instrument is observation sheet. ROC analysis and multivariate used logistic regression test.

Research Result

Table 1 shows the highest NEWS is 13 and the lowest is 0 with the average value is 6.83. The oldest respondent is 85 years old and the youngest is 25 years old with an average of 58.25 years old. A maximum systolic blood pressure on patients is 261 mmHg and the lowest is 95 mmHg with an average of 154.36 mmHg. The maximum heart rate of patient is 149 and lowest is 53 with an average of 97.36. The maximum respiration rate on patient is 40x/minute and the lowest is 16x/min with an average of 27.02x/min. The highest temperature of the patient is 38.5°C and the lowest is 34.9°C with an average of 36.5°C. The maximum oxygen saturation of patient is 100% and the minimum is 77% with an average of 94.69%.

Table 2 describes the gender of the respondents have an equal number of male and female with each number of 32 people. The survive respondents in this study were 44. The most respondents with alert awareness level were 58 people. The most respondent that use oxygen were 61 people.
Table 3 shows the NEWS has a value of p=0.000 and the AUC of 0.856 which describes NEWS can be a strong predictor related to mortality in patients with heart failure.

Table 4. Cut off Point, Sensitivity and Specificity

<table>
<thead>
<tr>
<th>NEWS</th>
<th>Cut off Point</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWS</td>
<td>6.5</td>
<td>0.85</td>
<td>0.818</td>
</tr>
</tbody>
</table>

Table 4 shows the cut off point of NEWS is at a point 6.5 which means that the detection of mortality of heart failure patients in the score of 6.5 with the sensitivity of 0.85 and specificity of 0.818. The sensitivity of 0.85 indicates the NEWS ability clinically to generate positive value or their mortality of heart failure patients by 85%. The specificity of 0.818 showed NEWS ability clinically to produce a negative value or the patient’s life in case of heart failure by 81.8%.

Table 5. The results of multiple logistic regression test between the scores of systolic blood pressure (SBP), respiratory rate (RR), temperature, oxygen saturation (SPO2), level of consciousness (AVPU) and use of oxygen to mortality in heart failure patients in the ED

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>The p-value</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>2.109</td>
<td>0.017</td>
<td>8.237</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>0.775</td>
<td>0.239</td>
<td>2.171</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.613</td>
<td>0.307</td>
<td>1.847</td>
</tr>
<tr>
<td>SPO2</td>
<td>0.987</td>
<td>0.016</td>
<td>2.684</td>
</tr>
<tr>
<td>Level of consciousness (AVPU)</td>
<td>7.276</td>
<td>0.999</td>
<td>1.445E3</td>
</tr>
<tr>
<td>The use of O2</td>
<td>8.624</td>
<td>0.999</td>
<td>5.565E3</td>
</tr>
<tr>
<td>Constants</td>
<td>-21.939</td>
<td>0.999</td>
<td>0.000</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>2.118</td>
<td>0.017</td>
<td>8.318</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>0.810</td>
<td>0.210</td>
<td>2.248</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.629</td>
<td>0.297</td>
<td>1.876</td>
</tr>
<tr>
<td>SPO2</td>
<td>0.999</td>
<td>0.015</td>
<td>2.717</td>
</tr>
<tr>
<td>Level of consciousness (AVPU)</td>
<td>7.277</td>
<td>0.999</td>
<td>1.447E3</td>
</tr>
<tr>
<td>Constants</td>
<td>-4.812</td>
<td>0.013</td>
<td>0.008</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>2.177</td>
<td>0.021</td>
<td>8.816</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>0.771</td>
<td>0.267</td>
<td>2.162</td>
</tr>
<tr>
<td>SPO2</td>
<td>1.100</td>
<td>0.004</td>
<td>3.003</td>
</tr>
<tr>
<td>Level of consciousness (AVPU)</td>
<td>7.352</td>
<td>0.999</td>
<td>1.560E3</td>
</tr>
<tr>
<td>Constants</td>
<td>-4.478</td>
<td>0.022</td>
<td>0.011</td>
</tr>
<tr>
<td>Step 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>2.323</td>
<td>0.013</td>
<td>10.208</td>
</tr>
<tr>
<td>SPO2</td>
<td>1.060</td>
<td>0.003</td>
<td>2.886</td>
</tr>
<tr>
<td>Level of consciousness (AVPU)</td>
<td>7.462</td>
<td>0.999</td>
<td>1.741E3</td>
</tr>
<tr>
<td>Constants</td>
<td>-2.529</td>
<td>0.000</td>
<td>0.080</td>
</tr>
</tbody>
</table>

Table 5 shown the final results of the multiple logistic regression test indicate the calculated value Exp (B) systolic blood pressure is 10.208, the value of Exp(B) of SPO2 is 2.886 and the value of Exp(B) of the level of consciousness (AVPU) is 1.741. Based on the results of this analysis, the variables SBP became independent variables that associated with mortality of heart failure patients with Exp(B) value of 10.208 which describes high score of SBP has greater risk of 10.208 times to the death compared with a normal score of systolic blood pressure (SBP) after being controlled by oxygen saturation (SPO2).
Discussion

The results of this study indicate that the NEWS is effective in detecting the occurrence of mortality in heart failure patients in the ER. Based on Table 5.4 shows that NEWS has the Area Under the Curve (AUC) of 0.856 (0.741-0.971), which means NEWS can be a strong predictor related mortality. Furthermore, the cut off point values of NEWS obtained at a point 6.5 which means that the detection of mortality of heart failure patients in the score of 6.5 with the sensitivity of 0.85 and specificity of 0.818. Supported by the positive predictive value of 0.68 indicates clinically NEWS ability to generate positive value or their mortality of heart failure patients by 68%.

According to the study results Alam et al., 2015 with a prospective design, explained NEWS as a good predictor of death with AUC value 0.768 (0.618 to 0.919). Powered studies Smith et al., 2012 retrospectively say that NEWS is an effective predictor to detect unexpected death compared with 33 EWS others with mean AUC value of 0.894 were strong (Smith et al., 2012). The study by Pimentel et al., 2018 retrospectively to detect mortality in patients in the ER told NEWS has a value of 0.862 which means strong AUC as a predictor of mortality. The purpose of NEWS including the assessment of acute illness, clinical deterioration detection, and enable timely clinical response. NEWS should be used for a preliminary assessment of acute illness and for further monitoring of patients during hospital stay. By NEWS regularly noted, the clinical response of patients can be identified when there is a potential patient’s clinical deterioration and the need to obtain clinical care. Likewise Scoring NEWS will provide guidance on patient recovery and re-stabilized, thereby reducing the frequency and intensity of clinical monitoring to discharge patients.

NEWS has seven physiological parameters include heart rate (HR), systolic blood pressure (SBP), respiratory rate (RR), body temperature, level of consciousness (AVPU), oxygen saturation and the use of supplemental oxygen in the range of 0-3 on each parameter. On multivariate analysis, obtained the variable component of the NEWS of the most influential is the component of systolic blood pressure (SBP) with Exp (B) 10 208 which describes score SBP high 10 208 times greater risk of death compared with a score of SBP normal after being controlled by the oxygen saturation (SPO2).

Blood pressure is one of the hemodynamic parameters were simple and easy to do measurement. According to Jones & Hall (2006), high blood pressure (hypertension) is an important risk factor for cardiovascular disease. The results showed that patients with systolic blood pressure of 261 mmHg highest and the lowest was 95 mmHg with an average reach 154.36 mmHg. The study results Britton et al., 2009 says there is an increased risk of heart failure by 35% among subjects with systolic blood pressure of 130-139 mmHg compared to subjects with normal systolic blood pressure of 120 mmHg. However, systolic blood pressure low (hypotension) an assessment of the worsening of the acute illness of the most significant because of hypotension may indicate compensation blood circulation due to a decrease in the volume of cardiac output, heart failure or heart rhythm disorders, and the effects of blood pressure lowering drugs. Low systolic blood pressure (<120 mmHg) at admission showed a worse prognosis. In the scoring system NEWS hypotension condition is given a higher assessment scores (a score of 1 and 2) than hypertension <200 mmHg given a low score (a score of 0). Described in severe hypertension (systolic blood pressure ≥200 mmHg), can occur as a result of the pain experienced by the patient but it is important to consider the impact of acute disease or be exacerbated by severe hypertension and selection of clinical measures.

Furthermore, oxygen saturation is a powerful tool for the assessment of pulmonary function and cardiac integrated. Measurement of oxygen saturation is one of the non-invasive procedure using pulse oximetry are routinely be used in the clinical assessment of acute illness but are still rarely included in the EWS system. Because the measurements are considered practical, the oxygen saturation is considered as an important parameter in NEWS. On the condition of heart failure with shortness of breath conditions can cause a decrease in oxygen saturation of the patient. In the study Sittichanbuncha et al., 2015 says that the oxygen saturation including predictors of mortality. Oxygen saturation has a negative correlation with prehospital mortality. In the results in Table 5.1 oxygen saturation values obtained for heart failure patients when entering the ED is 77-100%. There are still patients with heart failure had oxygen saturation below 94%. Studies have shown that the lower the patient’s oxygen saturation owned by the increased risk of death in patients. Each 1% increase in oxygen saturation, it will be followed by a decrease in the risk of death by 8%. By observing the oxygen saturation levels will be known needs oxygen delivery. Giving oxygen to patients would increase
survival in patients so it will give good results. Oxygen saturation has a positive correlation with the amount of oxygen supplied which means higher oxygen levels given the higher levels of oxygen saturation.

**Conclusion**

NEWS is effective as a predictor of mortality of heart failure patients in the ED as well as systolic blood pressure (SBP) is the most closely related to NEWS parameters as predictors of mortality of heart failure patients in the ED.

**Conflict of Interest:** None

**Ethical Clearance:** This research has passed the test of ethics with No: 070/219/432.603/2019 implemented in general hospitals Dr. Slamet Martodirdjo Pamekasan, East Java.

**Sources of Funding:** None

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Analysis of Gas H$_2$S Exposure with At Risk Behavior to Workers at XYZ Geothermal Company in 2018

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Abstract

The study was conducted in geothermal operations which has been found that the H$_2$S gas exposure was the riskiest. The purpose of this study was to examine the relationship between perceptions, knowledge, attitudes and the ability to avoid exposure H$_2$S with at risk behavior to workers in XYZ geothermal company in 2018. It used cross sectional design from 80 samples which used questionnaire to examine. The results showed that most respondents have good perception, knowledge, attitude and ability to avoid H$_2$S gas exposure, and have good safe behavior on H$_2$S gas exposure. The statistical test shows that there is a significant correlation between perception with P value 0.001 and OR 6.660 (CI 2.151 - 20.623), attitude about the hazard of exposure of H$_2$S gas with P Value 0.000 and OR 13.440 (CI 2.876 to 62.809) While knowledge and ability to avoid danger a significant relationship with risk exposure to H$_2$S gas. The multivariate result showed that attitude gave the biggest influence with P value 0.026 and OR 8,035. It is recommended that the company consistently conduct training and refresh training for workers related to H$_2$S gas exposure, improve the quality of Leadership Accountability activities, and improve the implementation of the BBS (Behavior Based Safety) program and synergize with the RTS (Right To Stop) program where each worker is authorized to stop work if observing any unsafe actions or conditions, and continue to communicate H$_2$S risks to all employees.

Keywords: Geothermal, hydrogen sulfide gas, at risk behavior, risk perception

Introduction

The ILO estimates that around 2.3 million women and men worldwide die from accidents or occupational diseases every year. Worldwide, there are about 340 million occupational accidents and 160 million work-related victims each year$^1$. In Indonesia, the number of work accidents in Indonesia is still high. Up to the end of 2015 there were 105,182 work accidents. Meanwhile, for cases of severe accidents that resulted in death there were 2,375 cases of the total number of work accidents$^2$.

Geothermal company XYZ’s geothermal steam field began operating in 1994 and continues to make efforts to make its operations safe for humans, the environment and assets. One of the hazards that are a priority in controlling hazards in XYZ is the risk of H2S gas exposure because the risk is the most dangerous, naturally occurring or in the production process. The company has carried out engineering controls, administrative controls, and protection of personal protective equipment (PPE) while protection by eliminating and substituting the risk of H$_2$S exposure cannot be done considering that H$_2$S is naturally present in geothermal activity. Company records, during January 2014 - December 2017, there were 4 cases of nearmiss related to H$_2$S and one of the factors that is always concluded as root cause is failure to identify the danger of H$_2$S when the work is done. Identification failures can be in the form of individual failures or failure of existing procedures to anticipate H$_2$S hazards. Based on the Observation Report and Right to Stop (RTS) data, it was shown that unsafe acts were still observed (more than 10%) in various activities that could potentially cause H$_2$S gas exposure during January 2015 to December 2016 (65 from 644 observations in 2015 and 40 from 322 observations in 2016).
The purpose of this study was to find out the description of the relationship of unsafe acts of employees of the XYZ geothermal company related to the risk of H$_2$S gas exposure and the factors associated with the risk of H$_2$S gas exposure to workers.

**Method**

This type of research is descriptive analytic with cross sectional research, where the independent variables include perceptions, knowledge, attitudes and ability to avoid the danger of H$_2$S gas exposure and the dependent variable at risk behaviors.

**Results**

The occupational health and safety management system used in the XYZ company is named the Integrated Geothermal Operations Management System (IGOMS). IGOMS consists of 4 elements, namely: Leadership Commitment, Management System Cycle, Standard and Expectation and Audit Review and continual improvement.

The company encourages leaders to monitor the implementation of the Managing Safe Work Program (MSW) as often as possible. Some of the activities carried out related to this leadership accountability include:

1. Leadership Engagement (LE), carried out by the leader group and the level above and the level engineer.
2. Leadership Safe Guard Verification (LSV). This activity is carried out by Middle Management (Team Manager up) against safeguards installed on production equipment to ensure all safeguards are installed and functioning.

Risk control for H$_2$S gas exposure is one of the processes in Incident/Injury-Free Operations (IFO). In this element there are several critical processes related to occupational safety and health in the company, including Managing Safe Work (MSW), Motor Vehicle Safety (MVS), Repetitive Stress Injury Program (RSIP), and Industrial Hygiene.

To ensure that geothermal operations do not cause the release of H$_2$S gas in high concentrations into the air, the company strictly monitors H$_2$S concentrations at some critical points contained in the production process. One of them is the cooling tower which is one of the latest production equipment from the operation of geothermal power plants.

H$_2$S hazard management by elimination and substitution cannot be done because H$_2$S is one of NCGs that are naturally present in nature. Some engineering designs used to control H$_2$S exposure for workers and the environment include the following: Material, Flash tank, Gas Removal System, Alarm System, Blower and active ventilation.

Administrative control refer to the main H$_2$S management standards to provide guidelines and requirements for reducing H$_2$S exposure among risky workers, with following: MSW, personnel training, specific procedures for high risk activities, portable gas detection, maintenance, tested and calibration and emergency management & preparedness.

The company has provided personal protective equipment, as the last protection against the dangers of H$_2$S gas exposure, to all employees, as well as visitors to the workplace. Some of the PPE provided by the company related to H$_2$S exposure are as follows: Air breathing equipment provided (SABA) and Self-contained breathing apparatus (SCBA).

The results of respondents’ risk perception using 9 psychometric paradigms are 1) The majority of respondents (66.7%) have a good paradigm by accepting voluntarily the risk of exposure to H$_2$S in these jobs; 2) Based on the immediacy of effect paradigm, most responses (70.4%) have a good paradigm; 3) The majority of responses (87.0%) have a Know to Expose the Risk perception paradigm that is lacking in risk exposure; 4) The paradigm of knowledge perception on the risk of H$_2$S gas exposure, for less and good categories has the same percentage of 50%; 5) The majority of respondents (70.4%) have a paradigm of perception of Control Over Risk for good risk control; 6) Most of the responses (79.6%) have a less paradigm where the risk faced is a risk that is commonly faced; 7) Most of the responses (94.4%) have a perception paradigm in which the potential risk level only occurs in one or several people; 8) In the paradigm of common-dread psychometry, most respondents (68.5%) have a poor perception paradigm; 9) Most of the responses (68.5%) have a good Severity of Consequences paradigm.

The majority of respondents (47.4%) had less perception and had more high-risk actions. It is found that the P value is 0.001 meant there is a relationship between respondents’ perceptions and at risk behaviors.
Respondents who have less knowledge and have more high-risk actions are as many as 5 people (38.5%) than respondents who have good knowledge and have low-risk actions as many as 18 people (26.9%). There is no relationship between the knowledge of respondents with at risk behaviors (P Value=0.505).

Respondents who had the attitude of accepting danger and having high risk actions were more as many as 21 people (45.7%) than respondents who had a hazard-resisting attitude and had low risk actions namely as many as 2 people (5.9%). There is a relationship between the attitude of respondents with at risk behaviors (P value=0.001).

The respondents who had less ability in avoiding H₂S gas exposure and had more high-risk actions were as many as 3 people (50.0%) than respondents who had good ability in avoiding H₂S gas exposure and having a low risk action that is as many as 20 people (27.0%).

The ability variable to avoid H₂S gas exposure with at risk behaviors is known that the P Value is 0.347, meant there is no relationship between the ability to avoid H₂S gas exposure with at risk behaviors.

The results of Multivariate analysis can be obtained that the greatest influence is the attitude variable with P Value 0.026 and OR 8.035. Respondents who have the attitude of resisting danger are more likely to do good behavior in preventing at risk behaviors after being controlled by perception variables. In predicting at risk behaviors, the ability of the model formed is 71.3%, this means that the attitude and perception variables predict at risk behaviors by 71.3%, R Square values obtained results of 0.294 means that the attitude and perception variables can explain variations in risk measures by 29.4%.

Discussion

The results of this study showed that most respondents had good behavior related to H₂S exposure. This principle requires that all work must be carried out in accordance with the standards at all times, so that there is no tolerance in carrying out the work according to the procedures / work standards that have been determined. This growing attitude of good safety behavior, one of which is influenced by the company’s commitment in implementing a work safety culture through the IGOMS. Provision of safety guard against potential production equipment for H₂S gas exposure, efforts to increase knowledge and awareness of H₂S risk through the fulfillment of workers’ competencies, provision of adequate resources for worker protection, provision of work-step standards, especially for high-risk work and activities are some examples of the company’s efforts in cultivating safe working behavior.

Risk perception is a subjective assessment that people make about the characteristics and severity of risk. This phrase is most often used in reference to natural hazards and threats to the environment or health. The results of perception analysis using 9 psychometric paradigms, obtained the results of the majority of respondents have had a good perception of jobs that have the potential to H₂S exposure in activities in geothermal operations. Perceptions of each respondent were lacking in the perception paradigm of Known to Expose of Risk, Newness, Chronic-catastropic, and Common-dread.

Most respondents behave safely in the face of the danger of H₂S gas exposure in activities that have the potential to cause H₂S gas exposure in the workplace (well maintenance, confined space, routine inspections around the well pad and Power Generation Facility (PGF)), as well as maintenance of production and injection wells.

The existence of good perception and knowledge can influence a person to decide the attitude of resisting danger. With the support of a good ability to avoid danger, the person will eventually be able to perform safe behavior. There are several reasons why this at risk behavior is still found in work at geothermal operations. In addition, the involvement of all workers in the implementation of Right To Stop (RTS) to stop dangerous actions observed through the Behavior Based Safety program must also be improved. One of the things that needs to be emphasized is more effective supervision when carrying out high-risk work.

It is found that most respondents had a good perception of the dangers of H₂S gas exposure. Perception can be formed because of the influence of experience, beliefs, facilities and socio-culture. From work period of the respondents, they had worked at the company for at least 5 years. So that during this period, the respondents had gained sufficient experience and knowledge regarding the risk of H₂S gas exposure. These experiences and knowledge were obtained from several sources including the communication culture of the reported incident/nearmiss / observation report. Most
respondents have good knowledge about the dangers of \( \text{H}_2\text{S} \) gas exposure. Knowledge is obtained through the learning process. Knowledge can be obtained through various trainings that have been followed.

The majority of respondents who have poor knowledge will take at risk behaviors compared to respondents who have good knowledge and have less behavior. There is no significant relationship between knowledge and behavior. In the high knowledge category, more respondents who were categorized as low unsafe behavior, and in the low knowledge category, there were more high unsafe behavior. That is, a high level of knowledge does not guarantee that someone will behave safely.

The majority of respondents who refused the danger would take a safe action. This indicate that the majority of respondents who have an attitude to accept the danger of \( \text{H}_2\text{S} \) gas exposure. This shows that most respondents have a good attitude in the face of the danger of \( \text{H}_2\text{S} \) gas exposure in the workplace. Risk perceptions are weakened if risk is chosen voluntarily, but strengthened if forced. The acceptance of this voluntary risk from the results of field observations is because the company has positively demonstrated its commitment in \( \text{H}_2\text{S} \) control efforts, from the beginning the company operated.

Most respondents showed good ability to avoid the danger of \( \text{H}_2\text{S} \) gas exposure based on the results of this study. They also have good ability to avoid the danger of \( \text{H}_2\text{S} \) gas exposure and have expertise in carrying out the activities needed. Training that is appropriate for the work will also support the ability of workers.

There was a small percentage of respondents still lacking ability to avoid the danger of \( \text{H}_2\text{S} \) gas exposure based on this study. Some respondents have the ability to avoid \( \text{H}_2\text{S} \) gas exposure is that there is a phobia of certain conditions. In addition, it is necessary to keep a safety briefing in the form of communicating JSA (Job Safety Analysis) which involves supervisors and workers before carrying out activities that have the potential to be exposed to \( \text{H}_2\text{S} \) gas, so that workers are confident in controlling hazards when the work is done.

The Multivariate analysis found the variables that have the most influence are attitude variables on \( \text{H}_2\text{S} \) gas exposure. Geothermal workers who have the attitude of resisting danger are more likely to do good behavior in preventing at risk behaviors after being controlled by perception variables. These prove that even though the company has implemented safety procedures well, workers’ attitudes and perceptions are important variables that must always be maintained, so that at risk behaviors related to \( \text{H}_2\text{S} \) gas exposure in geothermal operations can be minimized and even eliminated. The workers consider the risk of \( \text{H}_2\text{S} \) gas exposure to be a risk of having a low severity. One of the things that needs to be improved is to build awareness of the risks due to exposure to \( \text{H}_2\text{S} \) gas.

**Conclusion**

The company has made efforts to control occupational safety and health and environmental protection, by applying the IGOMS. Risk control for exposure to \( \text{H}_2\text{S} \) gas is one part of Managing Safe Work Process, as one of the processes contained in IGOMS.

The majority of respondents have had a good perception of jobs that have the potential to \( \text{H}_2\text{S} \) exposure in activities in geothermal operations. Most respondents have a good perception, knowledge, attitude and ability to avoid risks about the dangers of \( \text{H}_2\text{S} \) gas exposure. There is a significant relationship between perceptions and attitudes about the dangers of \( \text{H}_2\text{S} \) gas exposure and at risk behaviors which also means the acceptance of this research hypothesis. The results of the Multivariate Analysis showed, of all the variables studied in this study, attitude variables were the variables that most affected the at risk behaviors of exposure to \( \text{H}_2\text{S} \) gas in geothermal operations.

**Ethical Clearance:** Ethical Clearance is taken from ethics committee in Faculty of Public Health, Universitas Indonesia

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**Conflict of Interest:** The authors declare that there is no conflict of interest.

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Safety Critical Element Methodology in an Oil and Gas Company

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Abstract
Barrier systems are used to protect humans and assets from hazards. These barrier systems may be classified as either active or passive barrier systems, and as physical, technical or human/operational barrier systems. Safety Critical Elements (SCE) are part of these barrier systems to protect against major hazardous events such as fire, explosions, collisions, etc. SCEs prevent, control, mitigate and facilitate safe evacuation from the identified major hazards. However, there is no clear methodology to define which systems or equipment are SCE and what to do after SCEs are declared.

This study aimed to develop a specific methodology for implementing SCEs in an oil and gas company. The methodology involved risk assessment, major hazard scenario development, SCE identification, establishing a performance standard, developing maintenance, inspection and testing plans, implementing assurance activities and, finally, issuing a key performance indicator.

The results of this methodology can provide guidance for defining SCE systems and equipment and what to do after these SCE systems are established.

Keywords: Barrier system, Safety Critical element, Major accident

Introduction
The petroleum industry is facing risk from major accidents, i.e., accidents with major consequences, that can cause multiple fatalities and/or massive oil spills (1). Many concepts, programs and assessments have been developed to reduce risk to personnel, assets and the environment from these hazards. Safety Critical elements (SCEs) were specifically developed to protect against major hazards. SCEs form barriers to protect personnel, the environment and assets from a major hazardous event. SCEs prevent, control, mitigate and facilitate safe evacuation from the identified hazards. SCEs are defined as those parts of an installation or an operational organization whose failure could cause or contribute substantially to a major accident (2). These barrier systems may be classified as either active or passive barrier systems and as physical, technical or human/operational barrier systems (3). Because SCEs play an essential role in assurance activities (maintenance, inspection and testing), SCEs must be in place to continuously demonstrate that they remain fit for their purpose during an installation’s entire life.

To implement SCEs for a vast inventory of assets and activities, management efforts should focus on the installation elements that are the most critical to safety, with the objective of minimizing the risk of a major accident hazard (MAH). These critical elements should be designated as SCEs.

Systems and equipment that are designated as SCEs should be treated differently than other systems and equipment. The critical nature of SCEs means that their maintenance must be the highest priority, ranked above that of any other system or equipment. SCEs’ performance must meet required standards, and SCEs should be monitored using dedicated indicators. These processes should be implemented in any company that designates SCEs.
This study focused on SCE methodology. After defining SCEs, a step-by-step implementation process is discussed. There is little research that specifically discusses the methodology of SCEs. Most research has focused on barrier management systems; SCEs are part of these systems, such as the PETROMAKS Innovation project found in SINTEX report A 26845. Gasco company is a leading oil and gas producer in the UAE that has published a methodology for SCE implementation, but this is the only paper that discusses SCE methodology.

**Method**

The proposed methodology was developed as a guideline to implement SCEs. This research involved a literature review and an observational process. As stated above, there are few sources specifically related to SCEs, as most studies discuss barrier management, of which is SCEs are part.

Gasco company has published an example method in the Society of Petroleum Engineers (SPE) journal. In this method, the identification of SCEs is not integrated into the guidelines. The equipment or systems that are defined as SCE have been previously defined$^{[9]}$. DNV proposed that risk assessment is part of SCE implementation$^{[9]}$, since this step covers hazard identification, risk analysis and risk evaluation.

The implementation of SCEs should start with identifying hazards that have major consequences. These major hazards are identified and their risks are assessed through risk assessment and major risk register. These steps are mandatory and are a main reason why SCEs are needed.

**Risk Assessment, Major Scenario Development, SCE Identification**

Risk assessment is intended to identify, establish and describe barrier functions and to specify the properties of an individual barrier’s elements$^{[6]}$. In this paper, risk assessment specifically refers to risks that are generated by flammable, toxic and/or explosive substances. These risks concern personnel, the public, the environment and the integrity of the installation.

Gasco company implements risk assessment to identify major hazards; appropriate measures are developed separately and are not included in the SCE methodology. DNV proposed that identifying SCEs should be done via risk assessment. This step is important, since identified major hazards have serious consequences and specific SCEs against these hazards should be established.

Below is a list of scenarios (Typical) for Major Accident Hazards in offshore and onshore platforms. This list is taken from output studies such as Hazard identification (Hazid), Major Accident Hazard Register, dropped object study, ship collision study, etc.

- Platform Impairment
- Dropped Objects
- Fire & Explosions
- Generic failure: corrosion, vibrations, erosion, mechanical failure, weld defects
- Human Error
- Liquid carryover due to control valve failure
- Overpressure
- Pollution
- Segregation of drain system
- Ship collision
- Vent blockage

**Establishment of performance standards**

A performance standard is a statement that can be expressed in qualitative or quantitative terms, as appropriate, of the performance required of a safety critical element in order to ensure the safety and integrity of the installation$^{[9]}$. Once the key safety equipment or systems have been identified as SCEs, it is necessary to define the functions required to perform and confirm whether the actual equipment and systems can consistently and continuously perform these functions. That process is defined in the performance standard.

According to the Health and Safety executive report (safety case, 2005), safety critical elements should be verified through a suitable scheme. This scheme should be dependable and effective when required and perform as intended$^{[7]}$. DNV strongly proposed that performance standards should be established for safety critical elements$^{[6]}$. 
SCE Assurance Means

SCE assurance activities must be designed to continuously demonstrate that SCEs remain fit for their intended purposes during their entire service life. This process will confirm that the SCE requirements are being met and that the results are recorded and assessed. SCE procedures should be continuously improved as part of a Plan-Do-Check-Act (PDCA) process.

SCE Key Performance Indicator

Key Performance Indicators (KPIs) are used to monitor SCEs’ integrity. The measured results should be tracked against a performance indicator target. Tolerability levels for the degree of acceptability performance against those indicators should also be set. An Action Plan is needed in case there are any issues that may affect SCEs’ integrity.

It is recommended that facilities determine which barriers are most critical for managing major incident risk then select suitable leading and lagging KPIs for each critical barrier

Results

The proposed methodology for SCEs is illustrated below.

Safety Critical Element Methodology:

Risk Assessment → Major Scenario Development → SCE Identification → Performance Standard → Maintenance, Inspection & Testing Plan → Assurance Activities → Integrity KPI

Risk assessment and Major Scenario Development Process:

Hazard Identification → Major Scenario Development → Preliminary Risk Assessment → Detailed Risk Analysis → Risk Evaluation → Risk Register

Performance Standard Assurance Process, SCE Assurance, SCE Key Performance Indicator:

Define SCE Functional Requirement → Define SCE Design Assurance → Define SCE Operational Verification → SCE Measuring Point → Maintenance Plan → Operational Integrity Assurance & Verification → Develop Integrity Reporting → Execute SCE action plans

Discussion

Risk assessment, SCE Identification & Major Hazard scenario Development Process

First, risk assessment is used to identify any risk that is associated with major hazards. A major hazard is defined as any hazard that generates a consequence level of 4 to 5 to people, the environment and assets. The risk is then ranked using a risk matrix. The risk matrix may differ from one company to another. In this case, the risk matrix was a 5x5 table.

Preliminary risk assessment is for conservatively establishing a scenario to be studied in detailed risk analysis. Two methods are commonly used for preliminary risk assessment: simplified method and rigorous method. Detailed risk analysis reconfirms the risk associated with the major scenarios identified in the preliminary risk assessment. The main tasks of this step are to quantify the frequency of events and hazards outcomes, estimate probabilistic damage and present the scenario risk results of the risk matrix.

Risk evaluation is implemented to assist the decision-making process based on the results of risk analysis. This step involves comparing the level of risk with the acceptance criteria. A risk register, or Major risk register (specified for risks related to major hazards), should be created. This register contains a summary of the results of the risk assessment for all identified major risks, as well as a list of all existing risk reduction measures related to major risk.
Table 1. Typical Risk Matrix 5x5

<table>
<thead>
<tr>
<th>Level</th>
<th>CONSEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td></td>
<td>10 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td></td>
<td>15 Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td></td>
<td>20 Level 1 Risk (First Priority)</td>
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<tr>
<td></td>
<td>25 Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td>4</td>
<td>4 Level 3 Risk (Acceptable)</td>
</tr>
<tr>
<td></td>
<td>8 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td></td>
<td>12 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td></td>
<td>16 Level 1 Risk (First Priority)</td>
</tr>
<tr>
<td></td>
<td>20 Level 1 Risk (First Priority)</td>
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<tr>
<td>3</td>
<td>3 Level 3 Risk (Acceptable)</td>
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<tr>
<td></td>
<td>6 Level 3 Risk (Acceptable)</td>
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<tr>
<td></td>
<td>9 Level 2 Risk (Tolerable if ALARP)</td>
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<tr>
<td></td>
<td>12 Level 2 Risk (Tolerable if ALARP)</td>
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<td></td>
<td>15 Level 1 Risk (First Priority)</td>
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<tr>
<td>2</td>
<td>2 Level 3 Risk (Acceptable)</td>
</tr>
<tr>
<td></td>
<td>4 Level 3 Risk (Acceptable)</td>
</tr>
<tr>
<td></td>
<td>6 Level 3 Risk (Acceptable)</td>
</tr>
<tr>
<td></td>
<td>8 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td></td>
<td>10 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
<tr>
<td>1</td>
<td>1 Level 3 Risk (Acceptable)</td>
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<tr>
<td></td>
<td>2 Level 3 Risk (Acceptable)</td>
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<td></td>
<td>3 Level 3 Risk (Acceptable)</td>
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<tr>
<td></td>
<td>4 Level 3 Risk (Acceptable)</td>
</tr>
<tr>
<td></td>
<td>5 Level 2 Risk (Tolerable if ALARP)</td>
</tr>
</tbody>
</table>

Performance Standard Establishment and Assurance

Performance standards are key technical requirements to be met by SCEs to ensure they effectively operate on demand, perform as expected and can survive incidents. Performance standards include all the controls that are needed to verify SCEs’ integrity, as well as the minimum performance that should be maintained for each control point through operational and verification activities.

The three criteria of functionality, availability and survivability should cover these main activities:

1. Functionality: To define SCEs’ main functions based on related documents, such as internal documents or any related standards

2. Availability: To ensure the availability of SCEs by maintaining their reliability, which includes managing equipment obsolescence, defining a spare parts’ policy and expediting the procurement process

3. Survivability: To review integrity and design in order to keep SCE’s functions during an emergency

SCE Assurance activities, Maintenance/Inspection & Testing Plan

There are two ways to perform assurance activities: **assurance design and assurance operation**. Equipment should be checked against the initial design; this can be done through external standards, company standards, codes, etc.

After checking the design, the assurance operation should be done. Operational verification consists of compiling the means of assurance operations for all SCE controls (Functionality, Availability and Survivability). This should be performed during daily normal operations and maintenance/inspection. Operational verification consists of onsite and offsite verification. **On-site**
**verification** activities include visual checks, function tests, performance tests and preventive maintenance. **Off-site verification** activities include reviewing related reports (e.g., maintenance reports and inspection reports), work scheduling, stock material availability and data sheets.

**SCE Key Performance Indicators**

The indicators that can be used to monitor SCEs’ performance include:

- Failure of SCE during tests
- SCE Maintenance Backlog
- SCE Inspection Backlog

Below are the equipment or systems identified as SCEs in the oil and gas industry. They are divided into 4 groups: prevention elements, control elements, mitigation elements and evacuation elements. These main functions are used as barriers against major accident hazards as mentioned in METHODS.

1. **Prevention Elements**
   - Collision avoidance system: Navigational aids, Fog Horn
   - Structural Integrity: Jacket
   - Process Containment Integrity: Pressure Vessel & Large Storage Tank, Pipework, Exchangers
   - Pipelines and riser integrity: Pipeline & risers
   - Relief systems: Relief valves/PSV
   - HVAC Systems: HVAC systems and fire dampers
   - Ignition Prevention Systems: Flame Arrestors
   - Crane and lifting equipment: Powered Cranes
   - Corrosion Prevention and monitoring: Corrosion monitoring, corrosion inhibitor

2. **Control Elements**
   - Flammable Gas Detection: Fixed point Gas Detectors, Fixed acoustic leak detectors, Smoke Detectors
   - Fire Detection: Flame Detectors, Fusible loops
   - Fire and gas control system
   - Emergency isolation: ESD system, ESD valves
   - Riser/pipeline ESDV’s
   - Reservoir isolation & containment: Well control facilities, Down hole safety valves
   - Emergency depressurization: Blowdown valves
   - Fire pumps
   - Firewater systems: Diesel day tanks, Deluge system, Firewater monitors, Hydrants
   - Portable/trolley mounted extinguishers: Hose Reels, Portable fire extinguishers

3. **Mitigation Elements**
   - Fire pumps
   - Fire detection: Flame Detectors, Fusible loops
   - Fire and gas control system
   - Emergency isolation: ESD system, ESD valves
   - Riser/pipeline ESDV’s
   - Reservoir isolation & containment: Well control facilities, Down hole safety valves
   - Emergency depressurization: Blowdown valves
   - Fire pumps
   - Firewater systems: Diesel day tanks, Deluge system, Firewater monitors, Hydrants
   - Portable/trolley mounted extinguishers: Hose Reels, Portable fire extinguishers

4. **Evacuation Elements**
   - Fire pumps
   - Fire detection: Flame Detectors, Fusible loops
   - Fire and gas control system
   - Emergency isolation: ESD system, ESD valves
   - Riser/pipeline ESDV’s
   - Reservoir isolation & containment: Well control facilities, Down hole safety valves
   - Emergency depressurization: Blowdown valves
   - Fire pumps
   - Firewater systems: Diesel day tanks, Deluge system, Firewater monitors, Hydrants
   - Portable/trolley mounted extinguishers: Hose Reels, Portable fire extinguishers

**Conclusions**

The present study was aimed at developing a methodology to implement safety critical elements (SCEs), specifically in an oil and gas company. This study involved risk assessment, major development scenario, SCE identification, establishment of performance standards, maintenance, an inspection and testing plan, assurance activities, and a report in the form of a Key performance indicator (KPI).

Applying this method can lead to clear definitions for all equipment/systems defined as SCEs and help ensure these SCEs remain fit during the whole life of an installation.

**Acknowledgment:** The authors would like to acknowledge the help of Mila Tejamaya and Zulkifli
Djunaidi from the University of Indonesia while preparing this paper. We also acknowledge personnel from PT X for their valuable advice in developing this model.

The authors certify that they have no affiliations with or involvement in any organization or entities with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Conflict of Interest: The authors declare that there is no conflict of interests.

Source of Funding: This study is self-funded.

Ethical Clearance: The authors declare there is no need of ethical clearance in this study

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Safety Leadership Analysis in Construction Contractor Company (Study At Pt X In 2018)

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Occupational Health and Safety Department, Faculty of Public Health, Universitas Indonesia, Depok, West Java, Indonesia

Abstract
The construction industry has a high risk of occupational injury. Throughout August 2017 to February 2018, there had been thirteen construction accidents with three cases of fatality accidents in toll road and rail road projects in Indonesia. Safety Leadership is one of the important components in improving Safety, Health and Environment (SHE) performance. This study examines Safety Leadership Model at the lead position in the project and the operations department of the infrastructure project at PT X as a Construction Contractor Company. This study was a descriptive research with quantitative method based on two main variables of Safety Leadership, those are Leadership Style and Best Practice. Research data obtained from questionnaires, interviews, and observations at PT X’s project location in April - May 2018. This research obtained that Safety Leadership was still weak except The General Manager. This was due to lacks of understanding of SHE policies, communication, consistency and commitment to the implementation of SHE, proactive and initiative action when facing SHE issues. This suggests that company should improve by preparing and implementing Safety Leadership training program for all manager levels as well as maintaining the monitoring of SHE program implementation in the workplace.

Keywords: Safety Leadership; Transformational Leadership; Best Practices

Introduction
Construction industries recorded the most occupational accidents, including injuries and death in all sectors¹. Throughout August 2017 to February 2018, there were thirteen construction accidents including three fatality accident cases of toll road and railway infrastructure projects in Indonesia². Those three accidents causes were man behavior, unsafe workplace and poor management supervision including leadership³. There is relationships between leadership behavior, safety communication and safety performance in construction industry⁴. Safety leadership implementation had proven that safety leadership boosted safety effectiveness in organization. Safety leadership reducing accidents rate whereas promoting safety for all employee and managers and should be applied in all organization levels to ensure a solid commitment for safety.

Method
This study was descriptive research using qualitative method. Primary data was collected by questionnaire which includes Leadership Style (Transformational Leadership) and Best Practice, interview and observation about SHE implementation using unsafe act and condition form. Secondary data was collected was gathered by literature review, such as company records and department’s related documents.

This study was held in Kelapa Gading-Velodrome LRT Project located in Kelapa Gading, Jakarta Utara and Cengkareng-Batu Ceper-Kunciran Toll Road Project located in Tangerang, Banten. The subjects population are General Manager, 2nd Operation Division Manager in 1st General Civil Department and Managers in Project Areas, they are Project Manager, Construction Manager, and Employees of Implementation Unit in Kelapa Gading-Velodrome LRT Project and Cengkareng-Batu

DOI Number: 10.37506/v10/i12/2019/ijphrd/192405
Ceper-Kunciran Toll Road Project. Population had to meet two inclusion criteria, those are: had been have employment status under Kelapa Gading-Velodrome LRT Project and Cengkareng-Batu Ceper-Kunciran Toll Road Project managements and had been worked for a year at least.

Research’s sample was chosen by purposive sampling method. Samples are General Manager, 1st General Civil Department Division Manager, and managers in project area, all Project Managers, Construction Manager, Implementation Unit in Kelapa Gading-Velodrome LRT Project and Cengkareng-Batu Ceper-Kunciran Toll Road Project and Site Officers.

Results

The respondents are 48 men distributed by ages, 52% are 34 years olds or younger and 48% over 34 years olds. Classified by their position, there are 68% worked as Site Officers, 8% as Site Officer Chief, 12% as Construction Managers, 2% as Division Manager and 2% as General Manager. Moreover, grouped by length of working, 20% had been working under five years, 60% about 5-10 years and 20% over 10 years.

The components were studied in Leadership Style are influencing, inspiring, challenging, and engaging. The components were studied in Best Practice dimensions consist of vision, credibility, collaboration, communication, recognition and feedback, accountability and action oriented.

Table 1 Distribution of Safety Leadership based on Their Own Perspectives

<table>
<thead>
<tr>
<th>Safety Leadership</th>
<th>Position</th>
<th>Site Officer Chief</th>
<th>Construction Manager</th>
<th>Project Manager</th>
<th>Division Manager</th>
<th>General Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transformational Leadership</td>
<td>Less dominant</td>
<td>2 (66,7%)</td>
<td>3 (50%)</td>
<td>3 (75%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>1. Transformational Leadership</td>
<td>Dominant</td>
<td>1 (33,3%)</td>
<td>3 (50%)</td>
<td>1 (25%)</td>
<td>1 (100%)</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>2. Best Practices</td>
<td>Less dominant</td>
<td>2 (66,7%)</td>
<td>3 (50%)</td>
<td>1 (25%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2. Best Practices</td>
<td>Dominant</td>
<td>1 (33,3%)</td>
<td>3 (50%)</td>
<td>3 (75%)</td>
<td>1 (100%)</td>
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</tbody>
</table>

The Site Officer Chief and Project Manager had less dominant Transformational Leadership, while Construction Manager represents equal percentage between dominant and less dominant. Division Manager and General Manager in Dominant category. Best Practices variable shows different result, only Site Officer Supervisor got less dominant assessment. Construction Manager represents equal percentage between dominant and less dominant and most of Project Manager, Division Manager and General Manager acquired Dominant category.
Table 2: Distribution of Leadership Style and Best Practices components based on Their Own Perspective

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Position</th>
<th>Site Officer Chief</th>
<th>Construction Manager</th>
<th>Project Manager</th>
<th>Division Manager</th>
<th>General Manager</th>
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<td>1.</td>
<td>Influencing</td>
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<tr>
<td></td>
<td>Less dominant</td>
<td>2 (66.7%)</td>
<td>2 (33.3%)</td>
<td>3 (75%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
<td>4 (66.7%)</td>
<td>1 (25%)</td>
<td>1 (100%)</td>
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<td>2.</td>
<td>Inspiring</td>
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<td></td>
<td>Less dominant</td>
<td>2 (66.7%)</td>
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<td>3 (75%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
<td>3 (50%)</td>
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<td>3.</td>
<td>Challenging</td>
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<td>Less dominant</td>
<td>1 (33.3%)</td>
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<td>3 (75%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>2 (66.7%)</td>
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<td>4.</td>
<td>Engaging</td>
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<td></td>
<td>Less dominant</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>2 (66.7%)</td>
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<td></td>
<td>Vision</td>
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<td></td>
<td>Less dominant</td>
<td>3 (100%)</td>
<td>2 (33.3%)</td>
<td>1 (25%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>0 (0%)</td>
<td>4 (66.7%)</td>
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<td>Credibility</td>
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<td>Less dominant</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
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<td>3 (75%)</td>
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<td>Collaboration</td>
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<td>Less dominant</td>
<td>2 (66.7%)</td>
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<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
<td>4 (66.7%)</td>
<td>1 (25%)</td>
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<td>Communication</td>
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<td></td>
<td>Less dominant</td>
<td>1 (33.3%)</td>
<td>4 (66.7%)</td>
<td>2 (50%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>2 (66.7%)</td>
<td>2 (33.3%)</td>
<td>2 (50%)</td>
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<td></td>
<td>Recognition and Feedback</td>
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<td></td>
<td>Less dominant</td>
<td>2 (66.7%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
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<td>1 (25%)</td>
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<td>Accountability</td>
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<tr>
<td></td>
<td>Less dominant</td>
<td>2 (66.7%)</td>
<td>2 (33.3%)</td>
<td>1 (25%)</td>
<td>0 (0%)</td>
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<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
<td>4 (66.7%)</td>
<td>3 (75%)</td>
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<td>Action Oriented</td>
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<tr>
<td></td>
<td>Less dominant</td>
<td>2 (66.7%)</td>
<td>4 (66.7%)</td>
<td>1 (25%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dominant</td>
<td>1 (33.3%)</td>
<td>2 (33.3%)</td>
<td>3 (75%)</td>
<td>1 (100%)</td>
<td>1 (100%)</td>
<td></td>
</tr>
</tbody>
</table>
Most of Site Officer Chief and Project Manager had less dominant criteria in influencing component and most of Construction Manager, Division Manager and General Manager included in Dominant criteria. About inspiring component, Site Officer Chief and Project Manager got less dominant criteria, the result for Construction Manager is equal between Dominant and less dominant. Division Manager and General Manager included in Dominant criteria.

Majority of Construction Manager, Project Manager and Division Manager were still low. Otherwise, Site Officer Chief and General Manager classified as Dominant. Likewise engaging components, Site Officer Chief, Construction Manager, Division Manager and General Manager were Dominant and most of Project Manager was still less dominant. Construction Manager earned equal percentage between dominant and less dominant.

In Vision component, all of Site Officer Chief got less dominant rank. In Credibility component, most of Site Officer Chief were in less dominant grade. Construction Manager represented equal percentage between dominant and less dominant. Most of Project Manager, Division Manager and General Manager had been dominant. Most of Site Officer Chief and Project Manager got less dominant in Collaboration. The majority of Construction Manager, Division Manager and General Manager were classified as dominant.

In Communication component showed that most of Construction Manager were in less dominant rank. But, Project Manager had equal percentage of the dominant and less dominant one. Site Officer Chief, Division Manager and General Manager included in dominant.

Most of Site Officer Chief and Project Manager earn less dominant rating for Recognition and Feedback component. Construction Manager represented equal percentage between dominant and less dominant. Division Manager and General Manager had been dominant at this point.

In accountability, most of Site Officer Chief classified as less dominant and most of Construction Manager, Project Manager, Division Manager and General Manager had seen to be dominant.

Most of Site Officer Chief and Construction Manager were less dominant in Action Oriented and most of Project Manager, Division Manager and General Manager who gained Dominant.

### Table 3 Distribution of Safety Leadership based on Subordinate’s or Work Team’s Perspective

<table>
<thead>
<tr>
<th>Safety Leadership</th>
<th>Position</th>
<th>Site Officer Chief</th>
<th>Construction Manager</th>
<th>Project Manager</th>
<th>Division Manager</th>
<th>General Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transformational Leadership</td>
<td>Less dominant</td>
<td>18 (54,5%)</td>
<td>2 (66,7%)</td>
<td>2 (33,3%)</td>
<td>3 (75%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Dominant</td>
<td>15 (45,5%)</td>
<td>1 (33,3%)</td>
<td>4 (66,7%)</td>
<td>1 (25%)</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>2. Best Practices</td>
<td>Less dominant</td>
<td>17 (51,5%)</td>
<td>2 (66,7%)</td>
<td>2 (33,3%)</td>
<td>2 (50%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Dominant</td>
<td>16 (48,5%)</td>
<td>1 (33,3%)</td>
<td>4 (66,7%)</td>
<td>2 (50%)</td>
<td>1 (100%)</td>
</tr>
</tbody>
</table>

Site Officer Chief, Construction Manager and Division Manager was assessed as less dominant in Transformational Leadership by most of their subordinate perspective. Project Manager and General Manager had been dominant according to their subordinate or work team.

Site Officer Chief and Construction Manager was assumed that they had less dominant capacity in Best Practices variable. While Division Manager had equal percentage of the dominant and less dominant classification. Project Manager and General Manager gained dominant based on their subordinate perspective.
Discussion

Site Officer Supervisors were less dominant in influencing and inspiring aspects, but dominant in challenging and engaging; Construction Managers were less dominant in influencing and challenging, but dominant in influencing and engaging; Project Managers were less dominant in all aspects of Safety Leadership, such as influencing, inspiring, challenging, and engaging. Division Manager was dominant in influencing, inspiring, and engaging, while General Manager was dominant in all aspects.

Leadership Style in the position of leader of infrastructure project in PT X still had no significant effect in SHE implementation. Safety Patrol report and observation conducted on the field, showed the inadequate performance. Each position in infrastructure project of PT X had different dominant aspect related to Leadership Style in workplace. Inspiring is become suggested factor to be improved by the leaders in the infrastructure projects because most of respondents were less dominant in this aspects.

There was a variable which should be improved, that was influencing. This aspects is important because the leaders should influence their subordinate and work team to implement SHE in every work process well. Site Officer Chief should have influencing aspect as the leader of the Site Officers. Project Manager as a supreme leader in a project organization, have to be a role model for all team. There will be optimum engagement and compliance of SHE towards good SHE behavior in workplace.

Challenging aspect of Construction Manager and Project Manager should be improved. Division Manager could be declared as senior manager, so as he should encourage his subordinates to implement SHE in workplace. Engaging aspect of Construction Manager and Project Manager should be developed.

Best Practices of Site Officer Chief, Construction Manager and Project Manager were less dominant. Site Officer Chief were only dominant in Communication aspects. Construction Managers were less dominant in Credibility, Communication, Recognition and Feedback, and Action Oriented aspects, but dominant in vision, collaboration, and accountability. Manager Projects were less dominant in collaboration, communication, recognition & feedback, while they were dominant in best practices components. In other hand, Division Manager and General Manager represented dominant in all variable of Best Practices.

Refer to career path regulation in PT X, employee should be positioned in middle manager and first line manager before become senior manager. For example, Site Officer Chief will be prepared to be Construction Manager, likewise Construction Manager will be projected as Project Manager. Project Manager who had passed through training and development program, would be proposed as Division Manager Candidate, and he could be General Manager in the future.

Weak of Vision of Site Officer Chief was because they had not understand a whole of SHE regulation yet. They did not only communicate to workers rarely also ignore SHE directions when pursued by production deadline and target. One of PT X’s effort to improve worker’s credibility was providing company procedure about emergency, incidence, occupational accident and activities negligence reporting to management. There is inconsistency of Site Officer Chief and Construction Manager SHE performance on the field, especially while there was a forced production demand.

Collaboration by Project Manager and Site Officer Chief were less dominant. Project Manager tried to promote and implicate SHE in every work process. Site Officer Chief as first line manager, were less dominant in collaboration aspect actually. It was known that Site Officer Chief infrequently let in team members in resolve SHE issues. Site Officer Chief assigned team according to head’s instruction directly without any discussion. Communication became the less dominant one of Best Practices dimension on Project Manager and Construction Manager. It was found that they seldom communicated directly with team. Their heavy mobility caused them to be rarely on the field.

There should be improvement about recognition and feedback for Site Officer Chief, Construction Manager and Project Manager. The weak of recognition and feedback was happened because leaders in project assumed that there was no clear punishment mechanism. Reward and performance assessment were limited as reward in weekly safety morning talk. There was no SHE performance indicator for each position. Some respondents stated that SHE performance compliance is a common act. This was not motivated workers to proactive in SHE implementation.
Accountability of General Manager, Division Manager, Project Manager and Construction Manager were dominant because of Top Management’s regulation to obligate SHE Patrol for corporate until project level. Site Officer Chiefs ought to participate in this program but they rarely attend SHE Patrol. Stop Work Action (SWA) regulation by President Director actually could be stimulation to improve Action Oriented. The chairman ensure SWA initiator could not be punished although affect to work completion postponed.

The Site Officer Chief and Construction Manager had not been satisfied most of Safety Leadership aspects yet based on their own perspective and their subordinates perspectives. Differences in self assessment and subordinates assessments in Leadership Style and Best Practices dimension of Site Officer Chief, Construction Manager, Project Manager, and Division Manager indicated over estimate and underestimate of Safety Leadership in themselves. This was because there was no Safety Leadership socialization for all leader and manager levels in project and department.

**Conclusion**

Safety Leadership Model of Site Officer Chief, Construction Manager and Project Manager had been less dominant both in terms Leadership Style and Best Practices. Division Manager had been dominant in almost Safety Leadership aspects, but there were some criteria should be noticed, especially in Leadership Style components. While General Manager had been dominant in all Safety Leadership aspects. Weak Leadership Style and Best Practices caused by lack of comprehension about SHE regulation, communication between leaders and related department, consistency and commitment in SHE implementation including reward and punishmet, and proactive and initiative act while facing SHE problems.

**Suggestions**

This study suggests PT X to develop a cooperation between SHE Department and Human Capital Department. It will be needed for arrangement of Safety Leadership Training and Modul for middle managers and first line managers which contains Leadership Style and Best Practices. The cooperation should be performed for identification and SHE competency analysis in all unit and position. The company should stimulate collaboration between SHE Department and System Development Department to review and create SHE system to support Safety Leadership implementation in workplace.

SHE Department should carry out SHE Sharing which involves production unit, projects and department related, maintain SHE monitoring consistency such as safety patrol and safety meeting by leaders and their team, especially in projects area, and strengthen reward and punishment starting from the project to corporate level.

**Ethical Clearance:** Ethical Clearance is taken from ethics committee in Faculty of Public Health.

**Acknowledgement:** The authors want to thank PITTA Grants of Universitas Indonesia for funding this research.

**Conflict of Interest:** The authors declare that there is no conflict of interest

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9. Lekka C, Healey N. A Review of the literature on
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Influence of Scapular Stabilization Exercises on Asymptomatic Forward Head Posture; A Randomized Controlled Trial

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¹Physiotherapy Specialist, El-Sheik Zayed Al-Nahyan Hospital, Cairo, Egypt, ²Department of Physical Therapy for Basic Sciences, Faculty of Physical Therapy, Cairo University, Egypt

Abstract

Objective: The aim of this study was to investigate the influence of scapular stabilization exercises (SSE) on correcting asymptomatic forward head posture (FHP). Methodology: Forty participants aged from 20-30 years with mean (28.72±1.70 years) from both genders were included (21 female-19 male) randomly divided. Study group (A) received SSE and postural correctional exercises (PCE) while control group (B) received PCE only three sessions per week for ten weeks. Cranio-vertebral angle (CVA), and Root mean square (RMS) of muscle activity (EMG) of serratus anterior muscle were measured pre and post-treatment.

Results: Statistical analysis in form of MANOVA showed significant changes within-group at study group (A) in each of CVA, and muscle amplitude of serratus anterior both sides pre and post treatment with (P value =0.000). Also, a significant change within-group at control group (B) with (P value =0.000). The in between-group analysis showed no significant change in pre-value of all variables as (P=0.716, 0.291, 0.217) respectively, post-treatment showed a significant change in CVA as (P=0.000) and muscle activity for serratus anterior muscle showed a significant change of right side as (P= 0.004) while left side showed no significant change (P=0.112) but percent of improvement in study group (A) (R 83.6% , L 54.3%) higher than control group (B) (R 40.5 % , L 29 % ) respectively. Conclusion: SSE is considered as an effective method in correcting FHP in asymptomatic FHP subjects.

Key Words: Scapular stabilization exercises, Forward head posture

Introduction

Forward head posture (FHP) is known as anterior shifting of the cervical spine which occurs with lower neck bone flexion and extension of the upper neck bone and the head¹. Incidence of FHP is about (66%) in healthy subjects between the ages of 20-50 years ². But children and adolescents have shown a high epidemiological prevalence of spine postural deviations ³. Assuming forward posture for long periods, increase the load on neck posterior structures such as ligaments, joints, and muscles, moreover it changes scapular position and movement ⁴.

Serratus anterior and upper trapezius muscles are known as the primary scapular stabilizers. Suitable coupled motions of these two muscles are regarded vital for appropriate scapular movements⁵. Input of Serratus anterior in FHP subjects is lower than healthy ones and the input of upper trapezius in FHP subjects is higher than healthy ones. Therefore, it is very important to restore normal function of these two muscles in order to correct head posture ⁶.

Previous researches have shown that FHP cause shortening of the posterior cervical extensors, weakness of the anterior cervical flexors, and affects position and motion of the scapula ⁷. It is associated with weakness of mid scapular retractor (i.e., Rhomboids, Middle and Lower fibers of trapezius) and shortening of Pectoralis muscles ⁸. SSE correcting position, restoring kinematics of the scapula capable of placing cage of the thorax at the normal central position, restore normal alignment of the neck and correct its awkward posture⁹.

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Furthermore, there is a gap in randomized studies investigating the influence of adding scapular stabilization exercises to postural correctional (PCE) on correcting asymptomatic FHP. Therefore, this study was conducted to fulfill it.

**Materials and Method**

This research was performed at the EMG laboratory at the Faculty of Physical Therapy, Cairo University and training protocols were conducted in El-Sheik Zayed Al-Nahyan hospital. The study was conducted during the period of one year from October 2017 to September 2018. The protocol was accepted by Research Ethics Committee of Faculty of Physical Therapy (NO: P.T. REC/012/001628) and registered at Pan African Clinical Trial Registry. ([Registry ID PACTR 201703002094205](https://www.pactr.org/registries/PACTR/10.11485/pactr.201703002094205)).

**Sample size calculation**

It was determined a priori using G*Power (version 3.1.6). Calculation was based on F test, the type I error rate was set at 5% (alpha-level 0.05), and the effect size 0.30 of the main outcome variable obtained from a previous similar study was at 85% power. Considering a 15% drop out rate, the appropriate minimum sample size for this study was 32 subjects. So optimum sample size is 40 subjects with taking percent of drop out in consideration.

**Subjects**

Subjects were recruited from El-Sheik Zayed Al-Nahyan Hospital their ages between 20-30 years old. Sample was chosen from population and allocated randomly by rolling a dice into: Group (A): received SSE and PCE. Group (B) received PCE only. The range of ages from 20 to 30 years with average (28.72±1.70) years. The weight average was (67.05 ±9.32) kg, the height average was (169.07± 10.09) cm and the body mass index average (23.34±1.43) Kg/cm². Figure 1.

**Inclusion and exclusion criteria**

Subjects were asymptomatic FHP with CVA equal or less than 50° and shoulder flexion at least 130 degrees or more. Subjects were excluded if they had a history of cervical spine surgery or cervical spondylosis.

**Outcome measurements**

Neck alignment assessed by measuring Craniovertebral angle (CVA) by photographing (Canon power shot A490, 3.3 optical zoom, 10 mega pixels, China) and activity of serratus anterior muscle was assessed by measuring the root mean square (RMS) by electromyography (Neuro-EMG-Micro, Neurosoft, Ivanovo, Russia).

1. **CVA:**

FHP can be objectively measured by taking lateral photographing, which is a valid and reliable tool. It is the angle between a line passing horizontally by C7 and a line passing from the tragus of the ear till C7. Fix adhesive markers on the tragus and the spinous processes of the C7.

2. **Muscle activity (RMS):**

A two-channel digital electromyogram device was used to assess amplitude of serratus anterior muscle by determining root mean square (RMS). Maximum voluntary isometric contraction (MVIC) was measured.
for three times. Recording electrodes (one active and one reference) were positioned with 2-3 cm between them, and the ground electrode was wrapped around the wrist joints. Shaving was done with alcohol cleaning before the attachment of the electrodes for reduction of skin impedance.

Serratus anterior: the shoulder abducted to 90° and the electrodes were placed vertically along the mid-axillary line at rib levels 6 through 8.

The impedance was checked after the positioning of the electrode to confirm that it was at an acceptable level (<2 kΩ).

Testing protocol:

i. Normalization of resting bioelectric activity

The subject was in a seated position and was asked to perform static contraction of shoulder abduction with the arm at 125° shoulder flexion and neutral shoulder rotation. Resistance was applied manually proximal to the elbow joint. Contraction was maintained for 7 seconds and repeated three times with 30 seconds of rest in between.

ii. Root mean square calculation

Normalized RMS % = EMG amplitude during resting/(average of EMG MAX for the 3 trials) ×100.

Training procedure:

1. SSE:

It is five stages: In supine position, the participant was instructed to relax. In crock-lying position, shoulder flexion to 90° and scapula protraction. In quadruped position, he alternatively lifted up his arms while abducting and flexing it to 125°. In sitting position, a pair of dumbbells (2 kg) was held and lifted them up. Each stage was held for 10 seconds before returning to the starting position and three laps of 10 repetitions. In sitting position, he was instructed to correct his posture in front of a mirror.

2) Postural corrective exercises (PCE):

Strengthening (deep cervical flexors and scapular retractors). And stretching (sub-occipital and pectoral muscles) were performed. Based on a Harman program.

Statistical Analysis

Shapiro- wilk was used to assess the normality of data. All variables were normally distribute (P > 0.05) so parametric test was used (SPSS version 23) (IBM Corp, New York, United States). Mixed MANOVA was used to detect the difference within each group and in between groups. Alpha level (0.05).

Characteristics of subjects:

Data was tested by ANOVA as in table 1.

Results

Table 1: characteristics of subjects; age, weight, height and BMI

<table>
<thead>
<tr>
<th></th>
<th>Group “A”</th>
<th>Group “B”</th>
<th>F-value</th>
<th>P-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Age) years</td>
<td>28.80±1.70</td>
<td>28.65±1.75</td>
<td>0.075</td>
<td>0.78</td>
<td>NS</td>
</tr>
<tr>
<td>(Weight) Kg</td>
<td>65.75±8.85</td>
<td>68.35±9.82</td>
<td>0.773</td>
<td>0.38</td>
<td>NS</td>
</tr>
<tr>
<td>(Height) Cm</td>
<td>167.0±11.16</td>
<td>171.15±8.68</td>
<td>1.72</td>
<td>0.19</td>
<td>NS</td>
</tr>
<tr>
<td>BMI</td>
<td>23.50±1.38</td>
<td>23.18±1.50</td>
<td>0.49</td>
<td>0.48</td>
<td>NS</td>
</tr>
</tbody>
</table>

Sig: Significance, NS: Not significant, SD: Standard deviation, P-value: probability value
Table 2: Results of Cranio-vertebral angle

<table>
<thead>
<tr>
<th></th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>Comparison</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X ± SD</td>
<td>X ± SD</td>
<td>F-value</td>
<td>P-value</td>
</tr>
<tr>
<td>Within Group A</td>
<td>39.17±4.66</td>
<td>52.68±4.37</td>
<td>0.000*</td>
<td>S</td>
</tr>
<tr>
<td>Group B</td>
<td>38.72±2.90</td>
<td>46.14±2.79</td>
<td>0.000*</td>
<td>S</td>
</tr>
<tr>
<td>Between Pre (axb)</td>
<td></td>
<td></td>
<td>0.134</td>
<td>0.716</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31.73</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Table 3. Results of Serratus Anterior muscle activity (RMS)

<table>
<thead>
<tr>
<th></th>
<th>Right Serratus Anterior</th>
<th>Left Serratus Anterior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre X ± SD</td>
<td>Post X ± SD</td>
</tr>
<tr>
<td></td>
<td>F-value</td>
<td>P-value</td>
</tr>
<tr>
<td>Group A</td>
<td>14.15±3.5</td>
<td>25.89±4.8</td>
</tr>
<tr>
<td>Group B</td>
<td>15.87±3.4</td>
<td>21.8±4.6</td>
</tr>
<tr>
<td>In-between Pre (axb)</td>
<td></td>
<td></td>
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</table>

Discussion

This study was designed to investigate the influence of ten weeks SSE on correcting FHP in asymptomatic subjects through measuring CVA and normalized resting myoelectric activity of serratus anterior muscles. The consequences of the present study showed improvement in the study group for all measured variables in comparison with the study one.

SSE is considered a viable strategy to enhance awkward posture in FHP subjects. Therefore, according to the data analysis in the current study, the results of study group revealed that there was a significant improvement in the values of CVA 34.48% and RMS Serratus anterior (R 83.6% and L 54.3%). As an explanation for this change caused by diminishing the compensatory movement on the muscles that caused by awkward posture by increasing lower trapezius and serratus anterior muscles activities and enhancing the muscles around the neck by scapular stabilization. Moreover, as increment of the lower trapezius muscle activity takes place, a scapular tilt occurs and upper rotation angle diminished through alignment of the scapula. So, the hypothesis cited that SSE together with postural correctional exercises produced insignificant change on FHP in asymptomatic participants was rejected.

Our study results come in agreement with Park who stated that, as actuation of serratus anterior muscle becomes higher, it diminishes upper trapezius muscle actuation and it plays a vital role in scapular rotation and neck straightening. Also, in agreement with our study, Yoon and Lee have stated that SSE have a positive...
impact on CVA, and muscle actuation through correcting muscle imbalances caused by upper crossed syndromes.

In the current study, the significant difference between study and control group post treatment in CVA in favor of study group was attributed to stretch of viscous and plastic elements of the soft tissue which deformed by shortening in anterior and lengthening in the posterior aspect.24

Appropriate contraction and recruitment patterns of muscles require coupling of the serratus anterior muscle with the upper, middle, and lower trapezius muscles, thus resulting in “force couples,” which are regarded as vital for normal scapular orientation and refinement of cervical ROM.7

According to our study, Wegner et al.25 have stated that SSE responsible for positive changes observed in 38 patients with neck problems since of innovation abuse, especially computer usage.

In accordance to our study, Wegner et al.25 have stated that SSE responsible for positive changes observed in 38 patients with neck problems since of innovation abuse, especially computer usage.

According to our data analysis, the results of control group revealed that there was also a significant improvement but less than study group in the values of CVA 19.14% and RMS Serratus anterior (R 40.5% and L 29 %).

This improvement could be attributed to factors such as task familiarity or increased postural awareness,26 or due to direct activation of the deep cervical flexor musculature27 which have a relatively high density of muscle spindles28. Improved cervical kinesthetic senses.29

Therefore, SSE can be regarded as a successful strategy to restore normal posture in FHP subjects through correcting neck and scapula problems.30

The limitations of this study are that we cannot control for the subject’s daily lives. And that the restricted age range of our subject was (20–30 years) affects generalizability. The strengths are: Participants were assigned randomly to both groups. Also, interventions were provided by the same experienced physiotherapist.

**Conclusion**

SSE is considered as an effective method in correcting FHP in asymptomatic subjects.

**Conflict of Interest:** The authors declare that no conflicts of interest.

**Funding:** No funding sources

**Ethical Clearance:** Cleared by the ethical committee of El-Sheik Zayed Al-Nahyan Hospital, Cairo, Egypt

**References**


The Association between the Relative Visceral to Subcutaneous Abdominal Fat Distribution and the Presence of Coronary Artery Atherosclerosis

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Abstract

Introduction: Distribution of abdominal fat is more detrimental in the pathogenesis of coronary artery atherosclerosis (CAA) than its amount. Purpose: To detect the value of the amount of visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT), and their distribution by abdominal computed tomography in the detection of CAA as assessed by multi-slice computed tomography coronary angiography (MSCT-CA). Methods: The abdominal muscular wall was traced manually to calculate SAT and VAT areas (cm²) (outside and inside abdominal muscular wall respectively) at L4-L5 in 63 consecutive patients with no risk factors for coronary artery disease (CAD) referred for evaluation of chest pain by MSCT-CA. Results: 40% of the studied patients (n=25) had CAA (Group 1), while the remaining 60% (n=38) had no CAA (Group 2). There was no statistically significant difference between both groups as regards weight, body mass index (BMI), waist circumference (WC), waist-to hip ratio (W/H ratio), VAT area, SAT area, and total fat area. Group 1 patients were predominantly males (53% vs 24%; p=0.023), with statistically significantly increased VAT/SAT area ratio (0.40 ± 0.23 vs 0.29 ± 0.16; p=0.028), and increased age (55.7 ± 7.9 vs 44.0 ± 11.1; p<0.001) as compared to Group 2 patients. Conclusion: VAT/SAT area ratio can be used in the detection of CAA in patients with no CAD risk factors.

Key words: visceral adipose tissue, subcutaneous adipose tissue, multi-slice computed tomography coronary angiography.

Introduction

Obesity is a global epidemic, and it is considered an important cardiometabolic risk factor. The adipose tissue releases into the blood various adipokines responsible for cardiovascular homeostasis. Although, body mass index (BMI) and waist circumference (WC) have been commonly used to assess adiposity, however these anthropometric measures give an incomplete measure of visceral abdominal fat accumulation. This is because BMI does not distinguish fat-free mass from fat mass and can be misleadingly high in a lean, muscular athlete. WC, on the other hand, does not distinguish between the subcutaneous adipose tissue (SAT) and visceral adipose tissue (VAT) compartments. The latter could be differentiated from the former by the use of computed tomography (CT) or magnetic resonance imaging (MRI).

VAT was found to be associated with cardiometabolic risk, more than SAT, and it has been suggested that SAT may even have protective properties. Therefore Kaess et al hypothesized VAT/SAT ratio as a new parameter that can correlate with cardiometabolic risk, which was truly found to predict metabolic risk, even better than BMI and VAT.

Full volumetric analysis of abdominal fat can be substituted with single-slice analysis; with measurements near L4 level having the strongest correlation to volumetric measurements.

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We hypothesized that VAT/SAT area ratio at L4 would most accurately correlate with the presence of coronary artery atherosclerosis (CAD) in patients with no other risk factors for CAA.

**Patients and Method**

Between December 2015 and May 2017, we studied 63 consecutive patients presenting with chest pain, who were referred for evaluation of their symptoms by multi-slice computed tomography coronary angiography (MSCT-CA). Patients with intermediate pretest probability for coronary artery disease (CAD); based on age, gender and type of chest pain, and having no prior coronary intervention were included in our study. Excluded from our study were patients having diabetes, hypertension, dyslipidemia, smokers, or those with positive family history for CAD.

The study was approved by our hospital’s ethical committee, and a written informed consent was obtained from all patients.

**Risk factor assessment:**

All enrolled patients were subjected to full history taking and clinical examination at the time of MSCT-CA including demographic data such as age and gender, presenting symptoms and medical history.

**Basic anthropometric measures of obesity**

BMI was calculated after knowing the weight (in kilograms) and height (in meters) of the patient, using the formula: weight in kg/ height squared in meters. Waist and hip circumferences (HC) were measured using a measuring tape according to the WHO 2008 international guidelines [9]. Then, waist to hip ratio (W/H ratio) was calculated (WC divided by HC). WC was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. The HC was measured at the widest portion of the buttocks. Subjects were standing with arms at the sides, feet positioned close together, and weight evenly distributed across the feet, while these measurements were taken. The measurements were also taken at the end of a normal expiration, when the lungs are at their functional residual capacity. Each measurement was repeated twice; if the measurements were within 1 cm of one another, the average was calculated. If the difference between the two measurements exceeded 1 cm, the two measurements were repeated.

**Abdominal CT scan:**

Abdominal CT scan was performed in the spinal position at the 4th to 5th lumbar levels in late expiration for measurement of visceral and subcutaneous adipose tissue areas with attenuation ranging from -190 to -30 HU 10. The abdominal cut where the aorta starts to bifurcate into two common iliac arteries was chosen for the evaluation of VAT; which is fat inside abdominal muscular wall, and SAT; defined as fat under skin, but outside muscular wall.

**MSCT-CA:**

MSCT-CA was performed using a 256-slice iCT Philips scanner with a gantry rotation time of 275 ms. To avoid motion artifacts, patients with a resting heart rate (HR) ≥ 60 beats/ min were orally administered 50 mg of atenolol at 60 min before the CT scan. Intravenous contrast followed by 50 ml of saline at a rate of 5 ml/s was power-injected into the ante-cubital vein. Ascending aorta contrast-triggered (160 HU), ECG-gated helical scanning was then performed in a single breath hold. Scanning parameters included heart-rate dependent pitch (0.18), 120 kVp-tube-voltage depending on patient’s BMI, and 650 mA reference tube current. The acquired MSCT-CA data was reconstructed in mid-diastole and at end-systole using 0.6 mm slice thickness, 0.3 mm slice increment, 250 mm field-of-view, and 512 × 512 matrix. If reconstruction from standard phases of the cardiac cycle resulted in un-interpretable segments, additional phases were reconstructed and analyzed. MSCT-CA study quality was graded on a five-point scale ranging from un-interpretable to excellent. Only studies graded as being good (some minor artifact but all coronary segments evaluable) and excellent (no artifact present, all coronary segments evaluable) were included in the study.

Plaque assessment on MSCT-CA was performed by two blinded and independent readers using axial images, oblique multi-planar reformations, and oblique maximum intensity projections. Coronary artery atherosclerosis was defined as the presence of any plaque; with a plaque being any discernible structure that could be assigned to the coronary artery wall, and identified in at least 2 independent planes 11.

**Statistical Analysis**

Data were revised, coded and entered to the statistical package for social science (SPSS) version
Qualitative data were presented as numbers and percentages, while quantitative data as means and standard deviations. Two groups of quantitative data with normal distribution were compared using the Independent t-test. Independent predictors of CAA were assessed using logistic regression analysis. The confidence interval and the margin of error were set to 95% and 5% respectively.

Results

A total of 63 patients (34 males and 29 females) with no risk factors for CAD were assessed over a 17 month period. The mean age of the studied group was 48.6 ± 11.5 years. Obesity measurements of the studied group is described in table 1.

CAA was present in 25 patients (39.7%); while the remaining 38 patients (60.3%) had no CAA. Patients with CAA were older (55.7 ± 7.9 vs 44.0 ± 11.1 years; p value < 0.001), and most predominantly of male gender (53% vs 24%; p value = 0.023). VAT/SAT area ratio was found to be the only obesity parameter statistically significantly associated with the presence of coronary artery atherosclerosis (Table 2).

Table 1. Obesity measurements of the studied group

<table>
<thead>
<tr>
<th>Obesity parameters</th>
<th>Overall (n= 63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (Kg)</td>
<td>87.3 ± 14.5</td>
</tr>
<tr>
<td>BMI (Kg/m2)</td>
<td>31.6 ± 4.6</td>
</tr>
<tr>
<td>WC (cm)</td>
<td>96.3 ± 18.3</td>
</tr>
<tr>
<td>W/H Ratio</td>
<td>0.95 ± 0.07</td>
</tr>
<tr>
<td>VAT Area (cm²)</td>
<td>107.9 ± 63.6</td>
</tr>
<tr>
<td>SAT Area (cm²)</td>
<td>354.6 ± 158.8</td>
</tr>
<tr>
<td>Total Fat Area (cm²)</td>
<td>462.5 ± 188.6</td>
</tr>
<tr>
<td>VAT/SAT Area Ratio</td>
<td>0.33 ± 0.19</td>
</tr>
</tbody>
</table>

BMI: body mass index; WC: waist circumference; W/H ratio: waist-to-hip ratio; VAT: visceral adipose tissue; SAT: subcutaneous adipose tissue.

Discussion

In our study, which was conducted on 63 patients with no CAD risk factors, we found that age, male gender and VAT/SAT area ratio were associated with the presence of CAA.

The association between increasing VAT area and the presence of CAA was close to; but did not reach statistical significance. However, VAT/SAT area ratio was statistically significantly associated with the presence of CAA. This is in concordance with the study done by Bouchi et al, which revealed that patients with type 2 diabetes having the highest VAT areas, and the lowest SAT areas tended to have carotid atherosclerosis when compared to other groups with lower VAT and greater SAT areas. Similarly, another study showed that VAT area was associated with an atherogenic
profile and the development of atherosclerosis, while SAT area had no association with atherosclerosis\textsuperscript{13}. This might be explained by the fact that visceral and subcutaneous adipose tissues are metabolically different, with a stronger correlation between VAT and disturbed glucose metabolism, which could in turn predispose to atherosclerosis\textsuperscript{13}.

The second finding in our study was that age was associated with the presence of CAA. This is in concordance with the literature, as age induces physiological changes in the vascular wall predisposing to atherosclerosis\textsuperscript{14}.

Our final finding was that those having CAA were predominantly males. This may be because CAA develops 7-10 years earlier in males than females, which can be explained by the protective effect of estrogen in premenopausal females against CAD\textsuperscript{15}.

Limitations:

This study had a cross-sectional design, which makes it difficult to determine causal or temporal relationships, because associations are not prospective. All patients were exposed to the extra radiation of abdominal CT. However, CT images were limited to one transverse cut, with minimization of extra radiation. Though, MRI may provide a better resolution of fat depots, with no risk of radiation, however MRI is limited by its expense and the amount of time needed to perform the scan.

Conclusion

VAT/SAT area ratio can be used as an early independent predictor of coronary artery atherosclerosis before risk factor development.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of KasrAlainy Hospital.

No Conflict of Interest

References


Clinical Assessment of Surgical Outcome of Supratentorial Deeply Seated Gliomas in an Egyptian Tertiary Hospital

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Abstract

Background: Gliomas is a broad category of brain tumor which accounting 33% and comes from Glial cells. Glial cells are the tissue that surrounds and supports neurons.

Method: This is a controlled randomized study. Patients having gliomas in supratentorial areas were evaluated pre-operatively both clinically and radiologically. Operative procedures included tumor biopsy, subtotal resection, near total resection and gross total resection. Postoperatively, patients were evaluated and followed up for about 1 year for their neurological outcome.

Results: Out of the 50 patients who were included in this study; thirty eight patients (76%) had excellent outcomes, five patients (10%) had good outcomes, seven patients (14%) had fair outcomes, and no patient (0%) had poor outcome.

Conclusion: management of gliomas in supratentorial areas still represents a challenge that requires a complex multi-factorial equation in order to achieve an accepted surgical outcome while maintaining proper functional neurological integrity, preoperative neuroimaging, including CT, MRI and a neuronavigation protocol, may be able to maximize the extent of resection and preserve long-term neurological function than using the traditional way of surgery.

Keywords: Supratentorial, Gliomas, Neuronavigation, Neurological Deficits, Outcome

Introduction

It is generally accepted that complete or nearly complete surgical removal of a glioma is beneficial for a patient. The challenge is to remove as much tumor as possible, without injuring brain tissue important to the patient’s neurological function. Traditionally, we open the skull through a craniotomy to insure we can access the tumor and remove as much of it as possible. Image-guided stereotaxy can also be used to deliver different modalities of treatment. Hybrid techniques, in which image based stereotactic localization is used to guide microsurgical resection, are becoming increasingly important in reducing neurologic morbidity and patient length of stay.

Method

1) Patients

In this study, we clinically evaluated 50 patients with brain gliomas. All patients were operated in the Neurosurgery Department of Cairo University Hospitals, Cairo, Egypt along a time interval of one year. We followed very strict criteria in selecting our candidates from the patients who were suffering deeply seated gliomas. Inclusion criteria included any age group, any sex and all supratentorial lesions while exclusion
criteria included any infratentorial tumors, any recurrent supratentorial or residual supratentorial tumors.

II) Data Collection

All candidates provided the necessary data fulfilling our study protocol and were investigated clinically prior surgical interventions then were maintained on a scheduled post-operative follow up visits.

a) History Taking:

Age, gender, occupation, time of initial complaint till the time of presentation, history of any type of tumors the patient suffered from, history of comorbidities e.g. D.M and smoking.

b) Clinical Examination:

All patients were clinically evaluated and examined with special care to the following signs and symptoms: motor deficit, sensory deficit, sphincteric deficit or upper motor neuron (UMN) manifestations.

c) Radiological Investigations:

1) CT of the brain: with and without contrast

2) Brain MRI: (T1W, T2W, and T1W with contrast).

d) Management:

Pre-operative Management

All patients were given the following:

• Antiepileptics: loading and maintenance doses

• Steroids

Patients with lower limb weakness were closely monitored for proper hydration and were given prophylactic dose of short acting anticoagulants.

Operative Management

Skin incisions and craniotomies were fashioned according to the exact anatomical location of the lesions, determined by the pre-operative CT scan & MRI images. Neuronavigation was used in all patients, which were done after patients were anaesthetized and proper head fixation using three-pin Mayfield device after anesthetic scalp nerve block.

Postoperative Management

Patients were given Antibiotics, maintenance dose of phenytoin and tapering doses of steroids. All patients were subjected to a complete postoperative assessment and examination.

Follow up and Outcome

All patients were followed up at intervals of 1 month, 3 month, 6 months and 1 year whenever possible as some patients didn’t show at their scheduled follow up dates. Follow up included detailed neurological examination to evaluate the neurological deficits that the patients already had, and to detect any new neurological deficits the

Patients developed during the follow up period.

Follow up also included radiological evaluation by CT and/or MRI brain with IV contrast to detect tumor recurrence.

By the Karnofsky scoring scale (KPS):

The Karnofsky performance score (KPS) quickly became a standardized tool for expressing such outcome and was adapted for brain tumor treatment studies.(1)

Results

Age:

The median age of presentation in this study was 45.5 years with the youngest patient 4 years old and the oldest 73 years old. The mean age was 42.56 ± 19.6 years.

Presenting Symptoms

The most common presenting symptom was headache in 88%, followed by weakness in one side of the body in 44%, followed by disturbances of consciousness level in 26%, then visual disturbances in 12% followed by seizures in 10%, then speech problems in 6%, followed by frontal manifestations in 2%, followed by increased ICT in 2%.

Radiological Analysis

Regarding hemispheric distribution, thirty one patients had left-sided lesions (62%) and 18 patients had right-sided lesions (36%) and only one patient had midline lesion in the pineal gland (2%). The most commonly involved lobe was the frontal lobe, followed by the temporal lobe, followed by the parietal lobe, followed by the occipital lobe, followed by the thalamus.
**Diameter of the tumor:**

The maximum axial diameter was measured in all axial MRI images T1WI with contrast.

**Surgical Management**

Out of the 50 patients included in this study, regarding the extent of tumor excision, thirty eight had Gross total resection (76%), Seven patients had near total resection (14%), and three patients had Subtotal resection (6%) and two patients had biopsy done(4%).

**Postoperative Complications**

1. Regarding wound infection, three patients (6%) had superficial wound infection, in two patients this superficial wound infection resolved with IV antibiotics and repeated wound dressing for five days. One patient his condition progressed to deep wound infection with the need for surgical debridement.

2. Regarding motor power; four patients (8%) developed motor weakness involving the upper limb in two patients and the lower limb in the other two patients contra-lateral to the tumor in all the patients.

Out of these four patients three originally presented with motor power weakness, three patients (6%) had further deterioration of motor power; This motor power deterioration was transient in one patient (2%) that improved to the pre-operative motor status in one month under physiotherapy, while it became permanent in the other two patients (4%), only one patient (2%) presented preoperatively with full motor power and experienced motor power deterioration.

3. Regarding speech, two patients (4%) had new onset dysphasia, this new onset dysphasia was expressive dysphasia, appeared immediately postoperative& it was transient in these two patients (100%).

4. Regarding seizures, Out of the 5 patients (10%) that originally presented with seizures all patients were operated upon, all of them were controlled on Phenytoin, but another two patients (4%) had post-operative seizure despite adequate dosage and serum therapeutic level of Phenytoin and another antiepileptic drug had to be added.

The 5 patients who suffered from seizures preoperatively had shown marked improvement regarding the frequency and severity of the attacks without any change in their pre-operative anti-epileptic drugs.

Of the 50 patients of our study there were two patients (4%) who were suffering from dysphasia, one of them improved and the other one became aphasic.

There was only one patient (2%) who was suffering from aphasia which improved post operatively.

Three patients (6%) were not suffering at all from speaking difficulties, developed aphasia postoperatively, which was permanent.

One patient (2%) died postoperatively from pulmonary embolism.

**Follow Up:**

During the follow up period, no wound infection was detected, and the patients who had superficial wound infection showed proper healing at follow up, one month after discharge.

Out of the five patients who presented with seizures and operated the seizures were controlled in all of them (100%) in one month postoperative by Phenytoin, while the other two patients, who developed seizures postoperative, required the addition of another antiepileptic medication.

Out of the two patients (4%) who had dysphasia, one patient (2%) recovered to normal within one month postoperative and the other one (2%) deteriorated to total aphasia.

While the patient (2%) who originally presented with aphasia which improved to dysphasia in one month postoperative.

**Outcome:**

Out of the 50 cases which were included in this study we found that according to KPS assessment preoperative and postoperative:

About 37 patients (74 %) regardless of the nature of the tumor had improvements in their KPS postoperatively, About 8 patients (16%) had the same KPS postoperative and finally 5 patients had deteriorations in their KPS postoperative.
Plate 1: A Distribution of symptoms B. Anatomic distribution.

C. Postoperative complication D. Comorbidities present in our study group.

E. Comparison between pre and post KPS F. Comparison between pre and post KPS

IV) case study

Case 1:

58 years old female patient presented with confusion. Then she started to complain from right sided weakness. Imaging showing left parieto-occipital mass of heterogeneous density and patchy areas of enhancement after Gadolinium injection. We achieved Gross total resection and the patient was full motor power after operation.

Plate 2: Case1 A: Preoperative axial flair MRI images.
B: Showing preoperative Coronal T1WI with and without contrast, Sagittal T2WI and T1WI with contrast C: Post-operative axial CT brain without contrast

Case 2:

39 years old female patient presented to us with headache, two weeks prior to admission she suffered from a seizure attack which was controlled on Phenytoin. Imaging showed right temporal space occupying well circumscribed lesion, with ring enhancement after Gadolinium injection. We achieved Gross total resection and the patient was full motor power after operation.

Plate 3: Case 2 A: Preoperative MRI showing Axial cuts T1WI with an without contrast, (b) Preoperative MRI showing Sagittal T2WI, Sagittal T1WI with contrast, (c) Preoperative MRI showing Coronal T2WI,Coronal T1WI with contrast and (d) Preoperative MRI showing Axial T2WI and axial flair images.
Management of Gliomas in Supratentorial region still represents a major conflict and challenge in neurosurgery, as surgical resection of such brain tumors poses significant risks of postoperative neurological impairment.

How to maximally resect the supratentorial lesions without causing neurological deficit is not a simple issue, and most of literature studies in gliomas stated that survival rate is improved mainly by the total tumor resection. Surgical resection of such intra-axial brain tumors in the supratentorial region still poses significant risks of postoperative neurological impairment.

The goals of management in our study especially concerning the goals of surgery were to maintain an adequate quality of life and functional integrity for our patients.

In Willems P. et al study, they were able to achieve GTR in five patients in the standard surgery group and three patients in the neuronavigation assisted group. Unlike our study in which we were able to achieve GTR in 38 patients out of 50. Four patients out of these 38 patients survived only for less than one year and 34 patients were able to survive for more than one year. 7 patients were operated by NTR and 3 patients out of them survived for less than one year. 3 patients were operated by STR who survived for less than one year while the last 2 patients were operated by biopsy and survived for more than 1 year.

In Richard T. et al study, they have mortality rate of 21.7% in their study. They concluded that patient neurological condition was generally improved in the immediate postoperative period after extensive resection, and it was generally worse after partial resection or biopsy. Length of postoperative survival and the quality of survival were much better following extensive resection than following partial resection; these results were similar to our results.

In Sanai N. et al study, they concluded that for newly diagnosed GBM patients, aggressive resection of tumor equates to improvement in overall survival even at the highest levels of resection. These results were consistent with our results regarding the more extensive the resection was, the better the overall survival rate of the patients.

In McGrit MJ. Et al study, They were able to achieve GTR in 38%, NTR in 23% and STR in 39%, they concluded that GTR was associated with delay in tumor progression and malignant degeneration as well as improving overall survival independent of age, degree of disability, histological subtype. So GTR should be attempted when not limited by eloquent cortex.

Unlike our study in which we operated upon not only low grade gliomas, we were able to achieve GTR in 76%, NTR in 14%, STR in 6% and Biopsy in 4% of cases, but similarly we had same conclusion regarding GTR.

In Ius T. et al study, their cases were suffering from newly developed postoperative deficits in 43.7%. They concluded that the extent of resection is the strongest predictor in improving overall survival and delaying tumor progression. Also the use of intraoperative mapping and the overlap of functional data on the neuronavigation system, major resection is possible with acceptable risks and a significant increase in expected overall survival.

These results go along with our study as GTR was associated with better overall survival rates.

In Tanaka S. et al study, Their patients suffered from new persistent neurological deficits in 6.7% and postoperative hemorrhage in 5.7%. They concluded that there are certain factors affecting survival: young age, single lesion, resection, and adjuvant treatment.

In our results, we operated upon 50 cases, with median KPS of 80, only 2 patients in our study were operated upon by biopsy. These patients suffered from worsened Neurological condition in 8%, the pathology of cases included were not only GBM. The same conclusion was resection of as much as safe of the tumor the better the outcome and survival. But our study did not include age as a predictor that affects outcome.

In Bertrand C. et al study, all patients were suffering from high grade gliomas, they concluded that factors most strongly correlated with survival time: Tumor grade, age, seizures as a first symptom, KPS less than 70 and extent of resection. In our study, Male: female patient was 1.4:1, mean age 42.5 years.
Conclusion

The followings are the main conclusion that can be derived from this work:

• Despite the evolution achieved in neurosurgery in the last decade; regarding radiodiagnostic imaging techniques, management of gliomas in supratentorial areas especially eloquent cortical areas still represents a challenge that requires proper solving and adjustment of a complex multi-factorial equation in order to achieve an accepted surgical outcome while preserving proper functional neurological integrity.

• The preoperative clinical and neurological integrity greatly influence the postoperative condition and the KPS of the patient, so that the earlier the intervention done, the better the prognosis we get.

• We tried to use the very variables that had been used in the previous studies and we concluded that each variable apart from the preoperative KPS, had no direct influence on the clinical and neurological outcome, they might affect the survival and also they might collectively affect the outcome but not separately.

• The usage of the new techniques such as neuronavigation whenever possible increase the ability of better tumor localization and more radical resection with better outcome.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of Department of Neurosurgery, Faculty of Medicine, Cairo University

Conflict of Interest: No

References

Molecular and Bacteriological Method for Identification of Lactose Fermenting Salmonella in Mosul Province

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Abstract

The genus Salmonella consists of more than 2570 antigenic types. Salmonella Paratyphi A, B, C and Salmonella typhi are known to be non-lactose fermenters and the cause of typhoid fever.

The present study aimed to implement molecular (polymerase chain reaction PCR) and routine bacteriological methods to identify 5 Salmonella isolates; 3 clinical and 2 foodborne isolates (obtained from poultry) in Mosul city. Primary biochemical reactions indicated a tentative identification of the bacteria as Salmonella spp. All isolates were identified using selective media (MacConkey, Salmonella-Shigella and XLD agar) in addition to gram stain, and the biochemical tests (Oxidase, Indole, Urease, Citrate utilization, and Triple Sugar Iron agar reaction).

Identification was confirmed using molecular genome with PCR. DNA was extracted directly from each sample and amplified using Salmonella- specific primers.

We hereby report an unusual case of two unusual lactose fermenting strains of Salmonella, one clinical and the others from a poultry sampling. Lactose fermenting Salmonellae cultured on MacConkey agar appeared as pink colonies following a 24 hrs. incubation period at 37 °C. Prolonged incubation (i.e. 48 hrs.) resulted in the appearance of transparent colonies. There were no former reports, as far as we know on such lac+ Salmonella strains in Mosul city.

Isolation of lactose fermenting Salmonellae is critically vital because it could be overlooked or misdiagnosed. Therefore, there is a need of awareness of such unusual Salmonellae that may be misidentified as other members of Enterobacteriaceae (Escherichia coli).

Identification of Salmonellae by Molecular PCR has proved to be a more convenient method that could be completed within 24-36 hrs. as compared to 3-8 days by routine bacteriologic methods.

Key words: Lac +ve, Salmonellae, PCR identification, bacteriological methods.

Introduction

Salmonella spp. is a pathogen responsible for severe foodborne infections and is considered as the second most isolated foodborne pathogens that cause gastroenteritis infections in human after Campylobacter (1-2). There were 94,625 salmonellosis cases in 2015 and 126 deaths in EU [3].

Salmonella genus is a group of foodborne bacteria belonging to the family Enterobacteriaceae The Centers for Disease Control and Prevention (CDC) in UK estimates 1.4 million illnesses each year with 1.3 million cases food-borne infection [4]. Most of these cases can be due to contaminated food and drinking water [5-6].
The genus is prevalent worldwide and is capable of enduring difficult conditions as it is able to survive several weeks in dry environment and several months in water. Today more than 2,570 serotypes have been reported. All serotypes may cause diseases in humans and can be fatal in the elderly immunocompromised and young patients. The World Health Organization (WHO) classifies the genus into two species, *Salmonella enterica* and *Salmonella bongori*. *S. enterica*, can be further classified into six subspecies.[7]

Salmonella often causes serious infections that demand a suitable and effective antibiotic therapy. Among the main source of food-borne outbreaks in humans are contaminated poultry products. Generally, Salmonella are more widespread in poultry and poultry products. The major dissemination paths of salmonellae are trade in animal food products, inadequate cooking of animal food products, and the slaughtering process of meat products. Fish bacteriological safety is another critical and important issue since fish, which is a vital food item in the international trade exported to several countries, may act as a route for Salmonella transmission[8].

Conventional culture methods are usually the “gold standard” for the isolation and identification of pathogenic bacteria. This classical method is known to be sensitive and economical. However; it is laborious and time-consuming. Also, environmental factors, variations in gene expression of microorganisms can occur and may alter the results of biochemical tests.

Salmonellae are normally characterized by being lactose non-fermenters which differentiates them from other species of Enterobacteriaceae.

The general idea that lac+ Salmonella are rare may be true; although these strains result in health problem when an endemic occurs. Lactose-positive (lac+) Salmonella have been known since 1905 [9]. Various reports on the existence of lactose fermenting Salmonella have been recorded worldwide; Brazil [10], United States [11], Sulaimaniya [12], Pakistan [13], and Egypt [14]. Ewing [15] reported that lac+ Salmonella comprised less than 1% of all Salmonella examined at the Center for Disease Control and prevention (CDC). However, the actual incidence may be higher because most laboratories use only enteric plating media which contain lactose and lac+ Salmonella are indistinguishable from *Escherichia coli* on these media. Lac+ colonies would not be picked for further study. Another challenge is that Lac+ strains showed higher degree of antibiotic resistance than lactose-negative Salmonella [14]. Therefore, there is an urge to establish rapid detection and identification methods for these bacteria. Currently molecular identification is applied because of its high specificity, precision, and less time consuming [16].

**Materials and Method**

**Bacterial isolates:** Five isolates suspected to belong to the genus Salmonella were employed in the present work. Three clinical and two isolates from poultry samples.

**Media:**

**Selective media:** The following selective and differential media were used:

*Salmonella-Shigella* (LabM), Hektoen Enteric Agar (oxoid), MacConkey Agar (LabM), Xylose Lysine Deoxycholate agar (LabM).

**Biochemical Tests:**

Primary culture was made directly on MacConkey agar and Salmonella Shigella (SS) agar, Hektoen Enteric Agar and XLD agar, incubated aerobically at 37°C. After 24 hours incubation, the isolated lactose and non-lactose fermenting colonies were inoculated on Triple Sugar Iron agar (TSI) and identified by colonial morphology, gram staining and biochemical testing, (catalase test, oxidase test, indole, methyl red, Voges-Proskauer, citrate and urea tests. Colonies with TSI result of K/A or A/A H2S+ve and negative urease, oxidase, and indole test were chosen for further molecular identification [17-19].

**Genomic analysis:**

The extraction of Salmonella genome was performed according to the instructions by the manufacturer of the Genomic DNA purification kit (Promega) [20]. Concentration and purity of the extracted DNA was measured using the Nano drop.

Master reaction mixture was prepared for each PCR reaction by mixing DNA with the specific primer and the premix components inside a 0.2 ml eppendorf tube (supplied by Promega Company, USA). The reaction volume was brought up to 25 microliter (µl) using
distilled water.

In order to detect the presence of 16srRNA gene loci (rrn), 100 Nano gram of template DNA was added to the primer of the specific gene (supplied by alpha company) and the pre-mix components.

Forward (5’-GCAACG CGA AGA ACC TTA CC-3’)
Reverse (5’-GGT TAC CTT GTT ACG ACT T-3’)

Results and Discussion

Biochemical tests:

Inoculating a single selective medium is rarely adequate for gathering evidence or information on cultural characteristics, some of which may grow better or produce more typical colonies on one medium than on the other. In the present study, four selective media were inoculated; SS agar, XLD agar, Hektoen enteric agar and MacConkey agar. Five isolates were suspected as Salmonella spp. by conventional methods following a series of biochemical tests as shown in table (1).

Table (1): Biochemical tests of Salmonella isolates.

<table>
<thead>
<tr>
<th>Bacteriological Test Source</th>
<th>1 clinical</th>
<th>2 poultry</th>
<th>3 poultry</th>
<th>4 Clinical</th>
<th>5 clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS agar</td>
<td>Transparent colonies with black center</td>
<td>Transparent colonies</td>
<td>Transparent colonies with black center</td>
<td>Transparent colonies with black center</td>
<td>Transparent colonies with black center</td>
</tr>
<tr>
<td>MaConkey agar</td>
<td>Pink colonies</td>
<td>transparent colonies</td>
<td>Pink colonies</td>
<td>transparent colonies</td>
<td>transparent colonies</td>
</tr>
<tr>
<td>Hektoen agar</td>
<td>Black colonies</td>
<td>Growth without H2S</td>
<td>Black colonies</td>
<td>Growth without H2S</td>
<td>Growth without H2S</td>
</tr>
<tr>
<td>Indole test</td>
<td>- ve</td>
<td>- ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Methyl red test</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
</tr>
<tr>
<td>Voges proskauer test</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Citrate utilization test</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>+ve</td>
<td>-ve</td>
</tr>
<tr>
<td>TSI</td>
<td>A/A</td>
<td>K/A</td>
<td>A/A</td>
<td>K/A</td>
<td>K/A</td>
</tr>
<tr>
<td>Urease</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Gas</td>
<td>+ve</td>
<td>+ve</td>
<td>++</td>
<td>-ve</td>
<td>+</td>
</tr>
<tr>
<td>H2S</td>
<td>+++</td>
<td>-ve</td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Oxidase</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Catalase</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
<td>+ve</td>
</tr>
</tbody>
</table>

Table (1) also demonstrates biochemical characteristics of Salmonella isolates [1-3] on all selective media with or without H2S production Hydrogen sulfide production on different agars including SS, and TSI (triple sugar iron) agars is usually one of the main biochemical criteria for identification of pathogenic Salmonella strains [21]. All isolates produced black colonies and/or black precipitate on one or more media except isolate no. (2). Sakano [21] had also obtained four Salmonella non- H2S producers out of 95 poultry meat samples. Furthermore, a study by Lin [22] indicated that H2S negative Salmonella can be found in meat products in particular chicken, they are seen in all clinical serotypes and they carry virulent plasmid in a similar manner as
H₂S positive Salmonella. Their work also verified that H₂S negative Salmonella could be due to a mutation which renders the non-H₂S-producing Salmonella isolates incapable of utilizing thiosulfate to form the H₂S precipitate. Consequently, misconception is more likely to occur in laboratory and hospitals routine work.

Lac+ Salmonella isolates appeared as colorless colonies on XLD agar plates. XLD medium is used for xylose fermentation, H₂S production, and lysine decarboxylation. Salmonella utilize the sugar xylose and decarboxylate lysine which causes an increase in the pH (alkaline). However, Lac+ Salmonella produce large quantities of acids due to fermentation of lactose and sucrose. Consequently, the pH will not revert to alkaline unless incubation continues for more than 48 hours. Colony morphology on different selective media is shown in fig. (1).

(d) : XLD agar and (e): MacConkey Agar.

All isolates were Indole, and Voges proskauer (–ve). Sample (4) was citrate positive which is typical for all salmonella spp, other than S. typhi and S. paratyphi A. TSI was found to be K/A gas+ H₂S + except for isolate (1) and (3) as the results were A/A gas+ H₂S+ (resembling that of E. coli) and this is expected because of their extraordinary ability to ferment lactose and glucose and the production of excess acids.

The key biochemical test normally used to discriminate Salmonella from other Enterobacteriaceae is lactose fermentation according to Bergey’s Manual (23). Whereas; isolates reported in the current study illustrate the prevalence of lactose fermenting Salmonella in both clinical and foodborne samples. This correlates with a study by + who confirmed lactose-fermenting (Lac+) strains of several Salmonella serovars have been isolated from various foodborne outbreaks as well as different geographical regions worldwide.

Both Lac+ isolates (1) and (3) fermented lactose after 24 hours but turns transparent after 48 hours. These isolates yield a mixture of two types of colonies; dark pink lactose fermenters, and transparent non lactose fermenters both demonstrated similar biochemical tests. One isolated colony was taken and streaked out on the same medium but again it gave the same results as shown in fig. (2). These characteristics agree with the results of Latif [13] who also isolated two types of colonies on crystal MacConkey agar (Lac+ and Lac- Salmonella) from a blood culture of a patient. Latif indicated that Lac+ Salmonella carry the Lac + gene on an extra chromosomal plasmid that they might have acquired either by conjugation or transduction.
The prevalence of lactose fermenting Salmonella in humans have been documented since 1907, there have been various reports such as *S. enterica* serotype Typhimurium, *S. enterica* serotype Orangeburg, *S. enterica* serotype Typhi, and many others, Patrick [24].

Salmonella coexist with many enteric bacteria in the environment which may carry the Lac+ operon on either the plasmid or the chromosome where it may also carry determinants of antimicrobial resistance.

Leonard [25] concluded that the region responsible for lactose fermentation is readily transferable between members of Enterobacteriaceae. Acquisition of the lac+ characteristic by Salmonellae may offer environmental adaptation by these bacteria that enables them to grow in the intestine where lactose is present. Also, it has been confirmed that Lac+ Salmonella are more resistant to antibiotics than the lactose non fermenters strains which validate the significance of isolation and identification of lac+ strains of Salmonella [12].

Some isolates are now acquiring a new Lac region that has a truncated Lac A gene which enables them to use lactose without affecting their invasion ability [25].

As far as we know, lactose fermenting Salmonellae have not been reported before in Mosul city.

**Genomic analysis:**

Total genomic DNA extracted from each sample was utilized for PCR analysis. Reactions revealed that the PCR products for all isolates is identical to those of the reference Salmonella serovars. Results shown in Figure (3) revealed a single band (450 bp) similar in size to the positive control (PCR) products of reference Salmonella serovars.

Conflict of Interest: Nil

Source of Funding: Self-funded

Ethical Clearance: Research was performed according to the regulations of University of Mosul. No human or animal sources were used in the current research.
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Assessment of the role of T Helper 17 cells in the pathogenesis of Acne Vulgaris.

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Abstract

Background: Acne vulgaris, a multi-factorial disease, is considered one of the most common dermatological diseases carrying with it significant psychological disturbance. The mechanisms of inflammation occurring in acne are now a subject of intense investigation. The T-lymphocyte function is altered in AV together with the cytokines produced by T-cell subsets, hence implicated in the immunopathogenesis of AV. The role of T Helper 17 cells (Th17) in the pathogenesis of AV has not been established.

Objective: Study the level of expression of Th17 cytokine (IL-17) in tissue of patients of AV with both inflammatory and non-inflammatory lesions.

Method: 50 patients with AV as well as 30 age and sex matched healthy controls were included. Clinical examination was done and tissue levels of IL-17 were measured by ELISA.

Results: The mean tissue levels of IL-17 were significantly higher in patients than in controls (p < 0.001). A statistically significant relation was found between tissue levels of IL-17 and the type of lesion; where the mean levels of IL-17 were statistically significant in patients with both inflammatory (papules & pustules) and non-inflammatory type (comedones) of AV but was found statistically higher in inflammatory type.

Conclusion: Th17 cells potentially play a role in the pathogenesis of AV. Larger scale studies are required to verify the role of Th17 cells in inflammatory and non-inflammatory types of AV.

Key words: Acne vulgaris – T Helper 17 - Pathogenesis – Inflammatory lesions – Non-inflammatory lesions.

Introduction

Acne Vulgaris, a pilosebaceous unit disease, considered one of the commonest inflammatory diseases affecting most of the population. AV can occur due to internal or external factors like sebum overproduction, disturbed follicular keratinization, inflammation and marked colonization by the anaerobic commensal bacteria Propionibacterium acnes¹.

P. acnes has been suggested to be the main inflammatory response in AV working through innate and adaptive immune mechanisms ². T helper 17 pathway in considered a main contributor to the pathogenesis of AV through increased secretion of interleukin 17³. Although researches are continuous, but the pathogenesis of AV is still not clear.

The aim of this work is to study the levels of expression of IL-17 in tissue of AV patients, and their relation to demographic and clinical disease parameters establishing the role of T helper 17 cells in the pathogenesis of AV and hence possibly offering new targets of therapy.

Materials and Method

Study population

The present study is a case control study and was conducted at Dermatology outpatient clinic, Kasr Al Aini, Faculty of Medicine, Cairo University, after approval of the Dermatology Research Ethical Committee (Derma REC). Written informed consents were obtained from all participants. The study was conducted on 50 AV patients.
Acne patients were excluded if they were suffering from chronic inflammatory or autoimmune diseases, using topical or systemic treatment for acne such as hormonal therapy or isotretinoin 1 month before being enrolled in the study, or if they were pregnant or lactating females. Acne severity was evaluated using the Acne scoring System offered by Lehmann et al. in 2002. This scoring system assesses the acne severity through combing the type of acne lesions (papules, pustules, comedones and nodules), where mild acne is counting ≤20 comedones, or <15 inflammatory lesions or total lesion count <30, while moderate acne is from 20-100 comedones, 15-50 inflammatory lesions or total lesions count from 30-125, and for severe acne the comedonal lesions should exceed 100, total inflammatory lesions >50, >5 pseudocysts, or total lesion count >125.

Laboratory work

2mm punch biopsy was taken from lesional skin (face) of acne vulgaris (both comedonal and inflammatory) from each patient. Five milliliters of local anesthesia were injected in the biopsy site beforehand. The skin biopsy was stored in an empty test tube at -80°C for measuring the tissue level of IL-17 by ELISA technique.

Statistical Analysis

Data were statistically described in terms of mean ± standard deviation (± SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using Student t test for independent samples in comparing 2 groups when normally distributed and Mann Whitney U test for independent samples when not normally distributed. Comparison of numerical variables between more than two groups was done using Kruskal Wallis test. For comparing categorical data, Chi square (X²) test was performed. Exact test was used instead when the expected frequency is less than 5. Correlation between various variables was done using Spearman rank correlation equation. p values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) release 15 for Microsoft Windows (2006).

Results

This study was conducted on 50 patients (20 males and 30 females) with acne vulgaris and 30 normal subjects who served as controls. Twenty four patients had non-inflammatory type of AV (comedones) (48%), and twenty six patients had inflammatory type (papules & pustules) (52%). Degree of AV according to acne grading system offered by Lehmann et al. in 2002 varied from mild in fourteen patients(28%), moderate in twenty five patients (50%) and severe in eleven patients (22%). The course of the disease varied from stationary course in eleven patients (22%), progressive course in thirteen patients (28%) and recurrent disease in twenty six patients (52%). Duration of disease ranged from 1 month to 72 months with mean of 45.43 ± 55.91 months. Twenty eight patients had negative family history of AV (56%), while only twenty two patients had positive family history (44%) (table 1).

Table 1: Clinical data of patients

<table>
<thead>
<tr>
<th>Clinical variable</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of the lesion (No., %)</td>
<td></td>
</tr>
<tr>
<td>Non-inflammatory (Comedones)</td>
<td>24 (48%)</td>
</tr>
<tr>
<td>Inflammatory (Papules &amp; pustules)</td>
<td>26 (52%)</td>
</tr>
<tr>
<td>Degree (No., %)</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>25 (50%)</td>
</tr>
<tr>
<td>Severe</td>
<td>11 (22%)</td>
</tr>
<tr>
<td>Course (No., %)</td>
<td></td>
</tr>
<tr>
<td>Stationary</td>
<td>11 (22%)</td>
</tr>
<tr>
<td>Progressive</td>
<td>13 (26%)</td>
</tr>
<tr>
<td>Recurrent</td>
<td>26 (52%)</td>
</tr>
<tr>
<td>Duration (months)</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1-72</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>12.69 ± 14.128</td>
</tr>
<tr>
<td>Family history (No., %)</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>28 (56%)</td>
</tr>
<tr>
<td>Positive</td>
<td>22 (44%)</td>
</tr>
</tbody>
</table>

The mean tissue level of IL-17 was significantly higher in patients (4.895 ± 3.2922 pg/gm), than in controls (0.62 ± 2.01 pg/gm) (p < 0.001) (Table 2, Figure 1). A statistically significant relation was found between tissue levels of IL-17 and the type of lesion; where the mean levels of IL-17 were statistically high in
patients with both inflammatory (papules and pustules) and non-inflammatory (comedones) lesions but was found higher in inflammatory type (7.265 ± 2.8062) than non-inflammatory type (2.260 ± 0.9740) (Table 3, Figure 2) and a positive correlation was found between the mean tissue levels of IL-17 and degree of AV (mild, moderate and severe) (r = 0.079, P = 0.579) but was not statistically significant.

Table 2: Comparison between tissue levels of IL-17 in patients and controls.

<table>
<thead>
<tr>
<th></th>
<th>Patients</th>
<th>Controls</th>
<th>p value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue IL-17 (pg/gm)</td>
<td>1.07 to 17.44</td>
<td>0.62 to 2.01</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>4.895 ± 3.2922</td>
<td>1.014 ± 0.3491</td>
<td></td>
</tr>
</tbody>
</table>

SD=Standard deviation * p value < 0.05 is significant

Table 3: Comparison between tissue levels of IL-17 in patients with non-inflammatory and inflammatory lesions of AV

<table>
<thead>
<tr>
<th></th>
<th>Non-inflammatory</th>
<th>Inflammatory</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue IL-17 (pg/gm)</td>
<td>2.260 ± 0.9740</td>
<td>7.265 ± 2.8062</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Acne vulgaris (acne) is a common inflammatory disease typically associated with the adolescents 4. When compared to other dermatologic conditions such as psoriasis, which is characterized by more severe physical symptoms, acne has been associated with more negative psychosocial and social influence 5.

The pathophysiology of AV is multifactorial. Disturbed hormonal activity, sebum over production, increased follicular keratinization, overgrowth of Propionibacterium acnes (P. acnes), and different cascades of inflammatory events 6.

P. acnes is recognized by the innate immune system via Toll-like receptor 2 (TLR2) 7, causing hypersecretion of inflammatory cytokines, including IL-8 and IL-12. Also the adaptive immune response contributes to the inflammation in acne, leading to recruitment of activated T helper 1 (Th1) lymphocytes to early lesions of AV 8.

The purpose of our study is to elucidate the role of Th17 cytokine (IL-17) in the pathogenesis of AV, as previous studies in these respects are few and unclear. Our study showed that the tissue level of IL-17 was significantly higher in patients with AV than healthy controls as supported by Agak et al., 2014 who found IL-17 producing cells in acne lesions. They also revealed that P. acnes is a main promoter of IL-17, IL-22 and IL-17- associated genes in human peripheral blood mononuclear cells (PBMCs) 9. Kelhälä et al., 2014 also found that the main culprit cytokines IL-17A and IL-17F were significantly increased in lesions of acne at mRNA and protein level which supports our study, as well 10.
Interestingly, a positive correlation was found between the mean tissue levels of IL-17 and severity of AV but wasn’t significant statistically which needs larger scale studies for more verification.

IL-17A and IL-17F are the main cytokines for neutrophils activation and can affect various cell types including keratinocytes, endothelial cells, monocytes, fibroblasts to express pro-inflammatory cytokines IL-6, TNF-α, IL-1β, nitric oxide, matrix metalloproteinases and chemokines (GM-CSF, G-CSF, CXCL1, CXCL8, CCL2, CCL7, CCL20) \(^{11}\).

Keratinocyte proliferation is stimulated by IL-17 via IL-6/STAT3 signaling \(^{12}\). In addition, it is suggested that IL-17 attenuates keratinocyte differentiation \(^{13}\). Hence, homeostasis of follicular keratinocyte is disturbed in acne, as compared to the increased follicular keratinization occurring in psoriasis \(^{14}\).

Together with IL-17A, both Th1 and Th17 effector cytokines, transcription factors, and chemokine receptors are strongly upregulated in acne lesions as proved by Kistowska et al., 2015. They also observed that, in addition to Th17, P. acnes can induce mixed Th17/Th1 responses by promoting the simultaneous secretion of IL-17A and IFN-γ from specific CD4+ T cells in vitro \(^{15}\).

**Conclusion**

The current study sheds the light on the potential involvement of Th17 cells in the pathogenesis of AV. IL-17 represents a therapeutic target that can increase the efficacy of the current treatment regimens for better management of AV. Based on our findings, we can conclude that IL-17 is not only responsible for the start of inflammatory process in AV but also for the perpetuation of the inflammatory cascade. Despite our assumption that IL-17 levels were higher in inflammatory than non-inflammatory lesions of AV, further studies are needed to establish this role.

**Abbreviations**

AV: Acne Vulgaris

P.acnes: Propionibacterium acnes

IL-17: Interleukin 17

TNF-α: Tumour Necrosis Factor Alpha

**Ethical Clearance:** Cleared by the ethical committee of Dermatology Department, Faculty of Medicine, Cairo University, Egypt

No **Conflict of Interest**

**References**


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Evaluation of the Results of Intralesional Bleomycin Injection for Treatment of Haemangioma and Vascular Malformation


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Abstract

Aim: is to evaluate the results of intralesional bleomycin injection for treatment of haemangioma and vascular malformation. Indications, limitations, adjustment of dose and results of treatment. Patients and Method: This study was carried out on 40 patients with vascular anomalies; either hemangioma or vascular malformations from both sexes at different age groups. Patients treated with intralesional Bleomycin Injection and treatment response will be evaluated. Results: 26 cases (65%) present significant response which includes complete resolution, excellent and good response; 7 cases (17.5%) presents fair response and 7 cases (17.5%) presents poor response. No cases presents no change or increase in size. Conclusion: Intralesional bleomycin injection (IBI) is a simple, practical and noninvasive method of treatment of vascular anomalies and can considered one of priorities in the treatment of Infantile Hemangiomas and small and medium sized venous malformations.

Key words: Vascular anomalies, Infantile Hemangioma (IH), vascular malformation, Bleomycin and Intralesional Bleomycin Injection (IBI).

Introduction

Term vascular anomaly represents a broad spectrum of vascular pathology, including proliferating vascular tumors and vascular malformations1. Vascular anomalies are confusing due to presence of different types of vascular anomalies, similarity of lesions, and most practitioners use imprecise terminology resulting in inaccurate management2. According to International Society for the Study of Vascular Anomalies (ISSVA), recent classification where divides vascular anomalies into two groups: neoplasms and malformations which provides systematic approach and correlates histopathology with clinical course and therapy3. Hemangiomas and vascular malformations are developmental benign lesions that can occur in any organ4.

Infantile hemangiomas comprise major part of vascular anomalies and the most of vascular tumors. It is composed of rapidly proliferating endothelial cells5. Infantile hemangiomas (IHs) are the most common, benign vascular tumors of infancy, found in 4% to 5% of the population6 with a greater incidence in Caucasians, female, and premature infants7.

Vascular malformations are localized, structural abnormalities of vessels that happen due to developmental defects during vasculogenesis with no sex-predominance, and normal endothelial cell turnover8. Treatment of vascular anomalies is indicated when the lesions become symptomatic by causing functional disturbances, or disfigurement. Several treatment options include: Pharmacologic therapy, surgery, embolization and sclerotherapy9.

Surgery is mainly de-bulking procedure, except for localized VMs that can be totally removed. Surgery and medical treatment have limited success9.
Treatment with sclerotherapy especially lymphatic and venous malformations has advantages including no external scarring and few complications, as compared with surgery. Sclerotherapy causes cell destruction, thrombosis, and severe inflammation. Scarring leads to shrinkage of the lesion. Many sclerosants have been used including doxycycline, sodium tetradecyl sulfate, bleomycin, and OK-432.

Bleomycin induce its effect through two ways: DNA synthesis inhibition and also has sclerosing effect on vascular endothelium. Bleomycin is a valid therapy in vascular anomalies but it has complications too. Muir et al. reported flu-like symptoms, ulceration, cellulitis and temporary hair loss in some cases. Dose-related pulmonary fibrosis is reported in few oncology patients receiving high cumulative doses of intravenous bleomycin. It is reported that the total dose must not exceed 5 mg/kg in adults, or 20 mg in total in infants.

Our Study will evaluate the results of Intral deletion Bleomycin Injection in treatment of Haemangioma and vascular malformation. Indications, limitations, adjustment of dose and results of treatment.

**Patients and Method**

A prospective study was carried between October 2017 and June 2019 (20 months) in Kasr Al-Aini teaching hospitals, Cairo University, Egypt. Forty patients were included presented with haemangiomas and slow-flow vascular malformations from both sexes at different age groups. High-flow malformation, combined malformations and patient with history of previous intralesional sclerosant agent or steroid injection were excluded.

A standardized sheet recording patient’s details included age, sex, weight, and location of lesion, size in square centimeters, bleomycin dose, clinical response and adverse effects were recorded. The response was recorded by serial photography and measurement before, during, and after completion of the treatment.

Dosage regimen used were as follows:

- In children younger than 1 year, the maximum dose per injection is limited to 0.5 to 1 mg/kg and varied according to the size of the lesion.
- In children older than 1 year and adult, a dose of 1 to 15 mg was injected intralesionally per session.

- A single dose of 15 mg per session was never exceeded. The interval between each session was 3 weeks with total times less than 6 times during 6 months therapeutic period with exceptions in large or resistant lesions.

**Method of Intral injection Bleomycin Injection**

In children the injection was performed in general anesthesia and hospitalization was required for a day.

**Direct intral injection**: bleomycin was administered by using a syringe

**Transcutaneous injection** introduced through normal skin, and advanced into the hemangioma or vascular malformation.

**Assessing Response:**

- **Measurement of the lesion’s size**

Lesion size was recorded using “hemispheric” measurements. The regression of the lesion was evaluated according to 0 - 100% scale. An excellent response denotes complete resolution and 76-100% reduction in the size. A good response denotes 51-75% reduction in the size. A fair response denotes 26-50% reduction in the size. Finally, a poor response denotes 1-25% regression and moreover, no change and continued growth of the lesion's size.

**Results**

There were 40 patients treated with IBI. They were 17(42.5%) males and 23(57.5%) females. Their ages at the time of starting treatment was ranging between 4 months and 40 years with a median age of 12.2 ± 10 years. Patients Weights at the time of starting treatment was ranging between 5kgs and 91kgs with a median Weight of 26 ± 20kgs.

The majority of cases are infantile hemangioma 20 cases (50%) then venous malformations 15 cases (37.5%) then lymphatic malformation 3 cases (7.5%) and the least is capillary malformation 2 cases (5%).

Bleomycin average dose was 3 ± 1.4mg per session and ranged from 1.5 to 7.5mg. The Total dose ranges from 7.5 and 75 mg with average 23.6 ± 14mg. Number of sessions ranges between 5 and 12 sessions with average 7 ± 1.6 sessions. The Duration of treatment ranges between 4 and 14 m with average 7 ± 1.6 m.
In the study as regard the response to treatment presented by reduction in size 5 cases (12.5%) presents complete resolution. 14 cases (35%) presents Excellent response. 7 cases (17.5%) presents good response. 7 cases (17.5%) presents fair response. 7 cases (17.5%) presents poor response. No cases presents no change or increase in size. As overall 26 (65%) cases present significant response which includes complete resolution, excellent and good response.

Relation between outcome and Demographic Data of the Study group:

Table 1 shows younger cases had better response as compared poor response group.

Table 1: Relation between outcome and general data among studied cases.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Size reduction</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>20.2+11</td>
<td>8+7</td>
<td>2.6</td>
</tr>
<tr>
<td>Weight</td>
<td>34+25</td>
<td>23+15</td>
<td>1.2</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5(35.7%)</td>
<td>9(64.3%)</td>
<td>0.40#</td>
</tr>
<tr>
<td></td>
<td>12(46.2%)</td>
<td>14(53.8%)</td>
<td></td>
</tr>
</tbody>
</table>

Relation between outcome versus diagnosis among the study group:

Table 2 shows that cases with IH had better response as compared to vascular malformations with statistically significant difference between both groups by chi-square test.

Table 2: Relation between outcome versus diagnosis among the studied cases.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Size reduction</th>
<th>X2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>IH</td>
<td>3(21.4%)</td>
<td>17(65.4%)</td>
<td>7</td>
</tr>
<tr>
<td>Vascular malformations</td>
<td>11(78.6%)</td>
<td>9(34.6%)</td>
<td></td>
</tr>
</tbody>
</table>

Outcome of Infantile Hemangioma and venous malformation among the study cases:

Table 3 shows that cases with IH had better response as compared to venous malformation with statistically significant difference between both groups by chi-square test.

Table 3: Outcome of Infantile Hemangioma (IH) and venous malformation (VM) among the studied cases.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total No.</th>
<th>Size reduction</th>
<th>X2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Poor</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>IH</td>
<td>20</td>
<td>3(15%)</td>
<td>17(85%)</td>
<td>4.2</td>
</tr>
<tr>
<td>VM</td>
<td>15</td>
<td>7(46.7%)</td>
<td>8(53.3%)</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1: A 4 m old female infant with IH in the left peri-ocular region; treated with intralesionalbleomycin Complete resolution was occurred.
Fig. 2: A 6m old infant presented IH in the left forearm; treated with intralesional Bleomycin with Complete resolution.

Fig.3: A 5 years old boy presented venous malformation in the left big toe treated with intralesional bleomycin. Excellent response was occurred.

Discussion

Vascular anomalies are now classified into vascular tumors and malformations. With differences in biologic and radiographic behavior, malformations are classified to slow and fast flow lesions. In most patients with IHs, no treatment is necessary because most lesions regress over years without leaving scarring. Infantile hemangiomas of the head and neck especially those giving high proliferation rate and other complications or facial disfigurement had to be treated.

Vascular malformations sub-divided according to vessel type into capillary, venous, arterial and lymphatic malformation. Imaging mainly Doppler US and MRI are basic patient workup. In addition to confirming the diagnosis, they define the extent of the lesion. Different treatment modalities have been described for hemangiomas and vascular malformations, including drug therapy, sclerotherapy, surgery and laser therapy. Sclerotherapy can be used as definitive therapy or can be performed in combination with other procedures such as surgery or laser therapy.

Umezawa discovered Bleomycin as anti-cancer drug in 1966, then it is noticed as effective therapy through intralesional route in lymphatic malformations. Recently it has good results in treating vascular lesions.

Conrad Pienaar et al treated hemangioma with intralesional bleomycin by calibrated dose per session at 0.3 to 0.6 mg/kg. They found that 73% of cases have response more than 75% decrease in hemangioma size. Several studies found that efficacy of intralesional bleomycin for hemangiomas with nearly 56.2% of cases experienced 70% to 100% regression in hemangioma.

Sainsbury et al, 2011 reported 93.3% response rate, a 56.0% response rate was complete with 1.3% recurrence rate; 10.7% give moderate improvement and 6.7% no response. Pienaar et al. reported a mean of five bleomycin injections sessions and mean dosage of 13.6 mg (range, 1.4 to 24.6 mg).

Memon et al used 1.0 mg/ml concentration, though Zheng et al. used a concentration of 2 mg/ml for the venous malformations. They proceeded to four sittings for every case; others used 1-5 sittings, with mean of 3.5 sittings. Bleomycin therapy is in general safe, with reversible complications. They described excellent results, with 96% of hemangiomas cured or substantially reduced. Zheng et al. described success rate of 75-84% for venous and lymphatic malformations. In another series, Hou et al. described 88% cure or substantial reduction in 66 patients.

Our study was carried out on 40 patients with vascular anomalies; either hemangioma or vascular malformation. The Bleomycin injection reports a 12.5% complete resolution, with 52.5% of all patients having a good-to-excellent response, which is comparable to the results in the literature. This study demonstrated a 65% significant response rate of all patients.

In the 20 cases of hemangioma, 17 patients (85%) had clinically good results which is statistically significant with satisfied patient outcomes. 3 patients which had minimal response to bleomycin treatment required secondary interventions; either excision or other therapies. No rebound proliferation occurred
in any hemangioma lesions treated. In our series, the effectiveness of intralesional bleomycin injection as a sole treatment for venous malformations was 53.3% and there was 2 recurrences following treatment of thenar eminence and peri-auricular lesions. The effectiveness of intralesional bleomycin in superficial venous malformations were better than deep or combined forms due to the direct effect of bleomycin before fading away through the draining vessels, dispersion of drug into surrounding tissue with significantly reduced therapeutic effect and may be due imprecise injection and clinical inaccessibility of the deep component of the lesion.

For all lymphatic malformations, 3 cases were treated; a case with microcystic lymphatic malformation had no response. The other two cases were macrocystic lymphatic malformations and show moderate response and require other modalities of treatments. No systemic side-effects of repeated intralesional bleomycin injection treatment experienced, We report that local complications shows as follows: 12 cases (30%) show complications which include Ulceration 8 cases (20%), Hyperpigmentation 2 cases (5%) and Recurrence 2 cases (5%).

Analysis of the data collected shows that cases with better response had lower dosage, number of sessions, total amount and shorter duration of the treatment course with statistically significant difference between both groups. We report that cases with bigger size had poor response as compared to small sized lesions with statistically significant results. Also younger age patients had better response as compared poor response group with statistically significant results.

**Conclusion**

Intralesional bleomycin injection (IBI) was effective and safe in treating vascular anomalies. Our analysis showed that the preferred dose of bleomycin treatment was not more than 1mg/kg or less. In our study, bleomycin was effective in Infantile Hemangiomas than venous malformations. Small and medium sized lesions have better response. Intralesional bleomycin injection (IBI) is a simple, practical and noninvasive method of treatment of vascular anomalies and can considered one of priorities in the treatment of Infantile Hemangiomas and small and medium sized venous malformations.

**Funding:** Self-funding

**Ethical Clearance:** Cleared by the ethical committee of Plastic Surgery Department, Faculty of Medicine, Cairo University, Egypt.

**No Conflict of Interest**

**References**

5. Buckmiller LM., Richter GT., Suen JY. Diagnosis and management of hemangiomas and vascular malformations of the head and neck; Oral Diseases 2010; 16, 405–418.
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Improving the Performance of Potato Chips Using Turmeric

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Abstract

The current study was achieved to investigate the soaking potato chips indifferent concentrates of turmeric at 4, 8, 12 and 16% levels, and it was separately soaked at 60°C for 6.0 hours and then drying at 50°C for 30 minutes and then baking in a few amounts of sunflower oil. Antioxidant content and activity were determined in turmeric extract; meanwhile, sensory evaluation, color, physico-chemical properties, and texture analysis profile were determined in potato chips.

The results showed that turmeric had contained rich amounts from antioxidants and the highest activity in scavenging free radicals. Moreover, from the potato chips, the results observed that the better color, better crispness and overall acceptability in potato chips soaking in turmeric. The physico-chemical properties found that potato chips drying after soaking caused better moisture loss and it had contained less oil content in all soaked samples. Furthermore, the results from the texture profile analysis confirmed the result obviously the characteristics of potato chips.

From the obvious results, it could be recommended that the baking process of potato chips was soaking in different concentrations of turmeric is acceptability and also it is considered as a healthy alternative to frying could be due to its possibility to supply sensory properties of high quality with the presence of less oil.

Key words: Turmeric, soaking, antioxidant, sensory properties, texture profile analysis

Introduction

Recent research found that the generality of the turmeric activities of turmeric is could be due to curcumin. It has different beneficial characteristics with natural antioxidant activities. Curcumin, as a spice, exhibits most promise as a therapeutic factor

Curcumin had contained three main function groups had contained one diketone group and two phenolic groups. Significant chemical reactions connected with the biological activity of curcumin are most important to oxidation of curcumin, in addition to hydrolysis, dissolution, and enzymatic reactions. All these have a considerable function in different biological activities of curcumin.

In current years, increasing consumer knowledge of the connection between food and health has led to a request for high-quality nutrition to give high healthy. Consequently, making potato chips with less oil and great sensory properties as vacuum frying, low-pressure superheated steam drying, and baking is a prominent method. Between these methods, baking potato is thought carefully about as an alternative to frying could be due to its possibility to make available for use a similar product with no added fat.

The aim of this study was to investigate the effect of soaking potato chips in turmeric solution at different levels 4, 8, 12 and 16%, respectively. The major task of this study was to produce high quality, shiny, lower oil and higher natural antioxidant potato chips.

Materials and Method

Materials

Potatoes (Solanum tuberosum), sunflower oil, turmeric (Curcuma longa) was obtained from local market in Saudi Arabia.
Methods

Phytochemical analysis in turmeric

The total phenolic content (TPC) of the turmeric was estimated by Afroz et al.\textsuperscript{6} and it was determined as mg gallic acid equivalent (GAE)/100 g.

The total flavonoid content (TFC) was estimated by Chang et al.\textsuperscript{7}. The color was measured at 510 nm and it was determined as mg catechin equivalent (CE)/100g.

The total tannin content (TTC) was estimated according to Tambe and Bhambar\textsuperscript{8}. The results were expressed as mg of tannic acid equivalent (TE) per 100 g.

The ascorbic acid content (AAC) was estimated as described by Omaye et al.\textsuperscript{9} and it was determined as ascorbate equivalent mg of AE per 100 g.

Antioxidant radical scavenging in turmeric

ABTS radical cation assay was determined according to Arts et al.\textsuperscript{10}. Ferric-reducing power was measured the ability of the antioxidants to reduce ferrictripiridyltriazine (Fe3+-TPTZ) to a ferrous form (Fe2+) according to Niemeyer and Metzler\textsuperscript{11}. DPPH (1,1-Diphenyl-2-picrylhydrazyl) described by Ravichandran et al.\textsuperscript{12}.

Preparation of potatoes soaking turmeric

The soaking solutions were prepared turmeric powder at 4, 8, 12 and 16 g were dissolved separately in 100 ml distilled water. Potato slices were soaking lasted 6 hours and dried at 50°C for 30 minutes and also, the control potato was soaking in the water at 70°C for 5 minutes.

Baking potatoes chips for lower oil

The dried potato slices was baking in lowering sunflower oil at 180°C for 22 min, this temperature was to lead moisture less than 2% by weight.

Sensory evaluation of baking potato chips

Chips samples were organoleptically examined by twenty trained panelists from the Nutrition and Food Science Department, Faculty of Science, Taif University, the kingdom of Saudi according to Zhang and Zhang\textsuperscript{13}.

Color of baking potato chips

A color image obtained with a digital camera under controlled and defined illumination conditions (D65 illumination in a lightbox. according to Balaban\textsuperscript{14}.

Physico-chemical characteristics of potato chips

Moisture and fat content were estimated by AOAC\textsuperscript{15}. The amylose content and amylopectin was determined by the method prescribed by Hoover and Ratnayake\textsuperscript{16}.

Texture profile analysis of potato chips

Instrumental texture measurements were obtained at room temperature using a Texture Analyzer (CNS Farnell Com, U.K.) immediately up to 1 h after baking potato chips and cooling according to Tuta and Koray Palazoğlu\textsuperscript{17}.

Statistical Analysis

The obtained data were exposed to analysis of variance. Duncan’s multiple range tests at (P ≤ 0.05) level was used to compare between means. The analysis was carried out using the PRO ANOVA procedure of Statistical Analysis System\textsuperscript{18}.

Results and Discussion

Phytochemical analysis of turmeric powder

The results in Table (1) observed that the turmeric powder extract had contained from total phenolic acids, total flavonoids compounds, total tannin, and ascorbic acid were 120.15 mg GAE/100, 155.66 mg CE /100g, 7.70 mg TE/100g, and 0.06 mg AE/100g turmeric, respectively. These results confirmed by Shen\textsuperscript{19} found that the turmeric had contained high amounts from phenolics and flavonoids which as natural antioxidants.

Color of baking potato chips

A color image obtained with a digital camera under controlled and defined illumination conditions (D65 illumination in a lightbox. according to Balaban\textsuperscript{14}.

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Tannins are secondary metabolites important which water-soluble plant that has been found to have antioxidant, and antimicrobial activities\textsuperscript{20}.

Antioxidant activity as ABTS, FRAP and DPPH were determined in turmeric powder and the results found that 163.4, 32.6 and 17.31 μg/ml, respectively. These results illustrated that the free radical-scavenging activity could be due to the turmeric had contained high amounts from phenolics and flavonoids which as natural antioxidants.
Antioxidant activities had contained many therapeutic compounds like ascorbic acids possess considerable characteristics that could improve the influences which due to free radicals have been the etiology of several various human ailments.21.

Table (1): Antioxidant content and activity of turmeric powder

<table>
<thead>
<tr>
<th>Antioxidant</th>
<th>Turmeric content and activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total phenolic (gallic acid equivalent mg /100 g)</td>
<td>120.15 ± 0.255</td>
</tr>
<tr>
<td>Total flavonoids (catechin equivalent mg/100 g)</td>
<td>155.66 ± 3.42</td>
</tr>
<tr>
<td>Total tannin (tannic acid equivalent mg / 100 g)</td>
<td>7.74 ± 0.125</td>
</tr>
<tr>
<td>Ascorbic acid (ascorbate equivalent mg/100 g)</td>
<td>0.06 ± 0.004</td>
</tr>
<tr>
<td>ABTS μg/ml</td>
<td>163.4 ± 2.61</td>
</tr>
<tr>
<td>FRAP μg/ml</td>
<td>32.6 ± 0.32</td>
</tr>
<tr>
<td>DPPH IC50 μg/mL</td>
<td>17.31±0.011</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± SE of 3 replicates

Sensory evaluation of potato chip with turmeric

The results from Table (2) and photo (1) found that no variation between color, texture crispiness, odor and taste in the potato chips soaking in turmeric than the control sample. This may be that the baking potato chips were development and acceptability using turmeric. Texture (crispiness) of chips is a vital criterion that determines the consumers’ acceptance22. The texture is also a major measurement in the evaluation and acceptance of food products and a significant characteristic in determining consumer acceptability of fried foods23. Crispness is often described as one of the attractive textural characteristics of potato chips24.

![Photo (1): Showed the potato chips with turmeric at different levels](image)

Table (2) sensory evaluation of baking potato chips

<table>
<thead>
<tr>
<th>Samples</th>
<th>Color</th>
<th>Texture and crispness</th>
<th>Oder</th>
<th>Taste</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>7.50±0.39b</td>
<td>8.42±0.52a</td>
<td>8.00±0.85a</td>
<td>8.50±0.42a</td>
<td>8.11±0.51a</td>
</tr>
<tr>
<td>4%</td>
<td>7.60±0.74ab</td>
<td>8.26±0.67a</td>
<td>7.73±0.51ab</td>
<td>8.15±0.85a</td>
<td>7.94±0.58ab</td>
</tr>
<tr>
<td>8%</td>
<td>7.70±0.79ab</td>
<td>8.00±0.65a</td>
<td>7.46±0.49ab</td>
<td>7.72±0.79ab</td>
<td>7.72±0.60ab</td>
</tr>
<tr>
<td>12%</td>
<td>7.80±0.51ab</td>
<td>7.75±0.83b</td>
<td>7.38±0.65ab</td>
<td>7.45±0.79ab</td>
<td>7.60±0.51ab</td>
</tr>
<tr>
<td>16%</td>
<td>7.90±0.49a</td>
<td>7.63±0.62b</td>
<td>7.22±0.58b</td>
<td>7.34±0.58b</td>
<td>7.52±0.45b</td>
</tr>
</tbody>
</table>

Values are mean and SD (n = 3); where: Mean values in the same row with the same letter are slightly significantly different at 0.05 levels
Color of baking potato chips with turmeric

From the results in Table (3) it could be noticed that higher \( L \) values, lower \( a \), and higher \( b \) values in different potato chips than control. Subjective color scores were related to \( a \) value, with higher subjective color scores tending to coincide with higher \( L \) lower \( a \), and higher \( b \) values. This means that the potato chips soaking in different concentrations from turmeric give a brighter yellow-orange color chip higher \( L \) and \( b \) and lower \( a \) value readings. Crispness is perceived during a collection of different feelings and appears the key texture advantages of dry snack products through the mastication process that, in transformation, is based on break diffusion in crisp substances\(^{25}\).

Color is the greatest significant visual characteristic in the observation of product quality between the various classes of physical properties of foods\(^{26}\). Color is this critical in the acceptance of the product even previously it is consumed\(^{27}\).

Table (3): Effect of turmeric on color for baking potato chips

<table>
<thead>
<tr>
<th>Samples</th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>76.61±3.86c</td>
<td>-18.20±1.97 b</td>
<td>27.46±2.73b</td>
</tr>
<tr>
<td>4%</td>
<td>77.44±6.15b</td>
<td>-18.80±2.26 b</td>
<td>27.81±3.15 b</td>
</tr>
<tr>
<td>8%</td>
<td>79.09±4.39ab</td>
<td>-19.00±2.38 a</td>
<td>28.06±2.58 a</td>
</tr>
<tr>
<td>12%</td>
<td>81.57±6.12 a</td>
<td>-19.20±2.49 a</td>
<td>28.25±2.08 a</td>
</tr>
<tr>
<td>16%</td>
<td>83.23±5.73a</td>
<td>-19.40±2.01 a</td>
<td>29.13±2.18 a</td>
</tr>
</tbody>
</table>

Values are mean and SD \((n = 3)\); where: Mean values in the same row with the same letter are slightly significantly different at 0.05 levels.

Physico-chemical characteristics on potato chips

The results in Table (4) showed that no different significant between potato chips in moisture may be due to soaking potato in turmeric before baking. The results of this study showed that the texture or crispiness of the chips was related to the moisture content of chips. Thus, lowering oil absorption outcomes in elevate crunchiness values for the reason that of decreased moisture retention\(^{28}\).

Meanwhile, in the same Table observed that on significant variation in the amylose and amylopectin in potato chips, the results confirmed that turmeric doesn’t affect on potato chips during baking frying. Jyothi et al.\(^{29}\) found that the C. malabarica starch had contained 25 kg=100 kg amylose content and about 27% starch in variety C. zedoaria. Previous reports found that the amylose content of C. zedoaria starch was 31.3%, these results confirmed our results.

Table (4): Effect of turmeric on physico-chemical characteristics on potato chips

<table>
<thead>
<tr>
<th>Samples</th>
<th>Moisture</th>
<th>Fat content</th>
<th>Amylose</th>
<th>Amylopectin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.20±0.11a</td>
<td>7.30±1.258a</td>
<td>30.10±3.16a</td>
<td>69.90±4.36a</td>
</tr>
<tr>
<td>4%</td>
<td>2.25±0.15a</td>
<td>6.40±1.38ab</td>
<td>30.20±2.79a</td>
<td>69.80±3.85a</td>
</tr>
<tr>
<td>8%</td>
<td>2.20±0.14a</td>
<td>6.00±1.82ab</td>
<td>30.40±3.15a</td>
<td>69.60±4.41a</td>
</tr>
<tr>
<td>12%</td>
<td>2.30±0.12a</td>
<td>5.90±0.95ab</td>
<td>30.60±2.47a</td>
<td>69.40±4.29a</td>
</tr>
<tr>
<td>16%</td>
<td>2.25±0.12a</td>
<td>5.60±0.89b</td>
<td>30.70±2.92a</td>
<td>69.30±4.33a</td>
</tr>
</tbody>
</table>

Values are mean and SD \((n = 3)\); where: Mean values in the same row with the same letter are no significantly different at 0.05 levels.
Texture profile analysis of baking potato chips

Table (5) showed that the effect of turmeric at different levels on baking potato chips and the results found that the hardness was slightly increased from 8.20 to 8.10 N. Meanwhile, apparent modulus of elasticity, adhesiveness and compressive energy were slightly significant decreased from 585.7, 0.6 and 2190.1 to 450.4, 0.2 and 1768.7 g/sec, respectively. These results confirmed that the turmeric at different level improvement the quality the backing potato chips. The TPA measure springiness, cohesiveness, chewiness, and resilience are connected with foods flexibility and were considerably reconditioned with the noticed oral processing behaviors.

Adhesiveness indicates the quantity of work required for controlling the attractive power among the surface of the product and the substance with which in contact. This surface controlled on a connected influence of adhesive and cohesive powers.

Table (5): Effect of turmeric on textural attributes on baking potato chips

<table>
<thead>
<tr>
<th>Texture profile analysis</th>
<th>Hardness (N)</th>
<th>Apparent modulus of elasticity (g/sec)</th>
<th>Adhesiveness (g/sec)</th>
<th>Compressive energy (g/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>8.20±1.11b</td>
<td>585.7±31.02a</td>
<td>0.6±0.012 a</td>
<td>2190.1±102.02 a</td>
</tr>
<tr>
<td>4%</td>
<td>8.50±1.01 ab</td>
<td>550.2±23.26ab</td>
<td>0.5±0.06 ab</td>
<td>2008.0±89.2 ab</td>
</tr>
<tr>
<td>8%</td>
<td>8.70±0.15 ab</td>
<td>510.5±20.13ab</td>
<td>0.4±0.005 ab</td>
<td>1981.2±71.73 ab</td>
</tr>
<tr>
<td>12%</td>
<td>8.90±1.23 ab</td>
<td>480.3±20.38ab</td>
<td>0.3±0.001 ab</td>
<td>1876.3±75.38 ab</td>
</tr>
<tr>
<td>16%</td>
<td>9.10±1.38a</td>
<td>450.4±21.57b</td>
<td>0.2±0.002b</td>
<td>1768.7±83.19b</td>
</tr>
</tbody>
</table>

Values are mean and SD (n = 3); where: Mean values in the same row with the same letter are slightly significantly different at 0.05 levels.

Conclusion

From the results, it could be concluded that the soaking of potato slices in different concentrations of turmeric at 4, 8, 12 and 16% and drying before baking had an influence on the improvement of chips quality and the best sensorial acceptability was noticed in samples. Drying before baking potato chips caused better moisture loss, less oil content in chips, better crispness and overall acceptability in all soaked samples.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of Food Science and Nutrition Department, College Science, Taif University, Saudi Arabia

No Conflict of Interest

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Mitral Valve Repair with Flexible Band Versus Rigid Band in Non Rheumatic Mitral Regurgitation A Comparative Clinical Trial

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Abstract

Background: All over the world, the most common clinically presented valvular heart disease is Mitral regurgitation (MR). Mitral valve repair is considered the surgery of choice for mitral regurgitation.

Aim of work: Evaluation of the early result of mitral repair with flexible and rigid band in non-rheumatic mitral regurgitation.

Patients and Method: Between September 2017 till June 2019, we prospectively reviewing 86 patients who undergoing mitral valve repair with either a flexible or rigid band due to non-rheumatic cause. The mean age of flexible and rigid band group were (48.2±10.2) years and (50.4±10.3) years, respectively. We evaluate all patients after 6 months of surgery.

Results: There is no intraoperative mortality in our study, but according to early mortality there was 2 patient in flexible group and 1 patients in rigid one with no significant differences. There was also no significant differences according to failure of repair.

Conclusions: The early outcomes of Mitral valve repair with rigid or flexible band show good results in our prospective study, in spite of type of band that were used, but there were statistical differences between both groups regarding postoperative left ventricular dimension and function.

Keywords: Mitral regurgitation, mitral valve repair, band and surgery.

Introduction

The most common clinically presented form of valvular heart diseases in adult is mitral valve diseases. In particular, mitral valve regurgitation is most common presented form of mitral valve diseases. The annual incidence of degenerative MV disease in industrialized nations is estimated at around 2% to 3% 1.

MR can be organic or functional mitral regurgitation. Organic MR results from any pathology affecting leaflets and subvalvular apparatus, but functional MR results from left ventricular (LV) remodeling that has led to the dislocation of the papillary muscles and tethering of the leaflets in the presence of a morphologically normal valve 2.

The proper surgery for mitral regurgitation is Mitral valve repair but this surgery becomes more complex in case of rheumatic mitral regurgitation and may have bad results. The long term result can be evident for mitral valve repair in rheumatic heart patient by using long
acting penicillin.3

The most important and critical points in mitral repair are understanding pathology of mitral valve apparatus and mechanism of mitral regurgitation and verifying minor differences between different causes of mitral regurgitation, all these can be achieved by trans esophageal echocardiography 4.

The basic component of mitral valve repair is Annuloplasty. According to Carpentier’s concepts, an annuloplastic device is important for (I) restoring the size and shape of annulus; (II) preventing more annular dilatation; and (III) providing annular support 5.

Many types of annuloplasty devices are present today, rigid, semi rigid and flexible rings, any ring can be used according to the choice of surgeon 6.

Many studies carried out on the two techniques for management of mitral regurgitation each technique has some advantages over the other 7.

In our study we are trying to show which of them is more useful for mitral valve repair in patients with non-ischemic mitral regurgitation.

Patients and Method

This study includes 86 patients with non-rheumatic mitral regurgitation undergoing surgery for mitral valve repair with flexible or rigid annuloplasty device - (43 patients on each group) - attending the Zagazig university hospitals, Egypt and Essen University hospitals, Germany and followed up during the period from September 2017 till June 2019. Patients were randomly sorted into two groups according to a table of random numbers at the time of the operation.

Group A: patients will be subjected to mitral valve repair with flexible band,

Group B: patients will be subjected to mitral valve repair with rigid band.

Patients included in this study are adult patients who have moderate to severe or severe Ischemic, Degenerative, or Congenital mitral regurgitation.

Patients excluded from the study are those with significant mitral valve stenosis. And those who require aortic or pulmonary valves surgery.

After approval of the IRP committee, and a written consent from all patients, patients were subjected to preoperative history taking, clinical examination, and investigations as chest X-ray, echocardiography, cardiac catheterization if needed.

Surgical technique:

Trans-esophageal echocardiography (TEE) was performed in all patients after the induction of anesthesia. All operations were done through a median sternotomy with bicoval cannulation. Cardiopulmonary bypass was done with mild systemic hypothermia (32°C). Myocardial protection was done by antegrade blood cardioplegic solution. The size of annuloplasty device was selected according to the intertrigonal distance. Mitral annuloplasty devices were implanted with 2-0 Ethibond interrupted horizontal mattress sutures. According to the underlying pathology, before insertion of annuloplasty device, another operative technique has been used. After weaning from cardiopulmonary bypass, Mitral repair was reevaluated by using Trans-esophageal echocardiography.

Data collected as Operative time, Cardiopulmonary Bypass time for mitral valve repair, Intraoperative evaluation of mitral valve repair by trans-esophageal echocardiography and follow up data as; postoperative hemodynamic evaluation, Postoperative neurological evaluation, Postoperative Echocardiographic evaluation of mitral valve repair.

All will be presented in a suitable manner and analyzed statistically by SPSS (v 20) package program.

Results

According to demographic data of patients, there was no significant differences between both groups regarding pathology and etiology of mitral regurgitation, the commonest cause in the flexible band group is degenerative, but in rigid band group is ischemic and dilated annulus is the commonest pathology in both groups. There was no significant differences regarding etiology and pathology of mitral regurgitation as shown in table 1.

Preoperative echocardiographic data, as presented in table 2 shows no significant difference between both groups regarding Ejection fraction (EF), Left Ventricular end diastolic diameter (LVEDD), Tricuspid regurgitation (TR) and Left atrial diameter (LAD).
### Table 1: Demographic criteria, pathology and etiology of mitral valve regurgitation.

<table>
<thead>
<tr>
<th></th>
<th>Flexible group n=43</th>
<th>Rigid group n=43</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>48.2±10.2</td>
<td>50.4±10.3</td>
<td>0.3185</td>
</tr>
<tr>
<td>gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>20(46.5%)</td>
<td>23(53.5%)</td>
<td>0.5523</td>
</tr>
<tr>
<td>Female</td>
<td>23(53.5%)</td>
<td>20(46.5%)</td>
<td></td>
</tr>
<tr>
<td>Causes of mitral regurgitation(MR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischemic</td>
<td>19(22.1%)</td>
<td>24(27.9%)</td>
<td>0.499</td>
</tr>
<tr>
<td>Degenerative</td>
<td>22(25.6%)</td>
<td>19(22.1%)</td>
<td></td>
</tr>
<tr>
<td>Congenital</td>
<td>2(2.3%)</td>
<td>0(0%)</td>
<td></td>
</tr>
<tr>
<td>pathology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dilated annulus</td>
<td>19(22.1%)</td>
<td>25(29.1%)</td>
<td>0.499</td>
</tr>
<tr>
<td>Prolapse of AMVL</td>
<td>12(13.9%)</td>
<td>10(11.7%)</td>
<td></td>
</tr>
<tr>
<td>Prolapse of PMVL</td>
<td>10(11.7%)</td>
<td>8 (9.2%)</td>
<td></td>
</tr>
<tr>
<td>Cleft mitral valve leaflet</td>
<td>2 (2.3%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
</tbody>
</table>

P< 0.05% = significant difference.

### Table 2 preoperative data echocardiography.

<table>
<thead>
<tr>
<th></th>
<th>Flexible band</th>
<th>Rigid band</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ejection fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M±SD</td>
<td>60.00 ± 10.59</td>
<td>58.45 ± 12.17,</td>
<td>0.368</td>
</tr>
<tr>
<td>Range</td>
<td>32-71</td>
<td>30-70</td>
<td></td>
</tr>
<tr>
<td>Left ventricle(LVEDD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M±SD</td>
<td>60.56±10.41</td>
<td>64.78 ± 9.22</td>
<td>0.368</td>
</tr>
<tr>
<td>Range</td>
<td>45-83</td>
<td>48-82</td>
<td></td>
</tr>
<tr>
<td>Tricuspid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9 (10.5%)</td>
<td>10 (11.6%)</td>
<td>0.5970</td>
</tr>
<tr>
<td>Mild</td>
<td>14 (16.3%)</td>
<td>16 (18.6%)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>10 (11.6%)</td>
<td>9 (10.5%)</td>
<td></td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>2(2.3%)</td>
<td>1 (1.2%)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>8 (9.3%)</td>
<td>7 (8.1%)</td>
<td></td>
</tr>
<tr>
<td>LAD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M±SD</td>
<td>53.86±8.14</td>
<td>47.52±7.21</td>
<td>0.340</td>
</tr>
<tr>
<td>Range</td>
<td>37-73</td>
<td>35-70</td>
<td></td>
</tr>
<tr>
<td>PHT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M±SD</td>
<td>48.84±21.41</td>
<td>46.34±13.93</td>
<td>0.616</td>
</tr>
<tr>
<td>Range</td>
<td>Normal-90</td>
<td>30-78</td>
<td></td>
</tr>
</tbody>
</table>

P< 0.05% = significant difference.
Operative findings as presented in table 3

There was no significant difference between groups regarding technique of repair. The most common technique of repair used in flexible and rigid band groups was Annuloplasty only (22.1%, 27.9%) respectively. There were different sizes of bands among flexible band group patients. The most common band used was pericardial band 32 (46.5%). The only used rigid band was Carpentier-Edwards Ring (100%).

**Table 3: Operative data in both groups**

<table>
<thead>
<tr>
<th>Technique of repair</th>
<th>Flexible band group</th>
<th>Rigid band group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annuloplasty</td>
<td>19 (22.1%)</td>
<td>24 (27.9%)</td>
<td></td>
</tr>
<tr>
<td>Annuloplasty and artificial chordae with gortex suture</td>
<td>12 (13.9%)</td>
<td>10 (11.7%)</td>
<td>0.4992</td>
</tr>
<tr>
<td>Annuloplasty and closure of cleft with interrupted suture</td>
<td>2 (2.3%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Annuloplasty and quadrangular resection of p2</td>
<td>8 (9.4%)</td>
<td>6 (6.9%)</td>
<td></td>
</tr>
<tr>
<td>Posterior Leaflet triangular exclusion</td>
<td>2 (2.3%)</td>
<td>3 (3.5%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of bands flexible band group</th>
<th>Flexible band group (n = 43)</th>
<th>Rigid band group (n = 43)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teflon band 32</td>
<td>12 (27.9%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pericardial band 30</td>
<td>9 (20.9%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pericardial band 32</td>
<td>20 (46.5%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Cosgroov Edward band 30</td>
<td>2 (4.7%)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

According to concomitant surgery, the most common concomitant surgery among flexible group and rigid group is tricuspid valve repair and coronary artery bypass graft (CABG) with no significance of differences shown in table 4.

**Table (4): Concomitant surgery among studied patients**

<table>
<thead>
<tr>
<th>Tricusped Valve repair</th>
<th>Flexible band group (n = 43)</th>
<th>Rigid band group (n = 43)</th>
<th>( \chi^2 )</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>23 (26.7%)</td>
<td>26 (30.2%)</td>
<td>0.797</td>
<td>0.3719</td>
</tr>
<tr>
<td>Annuloplasty ring 30</td>
<td>0 (0%)</td>
<td>2 (2.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annuloplasty ring 34</td>
<td>0 (0%)</td>
<td>3 (3.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elgabryannuloplasty technique</td>
<td>12 (13.9%)</td>
<td>8 (9.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Devageannuloplasty</td>
<td>8 (9.4%)</td>
<td>4 (4.6%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CABG</th>
<th>Flexible band group (n = 43)</th>
<th>Rigid band group (n = 43)</th>
<th>( \chi^2 )</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>24 (27.9%)</td>
<td>19 (22.1%)</td>
<td>0.439</td>
<td>0.5074</td>
</tr>
<tr>
<td>Single graft</td>
<td>10 (11.7%)</td>
<td>11 (12.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three grafts</td>
<td>6 (6.9%)</td>
<td>8 (9.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four grafts</td>
<td>3 (3.5%)</td>
<td>5 (5.8%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASD closure</th>
<th>Flexible band group (n = 43)</th>
<th>Rigid band group (n = 43)</th>
<th>Fisher</th>
<th>0.8456</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>41 (47.7%)</td>
<td>43 (50%)</td>
<td>Fisher</td>
<td></td>
</tr>
<tr>
<td>Closure with pericardial patch</td>
<td>2 (2.3%)</td>
<td>0 (0%)</td>
<td>Fisher</td>
<td></td>
</tr>
</tbody>
</table>
There was significant difference between groups regarding post-operative degree of EF, MR and LV (p<0.05) while there was no significant difference between groups regarding post-operative Pulmonary hypertension (PH), TR and LAD (p >0.05). Table 5

**Table 5: Postoperative echocardiography follow up.**

<table>
<thead>
<tr>
<th></th>
<th>Flexible band group</th>
<th>Rigid band group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of MR</td>
<td>No</td>
<td>5 (5.8%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>10 (11.7%)</td>
<td>19 (22.1%)</td>
</tr>
<tr>
<td></td>
<td>Trivial</td>
<td>26 (30.3%)</td>
<td>20 (23.4%)</td>
</tr>
<tr>
<td></td>
<td>Mild to moderate</td>
<td>0 (0%)</td>
<td>3 (3.5%)</td>
</tr>
<tr>
<td>Ejection fraction</td>
<td>M±SD</td>
<td>59.43±9.04%</td>
<td>45.48±11.81%</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>39-70</td>
<td>25-70</td>
</tr>
<tr>
<td>Left ventricle (LVEDD)</td>
<td>M±SD</td>
<td>50.24±10.33</td>
<td>60.00±10.57</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>35-84</td>
<td>40-77</td>
</tr>
<tr>
<td>Tricuspid</td>
<td>No</td>
<td>8 (9.4%)</td>
<td>10 (11.3%)</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>20 (27.3%)</td>
<td>22(29.2%)</td>
</tr>
<tr>
<td></td>
<td>Trivial</td>
<td>13 (12.3%)</td>
<td>7 (6.7%)</td>
</tr>
<tr>
<td></td>
<td>moderate</td>
<td>0 (0%)</td>
<td>3 (2.8%)</td>
</tr>
<tr>
<td>LAD</td>
<td>M±SD</td>
<td>49.72±7.17</td>
<td>50.54±25.77</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>35-65</td>
<td>32-66</td>
</tr>
<tr>
<td>PHT</td>
<td>M±SD</td>
<td>33.94±11.32</td>
<td>35.52±9.51</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>20 - 65</td>
<td>25-55</td>
</tr>
</tbody>
</table>

P< 0.05% = significant difference.

In terms of complications the flexible band group had a higher rate of failure to repair, neurological complications and death while the rigid band group had a higher rate of re exploration for control of bleeding. As shown in table 6.

**Table 6: Complications rate**

<table>
<thead>
<tr>
<th></th>
<th>Flexible band group</th>
<th>Rigid band group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure of repair</td>
<td>2 (2.3%)</td>
<td>1 (1.2%)</td>
<td>0.495</td>
</tr>
<tr>
<td>Neurological</td>
<td>Lt sided hemiparesis</td>
<td>1 (1.2%)</td>
<td>Zero (0%)</td>
</tr>
<tr>
<td>complication</td>
<td></td>
<td>1 (1.2%)</td>
<td>Zero (0%)</td>
</tr>
<tr>
<td></td>
<td>Brain stem infarction</td>
<td>1 (1.2%)</td>
<td>Zero (0%)</td>
</tr>
<tr>
<td>Bleeding and re-exploration</td>
<td>2 (2.3%)</td>
<td>5 (5.8%)</td>
<td>0.436</td>
</tr>
<tr>
<td>Death</td>
<td>after 2 days</td>
<td>1 (1.2%)</td>
<td>Zero (0%)</td>
</tr>
<tr>
<td></td>
<td>after 7 days from HF</td>
<td>1 (1.2%)</td>
<td>Zero (0%)</td>
</tr>
<tr>
<td></td>
<td>Death after 7 days from cardiac ischemia</td>
<td>Zero (0%)</td>
<td>1 (1.2%)</td>
</tr>
<tr>
<td></td>
<td>Death after 10 day</td>
<td>Zero (0%)</td>
<td>Zero (0%)</td>
</tr>
</tbody>
</table>

P< 0.05% = significant difference.
Discussion

Mitral valve repair is the ideal procedure for mitral regurgitation in comparison to mitral valve replacement. All previous surgical studies stated that mitral valve replacement has higher rate of death than mitral valve repair. In this study, the commonest pathology in both band group was dilated annulus but there was no significant differences. In study that was done by David et al., there was prolapsed anterior leaflet in 21% of cases, posterior leaflet prolapse in 28%, bi-leaflet prolapse in 51%. According to Salvador et al., Study there was prolapse of anterior leaflet in 7.7% of cases, posterior leaflet prolapse in 50.7%, bi-leaflet prolapse in 41.6%.

Our study shows that early failure of repair and reoperation of Mitral Regurgitation was lower in the rigid band group, but this difference was statistically insignificant. Among 43 patients who required repair with flexible band, (2.3%) of patients need reoperation, the cause of recurrence of MR was dislodgment of artificial chordae from papillary muscle due to inappropriate surgical technique.

In study performed by chang et al., reoperation and recurrence of MR were higher in the Duran ring group, but this difference was not statistically significant. There were 8 patients who required reoperation, the cause of reoperation in 2 patients was dilated mitral annulus due to abnormal shape of the Duran ring, that caused in improper annular fixation. In study performed by Kanemitsu et al., mortality rate and freedom from reoperation were not significant. The causes of reoperation in three patients were recurrent leaflet prolapse in two and leaflet sclerosis in one.

In our study, regarding early morbidity occurred in our patients, in rigid band group 5 (5.8%) cases were reexplored but there were 2 (2.3%) cases among flexible band group. also there was neurological complications in form of 1 case with left sided hemiparesis and 1 case with brain stem infarction among flexible band group but no neurological complication among rigid band group.

In study performed by Kuntze et al., early morbidity was re exploration for bleeding in 3.6%, postoperative renal failure was 2.1% required dialysis, postoperative stroke in 1.7%. In study done by Salvador et al., early morbidity was re exploration for bleeding was 34% renal failure 9.6%, heart failure was 24%, postoperative stroke 10%. No Intraoperative mortality was found in our study. As regards early mortality (with 30 days of operation) in our study, in flexible band group, 2 cases died (2.3%), 1 case mortality at second day postoperatively occurred due to bleeding, 1 cases mortality at 7th day postoperatively occurred due to heart failure. But in rigid band group, 1 case died (1.2%) at 7 day postoperatively occurred due to cardiac ischemia.

In study performed by Kuntze et al., early mortality was 1.4% due to Congestive Heart Failure (2.5%). Also in study performed by Salvador et al., early mortality was 1% all related to low cardiac output.

In our study, there were no statistical clinical differences between both groups, regarding postoperative pulmonary hypertension and left atrial dimension. But there were statistical differences between them regarding postoperative left ventricular dimensions and function which were significantly improved in flexible band group.

Chang et al., showed that mitral valve Annuloplasty with both rings showed good short term results. There were no statistical differences between the two groups according to the left ventricular function and dimensions.

Conclusions

The early outcomes of Mitral valve repair with rigid or flexible band show good results in our prospective study, in spite of type of band that were used.

Mitral valve annuloplasty with flexible band is better than annuloplasty with rigid band according to left ventricular function and dimensions.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of Cardiothoracic Surgery, Faculty of Medicine, Zagazig University, Egypt.

No Conflict of Interest

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2- Maisano F, Redaelli A, Soncini M, Votta E, Arcobasso L, Alfieri O. Annular prosthesis for the


Efficacy and Safety of Intracavernosal Injection of Autologous Platelet Rich Plasma for Treatment of Erectile Dysfunction

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Abstract

Purpose: This work aimed to evaluate the efficacy and safety of intracavernosal injection (ICI) of autologous platelet rich plasma (PRP) for the treatment of erectile dysfunction (ED).

Method: This study included 30 patients (mean age 55.1) suffering from ED for more than 1 year. They were non-responders to oral phosphodiesterase type 5 (PDE5) inhibitors. Before initial therapy by PRP, all patients were subjected to history taking, examination and evaluation of erectile function (EF) using an abridged Arabic version of International Index of Erectile Function (IIEF-5). Additionally, patients were evaluated by Penile Color Doppler Ultrasonography (PCDUS). ICI of PRP was done once per week for 2 months. Follow up of EF and penile hemodynamics included evaluation of patients by IIEF-5 at 1, 2, 3 months and PCDUS at 3 months after initiation of therapy.

Results: IIEF-5 score showed significant improvement at 1, 2 and 3 months after PRP injection. The injections improved the penile hemodynamics on both sides such that, the right peak systolic velocity (PSV), end diastolic velocity (EDV) and diameter of cavernosal artery differed after treatment compared to pre treatment levels (p value 0.012, 0.002 and 0.000) respectively. Also, PRP therapy improved the left side PSV, EDV and cavernosal artery diameter but the difference was statistically significant only in the left cavernosal EDV and cavernosal artery diameter (p value 0.002 and 0.000) respectively. Moreover, the results revealed a significant difference between response to ICI before and after treatment (p value 0.028). Also, the treatment was well tolerated and no major side effects were reported.

Conclusion: ICI of PRP could improve erectile function, penile hemodynamics, response to ICI, patient satisfaction and might be a salvage treatment for patients with severe erectile dysfunction who failed response to medical treatment.

Key Words: Erectile dysfunction, Platelet rich plasma, Intracavernosal injection, International Index of Erectile Function (IIEF-5), penile hemodynamics.

Introduction

ED is a common problem which affects the quality of life. Many risk factors such as age, hypertension, smoking, obesity, dyslipidemia, coronary heart disease, diabetes, and depression increase the prevalence of ED.

Vascular insufficiency is one of the most common causes of erectile dysfunction. Vascular erectile dysfunction may result from endothelial dysfunction which impairs the nitric oxide pathway and decrease the vasodilatation in the penile vessels.
Oral phosphodiesterase type 5 (PDE5) inhibitors are effective therapy for erectile dysfunction while these therapies do not reverse vasculopathy or neuropathy associated with ED. So, we need a new treatment to solve these problems.

Regenerative medicine aims to repair damaged tissues by rejuvenation of cavernous endothelial cells, cavernous nerve, or both to restore nitric oxide bioavailability as a future therapy for curing patients with severe ED and non-responders to PDE5 inhibitors.

Platelets contain many growth factors and cytokines such as platelet-derived growth performance factors.

Platelet-rich plasma (PRP) involves centrifugation of autologous whole blood to extract the plasma with higher concentration of platelets. When platelets come into contact with exposed endothelium within damaged tissues, these growth factors are released and work with tissue-repair mechanisms to promote appropriate wound healing.

Autologous PRP has been investigated in different fields of medicine but there is still limited data regarding the efficacy and safety of PRP injection for the treatment of erectile dysfunction so this work aimed to evaluate the efficacy and safety of intracavernosal injection (ICI) of autologous PRP for the treatment of ED.

Patients and Method

Study Population:

35 patients attended the outpatient clinic of Andrology, Kasr El Aini Hospital, Cairo University. 5 patients dropped out during the study such that 2 patients were afraid of repeated blood sampling and 3 patients lost follow up. This study was approved by Research Ethical Committee of Andrology department, Kasr El Aini Hospital, Cairo University. This work included 30 patients complaining of erectile dysfunction for more than one year and above 40 years. They were non-responders to PDE5 inhibitors. Patients with peyronie’s disease, congenital penile deviation, congenital penile anomalies (hypospadius or epispadius), post traumatic erectile dysfunction and blood dyscrasias were excluded.

After signing an informed consent, all patients were subjected to personal history, sexual history, genital examination, evaluation of erectile function using an abridged validated Arabic version of IIEF-5 before therapy and at 1,2,3 months after initiation of therapy. Also, Pharmaco Penile Duplex Ultrasonography was done using a 7.5 MHz high-resolution linear array transducer (Mindray Z5 ultrasound diagnostic system with color Doppler) following intracavernosal injection of 20 µg prostaglandin E1 (PGE1) before therapy and after 3 months from initiation of PRP injections.

Preparation of PRP:

ICI of autologous PRP was done as sessions (one session every week for 2 months) using the following steps:

(i) Harvested venous blood sample from the patient was accomplished into four 4.5 mL citrate (3.8% sodium citrate)-containing Vacutainer tubes; (ii) blood sample identified with patient specific labels and 2 labels were attached for the returning final preparation; (iii) tubes placed in a sterile transfer box (iv) box opened under laminar flow hood and the tubes centrifuged for 10 min at 1000 rpm at room temperature; (v) After centrifugation, the tubes were removed and sprayed with 70% alcohol and transferred under the laminar flow hood; (vi) The platelets were removed with a sterile 5 ml pipette inserted above the buffy coat. The plasma and platelets were transferred to a new 5 ml Falcon centrifuge tube; (vii) The tube was centrifuged for 15 min at 3500 rpm at room temperature; (viii) The pellet was kept with 2 ml plasma, transferred to a 3 ml syringe and the syringe was closed with a sterile cap to which a patient label was attached and (ix) For each patient, 1ml PRP concentrate was injected in each corpus cavernosum within few minutes after preparation and the patients were observed after the injection for 30 minutes for any complications or side effects.

Before injection of PRP, Sterilization of the skin with alcohol was done to reduce the risk of infection. The intracavernosal injection was performed with 28 gauge needle. The penis was gently stretched in an upright position, and the needle was introduced in a smooth and continuous pattern through the skin, subcutaneous tissue, and tunica albuginea into the cavernous body. The contents of the syringe were gently and smoothly injected into the cavernous body. After injection, the needle and syringe were removed in a rapid fashion and pressure was applied to the injection site for 1 to 2 minutes then massage of the penis was done for 2-3 minutes to distribute the platelet rich plasma in the whole penis.
Statistical Analysis

Statistically analysis of data using program SPSS and calculated as mean ± standard deviation, range, or frequencies and percentages when appropriate. Within group comparison of numerical variables was done using paired t test in normally distributed data and Wilcoxon signed rank test for paired (matched) samples when data was not normally distributed. For comparing categorical data, Chi square (χ²) test performed. Exact test was used instead when the expected frequency is less than 5. McNemar test was performed to compare response.

Results

This study included 30 patients with mean age 55.1(range 42-69). The mean duration of erectile dysfunction was 4.7 years (range 1-15). The average pre PRP IIEF-5 score was 6.5 (range 4-11). The average post PRP IIEF-5 score at 1 month was 7.7 (range 4-17), at 2 months was 9.5 (range 5-24), at 3 months was 10.2 (range 5-24). At the end of this work, selected patients were divided into 2 groups according to the level of improvement in IIEF-5 score as the following:

Group 1: No improvement (No. 20 patients), Group 2: Improvement(No. 10 patients).

This work revealed an improvement of IIEF-5 score at 1, 2 and 3 months after treatment compared to pre-treatment level (Table 1). Also, the 5th question of IIEF-5 which represented satisfaction of the patients revealed statistically significant difference at 2 and 3 months post treatment compared to pre-treatment level (Table 2). In addition, the injections improved the penile hemodynamics on both sides such that, the right peak systolic velocity (PSV), end diastolic velocity (EDV) and diameter of cavernosal artery differed after treatment compared to pre treatment levels (p value 0.012, 0.002 and 0.000) respectively. Also, PRP therapy improved the left side PSV, EDV and cavernosal artery diameter but the difference was statistically significant only in the left cavernosal EDV and cavernosal artery diameter (p value 0.002 and 0.000) respectively (Table 3). Moreover, the results revealed a significant difference between response to ICI before and after treatment (p value 0.028) (Table 4). Also, the treatment was well tolerated and no side effects were reported. Follow up by penile ultrasound after injections to exclude fibrosis.

<table>
<thead>
<tr>
<th>Mean</th>
<th>Paired Differences</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std. Deviation</td>
<td></td>
</tr>
<tr>
<td>Pair 1 IIEF5 Pre - IIEF5 1month</td>
<td>-1.167</td>
<td>2.245</td>
</tr>
<tr>
<td>Pair 2 IIEF5 Pre - IIEF5 2 months</td>
<td>-3.033</td>
<td>4.860</td>
</tr>
<tr>
<td>Pair 3 IIEF5 Pre - IIEF5 3 months</td>
<td>-3.733</td>
<td>5.458</td>
</tr>
<tr>
<td>Pair 4 IIEF5 1 month - IIEF5 2 months</td>
<td>-1.867</td>
<td>4.150</td>
</tr>
<tr>
<td>Pair 5 IIEF5 1 month - IIEF5 3 months</td>
<td>-2.567</td>
<td>4.644</td>
</tr>
<tr>
<td>Pair 6 IIEF5 2 months - IIEF5 3 months</td>
<td>-0.700</td>
<td>1.950</td>
</tr>
</tbody>
</table>

(P-value less than 0.05 is significant).

<table>
<thead>
<tr>
<th>Mean</th>
<th>Paired Differences</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std. Deviation</td>
<td></td>
</tr>
<tr>
<td>Pair 1 IIEF(5Q)before - IIEF(5Q) 1month</td>
<td>-0.100</td>
<td>0.305</td>
</tr>
<tr>
<td>Pair 2 IIEF(5Q)before - IIEF(5Q) 2months</td>
<td>-0.600</td>
<td>1.102</td>
</tr>
<tr>
<td>Pair 3 IIEF(5Q)before - IIEF(5Q) 3months</td>
<td>-0.700</td>
<td>1.264</td>
</tr>
<tr>
<td>Pair 4 IIEF(5Q) 1month - IIEF(5Q) 2months</td>
<td>-0.500</td>
<td>1.009</td>
</tr>
<tr>
<td>Pair 5 IIEF(5Q) 1month - IIEF(5Q) 3months</td>
<td>-0.600</td>
<td>1.163</td>
</tr>
<tr>
<td>Pair 6 IIEF(5Q) 2months - IIEF(5Q) 3months</td>
<td>-0.100</td>
<td>0.607</td>
</tr>
</tbody>
</table>

Table 1: Comparison between IIEF-5 score before and after treatment

Table 2: Comparison of Score of Question 5 (5 Q) of IIEF-5 (satisfaction of the patient) pretreatment&1, 2 and 3 months post treatment
Table 3: comparison of penile duplex parameters (PSV, EDV and cavernosal artery diameter) on both sides before and after treatment

<table>
<thead>
<tr>
<th>Mean</th>
<th>Paired Differences</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rt Cav. PSV Pre treatment - Rt Cav. PSV Post treatment</td>
<td>-4.5867</td>
<td>9.3489</td>
<td>1.7069</td>
<td>0.012</td>
</tr>
<tr>
<td>Rt Cav. EDV Pre treatment- Rt Cav. EDV Post treatment</td>
<td>1.4467</td>
<td>2.3047</td>
<td>0.4208</td>
<td>0.002</td>
</tr>
<tr>
<td>Rt Cav. Diameter Pre treatment - Rt Cav. Diameter Post treatment</td>
<td>-0.4400</td>
<td>0.1673</td>
<td>0.0306</td>
<td>0.000</td>
</tr>
<tr>
<td>Lt Cav. PSV Pre treatment- Lt Cav. PSV Post treatment</td>
<td>-4.1367</td>
<td>12.5999</td>
<td>2.3004</td>
<td>0.083</td>
</tr>
<tr>
<td>Lt Cav. EDV Pre treatment- Lt Cav. EDV Post treatment</td>
<td>1.4533</td>
<td>2.2717</td>
<td>0.4147</td>
<td>0.002</td>
</tr>
<tr>
<td>Lt Cav. Diameter Pre treatment - Lt Cav. Diameter Post treatment</td>
<td>-0.4167</td>
<td>0.1533</td>
<td>0.0280</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Rt: Right, Lt: Left, Cav.: Cavernosal artery, PSV: Peak systolic velocity, EDV: End diastolic velocity

Table 4: Comparison between response to ICI pre and post treatment for the improved group (10 patients):

<table>
<thead>
<tr>
<th>E3</th>
<th>1 cc prostin Response After</th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E4</td>
<td>E5</td>
<td></td>
</tr>
<tr>
<td>1 cc prostin Response Before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E3</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>E4</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Discussion

Our results revealed an improvement in IIEF 5 score after ICI of PRP in patients with erectile dysfunction not responding to medical treatment. This may be attributed to the release of growth factors by platelets when they come into contact with exposed endothelium within damaged cavernous tissues.

In the present study, analysis of the results showed a statistically significant improvement in penile hemodynamics on both sides such that, the right peak systolic velocity (PSV), End diastolic velocity (EDV) and diameter of cavernosal artery differed after treatment compared to pre treatment levels (p value 0.012, 0.002 and 0.000) respectively. Also, PRP therapy improved the left side PSV, EDV and cavernosal artery diameter but the difference was statistically significant only in the left cavernosal EDV and cavernosal artery diameter (p value 0.002 and 0.000) respectively. This implies that most of the hemodynamic parameters of the penis improved after PRP therapy. These results could be explained by the effect of growth factors present in platelet rich plasma especially vascular endothelial growth factor (VEGF) on angiogenesis and endothelium. Intracavernous delivery of VEGF-A gene or protein shown to restore erectile function in animal models of vasculogenic ED.

In the present study, there was a statistically significant improvement in response to ICI post treatment compared to pre treatment (p value 0.028). The improvement of ICI response after treatment may be a result of improvement in penile hemodynamics due to platelet rich plasma treatment or the effect of platelet rich plasma on cavernosal nerves regeneration. Our results come in line with a study done by WU CC et al.,
2012\(^9\) to assess the neuroprotective effect of platelet rich plasma injection in corpus cavernosum after bilateral cavernous nerve injury (rat model) and they concluded that PRP injection in the corpus cavernosum increased the number of myelinated axons and facilitated recovery of erectile function in the bilateral cavernous nerve injury rat model.

There were no reported side effects for PRP injection into the cavernous tissue during follow up of our patients. These results were supported by Kim et al., 2011\(^{10}\) who said that the technique is easy to be performed and has no important side-effects.

**Conclusion**

ICI of PRP could improve penile hemodynamics, response to ICI, patient satisfaction, erectile function and might be a salvage treatment for patients with severe erectile dysfunction who failed response to medical treatment.

**Funding:** Self-funding

**Ethical Clearance:** Cleared by the ethical committee of Andrology Department, Faculty of Medicine, Cairo University.

**No Conflict of Interest**

**Abbreviations:**

ICI: Intracavernosal injection
PRP: Platelet rich plasma
ED: Erectile dysfunction
PDE5: phosphodiesterase type 5
EF: Erectile function
IIEF-5: International Index of Erectile Function
PCDU: Penile Color Doppler Ultrasonography
PSV: Peak systolic velocity
EDV: End diastolic velocity
PGE1: prostaglandin E1

VEGF-A: vascular endothelial growth factor

**References**


Modulatory Effects of Concanavalin A and D 609 on Apoptotic Markers in Dimethylbenz (a) anthracene induced Breast Cancer in Rats

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Abstract

The present study was conducted to evaluate the chemopreventive efficacy and modulatory effects of concanavalin A and D609; either individually or in combination, on some apoptotic markers in Dimethylbenz (a) anthracene (DBMA) induced breast cancer in rats. Breast cancer was induced in adult female albino rats by injection of DMBA (50 mg/kg b. wt.). After 15 weeks, animals and divided into four groups. One group did not receive any treatment and served as a tumor group. The other three groups were injected with concanavalin A (of 20 mg/kg b. wt.) or D609 (50 mg / kg b. wt.) or both components together for a period of 8 weeks. At the end of experimental period, animals of control and treated groups were sacrificed and samples of breast tissues were obtained and prepared for analysis of the apoptotic markers Bcl-2 (B-cell leukemia/lymphoma 2), Bim (BcL2 interacting mediator), Bax (Bcl-2 associated X protein), Caspase 9, and Caspase 3. The results exhibited highly significant changes in apoptotic markers in cancer group as compared to normal control group, mainly represented by the increased levels of Bcl-2 and decreased levels of Bim, Bax and caspases 3 and 9. On the other hand, concanavalin A and D609 treatments induced significant modulatory effects on these markers. They induced significant decrease in Bcl-2 levels and increase in Bim, Bax and caspases 3 and 9 levels in all treated groups as compared to the DBMA-tumor group. These ameliorative changes were highly significant in the group of animals exposed to co-treatment of both materials. To conclude: the present study provides evidence that concanavalin A and D609 enhance apoptotic activity in DMBA-induced breast cancer in rats and suggests that the use of combination of the two therapies is recommended in the treatment of breast cancer.

Key Words: Apoptosis, Breast Cancer, concanavalin A, D609.

Introduction

Breast cancer is the second leading cause of death in women today (after lung Cancer) and it is the most common cancer among women worldwide (23% of all new cancer cases). In Egypt, represents 18.9% of total cancer cases (35.1% in women and 2.2% men)¹.

In general all types of carcinoma are occur in the absence of the suppressor protein P53, so in normal cells the transcription factor and tumor suppressor protein P53 plays a pivotal role in controlling the cell cycle, Apoptosis, Genomic integrity and genotoxic stress ².

Apoptosis (programmed cell death) is an operation that is genetically controlled causing cell death as a result of environmental or developmental signals³. ⁴. Apoptosis can be started throughout two pathways: intrinsic and extrinsic. In the intrinsic pathway, the cell kills itself because of sensing cell stress. In the extrinsic pathway, the cell kills itself as a result of signals from other cells⁵. Each of the pathways induces cell death by

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making caspases active, that are proteases, or enzymes, that decay proteins \(^6\). Apoptosis can be promoted by some factors such as Fas receptors \(^7\), whereas apoptosis can be inhibited by some of the Bcl-2 family members of proteins \(^8\).

There are at least two broad pathways that lead to Apoptosis, an “Extrinsic” and an “Intrinsic” Pathway. In both pathways, signaling results in the activation of a family of Cys (Cysteine) Proteases, named Caspases that act in a proteolytic cascade to dismantle and remove the dying cell. The extrinsic pathway begins outside a cell, when conditions in the extracellular environment determine that a cell must die. The intrinsic apoptosis pathway begins when an injury occurs within the cell. The injury could result in necrosis and produce an inflammatory response, but the apoptotic machinery is in place to ensure that the damaged cell is packaged and removed cleanly, in order to prevent inflammation. Apoptosis in Mitochondria is the best known intrinsic apoptosis pathway \(^9\).

The plant lectin Con A is derived from Jack beans is known to cross-link cell surface glycoproteins, there by initiating various cellular responses, including T-cell activation, D609 which targeting sphingomyelin synthase preventing the formation of sphynomyelin in membrane lipid raft and profound defect with impaired CD4+ T cell function with decreased level of II-6 and interferon-\(\gamma\) by Con A injection. D609 could attenuate the formation of ROS and oxidized –PC (OxPC) through its antioxidant/glutathione mimetic properties \(^10\).

The aim of this study is to evaluate chemo preventive efficacy of concanavalin A and D609, either in single or combined treatments, in DBMA –induced breast cancer in rats.

**Materials and Method**

Materials:

1- 7, 12 – dimethylbenz [\(\alpha\)] anthracene (DMBA) with a dose of (50 mg/kg bw) prepared as (120.0 nmol DMBA in 0.2 ml acetone) \(^11\).

2- Concaavalin A (Con A) with a dose of 20 mg/kg (Sigma Chemical) was administered intratumor in 200 microliters of sterile saline according to (12).

3- Potassium tricycle (5.2.1.0) - decan-8-yldithiocarbonate (D609) (50 mg / kg body wt) was prepared in phosphate-buffered saline according to \(^13\).

4- phosphatasebufferd saline (PBS) were dissolved in sterile double distilled H2O at a final concentration of 100Mm Stock solutions were aliquot and kept at 20\(^\circ\)C for long term storage.

All this chemicals were purchased from Sigma Chemicals Company U.S.A.

Animal grouping:

100 female albino rats about 150 – 200 gm. was divided into two main groups:-

2-A: Tumor group. Animals inducted to 1-Normal control group:

Animals (20 rats) (and served as normal control).

2- Inducted group:

80 rats inducted to cancer (breast carcinoma).

Cancer (breast carcinoma) and still without treatment.

2-B: Treated groups: animals receive treatments with different materials and divided into three subgroups:

B-1: receive treatments with Concanavalin A by injection intra tumor for 8 weeks ones per week.

B-2: receive treatments with D609 by injection intra tumor for 8 weeks ones per week.

B-3: receive treatments with Concanavalin by injection intra tumor and D609 by injection intra tumor for 8 weeks ones per week.

**Tumor Induction**

1- The first step was the incitation to tumor by injecting all animals with DMBA intra tumor portion (120.0 nmol DMBA in 0.2ml acetone). The 1st time on the day 30 from birth. Then at the days 50\(^{th}\), 80\(^{th}\) and 110 day with a dose of (50 mg/kg bw).

**Preparation of Tumor Homogenates:**

Tumor homogenates were prepared as follows: rats bearing tumor, with and without treatment, were sacrificed; samples of tumor tissue (5 - 10mm3) were cut weights of the tissues were recorded; and tumor tissues were rinsed with ice-cold PBS (0.01M, pH=7.4), weighed, minced, and then homogenized in PBS (9mL PBS per gram tissue) with a glass homogenizer on ice. The homogenates were centrifuged at 5000r.p.m for
5 min and supernatant was removed and frozen at -70°C. Similarly, normal control rats without tumor and samples of breast tissue (5 - 10 mm³) were treated as above.

Biochemical Analysis:

Results

Biochemical Analysis for apoptotic markers:

Table (1): Effect of the treatment with Concanavalin A, D609 either individual or together on BcL2, BIM, BAX, Caspase 9, and Caspase 3, levels in homogenate.

<table>
<thead>
<tr>
<th></th>
<th>Normal control group</th>
<th>Tumor group</th>
<th>Con A group</th>
<th>D609 group</th>
<th>Con A + D609 group</th>
</tr>
</thead>
<tbody>
<tr>
<td>BcL2 result (ng / L)</td>
<td>1.20 ± 0.10</td>
<td>3.31 ± 0.15</td>
<td>1.58 ± 0.07</td>
<td>2.00 ± 0.06</td>
<td>1.28 ± 0.09</td>
</tr>
<tr>
<td>BIM result (ng / L)</td>
<td>16.7 ± 0.98</td>
<td>9.40 ± 0.43</td>
<td>22.00 ± 2.22</td>
<td>19.40 ± 1.93</td>
<td>25.50 ± 1.73</td>
</tr>
<tr>
<td>BAX result (ng / L)</td>
<td>5.45 ± 0.17</td>
<td>2.29 ± 0.13</td>
<td>8.20 ± 0.20</td>
<td>7.38 ± 0.14</td>
<td>10.05 ± 0.39</td>
</tr>
<tr>
<td>Caspase 9 result (ng / ml)</td>
<td>2.17 ± 0.16</td>
<td>1.47 ± 0.17</td>
<td>3.91 ± 0.19</td>
<td>3.09 ± 0.19</td>
<td>4.52 ± 0.39</td>
</tr>
<tr>
<td>Caspase 3 result (ng / ml)</td>
<td>2.36 ± 0.08</td>
<td>1.36 ± 0.08</td>
<td>3.61 ± 0.12</td>
<td>2.91 ± 0.12</td>
<td>4.75 ± 0.19</td>
</tr>
</tbody>
</table>

(*) means significant Vs normal control (#) means significant Vs tumor group

(**) means high significant Vs normal control (##) means high significant Vs tumor group

() means non-significant Vs normal control ( ) means high significant Vs tumor group

BcL2 levels:

The differences between BcL2 levels in Con A, D609 and mix of ConA with D609 groups compared to normal control and Tumor groups were recorded in table (1), and figure (1). These results showed a high significant increase compared to the normal control in the group treated with cancavalin A and D609 (p < 0.000). The mixed treatment group showed non-significant increase compared to the normal control (p < 0.556). The tumor group showed a significant increase compared to normal group. A high significant decrease in all treated groups compared to the tumor group (p < 0.000).

Figure (1): BcL2 mean levels

Bim levels:

The comparisons between Bim levels in Con A, D609 and mix of ConA with D609 treated groups compared to normal control and Tumor group were recorded in table (1), and figure (2). These results showed a highly significant increase in Concanavalin A group compared to the normal group (p < 0.000) and a high significant increase in D609 group compared to the normal control (p < 0.01). The mixed treatment group showed highly significant increase compared to the normal control (p < 0.000). A high significant increase in all treated groups
compared to the tumor group (p < 0.000). There was a highly significant decrease in tumor group in comparison to normal control (p < 0.000).

**Figure (2): Bim mean levels between**

**BAX levels:**

The differences between BAX levels in con A, D609 and mix of Con A with D609 groups compared to normal control and Tumor groups were recorded in table (1), and figure (3). showed a high significant increase in all treated groups (p < 0.000) compared to the normal control group. A high significant increase in all treated groups compared to the tumor group (p < 0.000).

**Figure (3): BAX mean levels.**

**Caspase 9 levels:**

The differences between Caspase 9 levels in con A, D609 and mix of Con A with D609 groups compared to normal control and Tumor group were recorded in table (1), and figure (4). showed a high significant increase in all groups compared to normal control (p < 0.000). A high significant increase in all treated groups compared to the tumor group (p < 0.000).

**Figure (4): Caspase 9 mean levels.**

**Caspase 3 levels:**

The differences between Caspase 3 levels in con A, D609 and mix of Con A with D609 groups compared to normal control and Tumor groups were recorded in table (1), and figure (5). showed a high significant increase in all groups compared to the normal control (p < 0.000). A high significant increase in all treated groups compared to the tumor group (p < 0.000).

**Figure (5): Caspase 3 mean levels**

**Discussion**

It is now accepted that efficacy of chemotherapeutic drug is related to its ability to induce apoptosis; therefore, apoptosis represents a vital target in cancer therapy. In this study chemopreventive efficacy of concanavalin A and D609, was evaluated in DBMA -induced breast cancer in rats. DMBA-induced changes in apoptotic markers analyzed in the present study showed increased anti-apoptotic and decreased pro-apoptotic marker levels compared to control animals (Table1). Enhanced oxidative stress and disruption of tissue redox balance 14 and evasion of apoptosis15. The increase of Bcl-2 concentration and decreased levels of Bax, Bim and caspases 3 and 9 in DBMA-treated animals in this study indicate a principal role of apoptotic pathway dysfunction in breast carcinogenesis.
In this study, caspase-3 and caspase-9 levels were low in DBMA-induced breast cancer in rats. The decreased levels of caspase-3 and caspase-9 expression in breast tumors have been reported in previous studies.

Menget al. (2004) found that breast tumor samples lacked the caspase-3 transcript and caspase-3 protein expression, 17.

Tricyclodecan-9-yl-xanthogenate (D609) has been used as an inhibitor of phosphatidylcholine-specific phospholipase. It impairs proliferation of different cell types, including cancer cells and considered a selective tumor cytotoxic agent. Therefore, this study examined its therapeutic effect in combination with concanavalinA on breast cancer in rats. The results showed that D609 induced changes in apoptotic markers 18, 19.

However, the results of caspases analysis in this study exhibited elevated levels in groups of animals treated with D609 either alone or in combination with concanavalinA treatment. Similarly, it has been also demonstrated that caspase-9-deficiency impairs ceramide-induced apoptosis in Jurkat T cells 20.

Generally, all apoptotic markers investigated in the present study exhibited highly significant changes in group of animals exposed to co-treatment of both concanavalin A and D609 as compared to control or to group treated with each component alone. The results obtained indicate synergistic action of the two components in activation of apoptosis in DMBA-induced breast cancer. Since the therapeutic compounds affect cancer cells at different points in the cell cycle, it was recently reported that the use of combination of different drugs increases the chance that all of the cancer cells could be eliminated 21.

**Conclusion**

In conclusion, the present study provides evidence that Concanavalin A and D609 exert many effects on apoptosis in DMBA-induced breast cancer in rats and suggests that the use of combination of the two therapies is recommended in the treatment of breast cancer.

**Ethical Clearance:** Cleared by the ethical committee of Medical Physiology Department, National Research Centre, Egypt

**Conflict of Interest:** The authors declare that there is no conflict of interest in this study.

**Funding Resources:** None.

**References**

11. induced Jurkat leukemia T cell apoptosis. Biochim.


Hippotherapy versus Traditional Physiotherapy on Gait in Spastic Diaplegic Children

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Abstract

Objectives: The objective of this review is to determine the effect of hippo therapy on hip angles during stance phase in diaplegic children.

Method: Thirty diaplegic cerebral palsied children of both sexes, ranged in age from 9 to 11 years enrolled in this study. They randomly assigned into two groups of equal number; control group (A), study group (B). Group (A) groups received the conventional neurodevelopmental physical therapy plan for such cases. Whereas group (B) received the same conventional physical therapy program in addition to hippo therapy program for 45 minute. All children were assessed before and after the treatment program by using 2D video based gait assessment system to measure the hip angles during stance phase.

Results: This study showed a statistically significant improvement in both groups by comparing the mean values of all measured variables before and after treatment. There were significant differences between groups A and B in favor of group B with respect to all assessed variables when comparing the post-treatment outcomes.

Conclusion: Our results suggest that hippo therapy program can be included as an alternative therapeutic modality to enhance hip angles in children with spastic diplegia.

Key words: Cerebral palsy, Hippo therapy, Spastic Diaplegia.

Introduction

Cerebral palsy (CP) is a disorder of movement and postural control that results from an insult to the developing fetal or infant brain. The diagnosis of gait varies greatly between patients. As a result of irregular muscle activity or bone loading, secondary impairments can develop over time, such as shortened muscles, which limit the joint range of motion. Both primary and secondary impairments manifest in a pathological pattern of CP gait. Children with CP suffer a high-energy cost when walking as high as three to four times that of non-disabled children. In addition, this cost usually increases with age. Over time, the high energy cost ill cause a deterioration in the act of walking. Regarding the Topographic classification of CP: spastic diaplegic CP children are characterized by hypertonia; the lower limbs are more affected than the upper limbs. Physical problems that face the spastic diplegia include: abnormal gait pattern, poor postural reactions, hypertonia, and deformities. Hippotherapy is a rehabilitation technique that uses equine motion to achieve improvement in different neurological disorders. There are many benefits of horseback riding therapy in CP children included control of hypertonia and improvement of motor control, balance and locomotion.

Method

30 spastic diaplegic children (Twenty boys and ten girls) participated in this study. They had been selected regarding the following criteria: their age ranged from 9 to 11 years, diagnosed as spastic diaplegic CP. spasticity; ranged from grade 1 in the upper limb to 1+ in the lower limb according to Modified Ashworth Scale.
The gross motor development ranged from II to III, according to Gross Motor Function Classification System (GMFCS). All participants could understand & follow orders. They had enough hip abduction to sit with no fixed contractures or deformities of the spine, upper or lower extremities, visual or respiratory disorders. All children’s parents gave their informed consents to have their children participated in the study. They were assigned randomly into two groups: (Group A) 15 children in this group were received a traditional training program as follows: Facilitation of postural mechanism, Proprioceptive training, standing facilitation exercise, gait training activities, up and down stairs and jumping in place. (Group B) 15 children in this group were received a traditional training program given to group A in addition to hippotherapy program (45 minutes/session, 2 session/week for 12 weeks).

For evaluation: Tracker Video Analysis and Modeling Tool (2D video based gait assessment system), it is a free video analysis tool based on the open source physics (OSP) java platform. It is designed to model and analyze object movement in videos by overlaying basic dynamic models directly to the location of videos and extracts. The children walked over 2 meters pathway and a digital video camera (canon) was set up so that it could record the subjects in the sagittal plane on a level tripod, perpendicular to the center of the pathway at a distance of 3 meters. This setting ensured that the calibration area covered the lower limb then the video was analyzed by tracker software.

**Data Analysis**

Mean and standard deviation calculated for all measured variables. Parametric measures (paired and unpaired t-test) used to analyze the mean values of the hip angle before and after the interventions for both groups. Computer program SPSS (version 20) used to analyze data. Statistical tests considered significant if (p < 0.05).

**Results**

In this study, we used tracker software for measuring hip angles during stance phase. The results of this study pre-treatment showed that there were no significant differences between the two groups in all measured parameters and comparison of pre-treatment and post-treatment results of hip angles indicated significant improvements in both groups. Comparison of both groups’ post-treatment results of hip angles indicated significant improvements in favor of group B.

### Table 1: Demographic characteristics of children in two groups

<table>
<thead>
<tr>
<th></th>
<th>Group A (N=15)</th>
<th>Group B (N=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>9.76±0.82a</td>
<td>9.83± 0.69a</td>
</tr>
<tr>
<td>Height</td>
<td>132.26±1.09a</td>
<td>132±1.13a</td>
</tr>
<tr>
<td>Weight</td>
<td>29.10±1.41a</td>
<td>29.30±1.46a</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>7(46.66%)b</td>
<td>6(40%)b</td>
</tr>
<tr>
<td>Boys</td>
<td>8(53.33%)b</td>
<td>9(60%)b</td>
</tr>
</tbody>
</table>

* Values are mean ± standard deviations, \( \text{b} \) Frequency (percentage)

### Table 2: Statistical analysis of right hip angles within groups

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre ( \bar{X} \pm SD )</td>
<td>Post ( \bar{X} \pm SD )</td>
</tr>
<tr>
<td>Initial contact</td>
<td>41.20±1.14</td>
<td>37.20±1.20</td>
</tr>
<tr>
<td>Loading response</td>
<td>40.46±0.99</td>
<td>36.66±0.89</td>
</tr>
<tr>
<td>Mid stance</td>
<td>31.33±1.29</td>
<td>16.26±1.33</td>
</tr>
<tr>
<td>Terminal stance</td>
<td>31.00±1.19</td>
<td>19.93±1.27</td>
</tr>
<tr>
<td>Pre swing</td>
<td>30.80±1.08</td>
<td>19.53±1.80</td>
</tr>
</tbody>
</table>

\( \bar{X} \): Mean; SD: Standard Deviation; t-value: paired t test; *Significant at p<0.05
### Table 3: Statistical analysis of left hip angles within groups

<table>
<thead>
<tr>
<th>Stance phase</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre $\overline{X} \pm SD$</td>
<td>Post $\pm SD$</td>
</tr>
<tr>
<td>Initial contact</td>
<td>40.93±2.31</td>
<td>39.13±1.40</td>
</tr>
<tr>
<td>Loading response</td>
<td>40.53±0.74</td>
<td>38.53±0.83</td>
</tr>
<tr>
<td>Mid stance</td>
<td>31.66±1.23</td>
<td>18.93±2.01</td>
</tr>
<tr>
<td>Terminal stance</td>
<td>30.73±1.16</td>
<td>20.33±1.17</td>
</tr>
<tr>
<td>Pre swing</td>
<td>31.06±1.27</td>
<td>20.73±1.22</td>
</tr>
</tbody>
</table>

$\overline{X}$: Mean; SD: Standard Deviation; t-value: paired t test; *Significant at p<0.05

### Table 4: Statistical analysis of right hip angles among groups

<table>
<thead>
<tr>
<th>Stance phase</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre $\overline{X} \pm SD$</td>
<td>Post $\pm SD$</td>
</tr>
<tr>
<td>Initial contact</td>
<td>41.20±1.14</td>
<td>41.00±1.13</td>
</tr>
<tr>
<td>Loading response</td>
<td>40.46±0.99</td>
<td>40.20±0.77</td>
</tr>
<tr>
<td>Mid stance</td>
<td>31.33±1.29</td>
<td>31.26±1.22</td>
</tr>
<tr>
<td>Terminal stance</td>
<td>31.00±1.19</td>
<td>30.80±1.14</td>
</tr>
<tr>
<td>Pre swing</td>
<td>30.80±1.08</td>
<td>30.93±1.09</td>
</tr>
</tbody>
</table>

$\overline{X}$: Mean; SD: Standard Deviation; t-value: Unpaired t test; *Significant at p<0.05

### Table 5: Statistical analysis of left hip angles among groups

<table>
<thead>
<tr>
<th>Stance phase</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre $\overline{X} \pm SD$</td>
<td>Post $\pm SD$</td>
</tr>
<tr>
<td>Initial contact</td>
<td>40.93±2.31</td>
<td>40.80±1.08</td>
</tr>
<tr>
<td>Loading response</td>
<td>40.53±0.74</td>
<td>40.33±0.97</td>
</tr>
<tr>
<td>Mid stance</td>
<td>31.66±1.23</td>
<td>31.13±1.24</td>
</tr>
<tr>
<td>Terminal stance</td>
<td>30.73±1.16</td>
<td>30.73±1.16</td>
</tr>
<tr>
<td>Pre swing</td>
<td>31.06±1.27</td>
<td>30.80±1.08</td>
</tr>
</tbody>
</table>

$\overline{X}$: Mean; SD: Standard Deviation; t-value: Unpaired t test; *Significant at p<0.05
Discussion

This study investigated the effectiveness of hippotherapy program in children with spastic diaplegia that represents the main community of spastic types of CP. This reporting was verified by Yokoshi\(^{10}\) who stated that spastic diaplegia is the main common type of CP accounting for about 44% of CP and about 80% of pre mature infants.

The results of the current study revealed that there was significant improvement in group A and B regarding hip angles with comparison with the pre-treatment results. These findings were supported by McGee, et al.\(^{11}\) in their study who concluded that hippo therapy has a beneficial effect on motor efficiency in cerebral palsy children. Hippo therapy tends to be a therapeutic technique and a way to improve physical outcomes in cerebral palsy children. Hippo therapy is a successful animal-assisted therapy in cerebral palsy children\(^{12}\). The result of the study groups at the end of the treatment period showed significant improvement in hip angles in different gait phases which could attribute to the effect of hippo therapy program help in improvesgait parameters. This finding comes in agreement Kwon et al.\(^{13}\) with who stated that the beneficial effect of hippotherapy on gaitcerebralpalsychildren.

The result of the study groups at the end of the treatment period showed significant improvement in hip angles which may be attributed to the effect of vestibular stimulation over time would enhance sensory integration, standing and walking in individuals with cerebral palsy. These finding support that vestibular stimulation can enhance arousal rates, visual exploratory activity, motor development, balance, and reflex coordination in at-risk infants and developmental retardation disorders\(^{14}\).

The findings of this study provided evidence that good sensory integration involves stimulation of the vestibular, proprioceptive and tactile systems, as a means of exploring new skills. The activities pitched at a level, which stimulates and challenges, but is within the child’s capabilities. The effectiveness of facilitation of sensory integration through the vestibular stimulation is a major component of sensory integrative treatment\(^{15}\).

The horse’s rhythmic symmetrical walking movement could be an important factor, constantly moving the child back and forth across the midline, while the horse’s girth provides the adductor muscles with a gentle, steady stretch. The powerful thrusts of the horse’s legs provide good vestibular and proprioceptive stimulation and body awareness, while regular minor postural changes help the child develop a more normal sense of midline and weight-bearing symmetry.

The findings of the present study revealed that there was a significant improvement in hip angles in the study groups which may be attributed to the effect of hippo therapy that boost the maximum functional potential of a child thus reducing the impact of adductor hyperactivity and weight-bearing asymmetry. These come in agreement with the finding of Benda et al.\(^{16}\).

Conclusion

From the obtained results, it concluded that hippotherapy improve hip angles during stance phase in spastic diaplectic children.

Acknowledgement: The authors would like to express their appreciation to all the children and their parents for their co-operation and participation in this study.

Ethical Clearance: Cleared by the Ethical Committee, Faculty of Physical Therapy, Cairo University.

Conflict of Interest: The authors declare that there is no conflict of interest in this study.

Funding Resources: None.

References


The Value of Regional 2D Longitudinal Strain Analysis during Dobutamine Stress Echocardiography in Detecting the Culprit Coronary Territory

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¹Assistant Lecturer, ²Lecturer, ³Assistant Professor, ⁴Professor, Cardiovascular Department, Faculty of Medicine, Cairo University, Egypt

Abstract

Aim: To evaluate the diagnostic value of analyzing the regional longitudinal strain by 2D speckle tracking modality during dobutamine stress echocardiography (DSE) in detecting the culprit disease in either coronary circulation.

Methodology: Prospectively 101 symptomatic patients at intermediate pretest probability for CAD were studied within one month by DSE, followed by coronary angiography. The 3 standard apical views were acquired both at rest and peak stress at an average frame rate of 70/sec. The following indices: longitudinal peak systolic strain (LS), longitudinal peak systolic strain rate (LSRs), and longitudinal early diastolic strain rate (LSRd) were obtained from each segment of the 17 segment model. Regional strain was calculated as the mean of strain parameters of all 10 segments representing the anterior coronary circulation and of the 7 segments representing the posterior coronary circulation separately. Coronary stenosis ≥ 50% was considered significant.

Results: 52 patients had normal or mild CAD, the 49 patients with significant CAD were classified into ACC group n=21, and PCC group n=22. Those with mixed territory disease (n=17) were excluded from final analysis.

At rest, LS & LSRs were significantly lower in PCC than ACC group (-19.46±2.6 vs -21.76±2.5, p: 0.007 and -1.23±0.17 vs -1.49±0.33, p: 0.015 respectively).

At peak stress, all strain parameters were significantly different between the two groups regardless of the involved territory. In Receiver Operator Characteristics analysis, peak stress LS in either ACC and PCC territories showed the largest area under the curve: 0.9 (p<0.001) and 0.88 (p<0.001) respectively. The mean LS at cutoff value of -21% & -20% had 90.5% sensitivity and 88.5% specificity for detecting significant ACC disease, and 81.8% sensitivity and 79% specificity for detecting significant PCC disease respectively.

Conclusion: Baseline regional strain analysis has the potential to detect significant CAD in PCC territory. At peak stress the longitudinal systolic strain can detect significant disease in either coronary territory with high sensitivity and specificity.

Key words: Dobutamine stress echocardiography – 2D speckle tracking – Regional strain analysis – Intermediate pretest probability

Introduction

Dobutamine stress echocardiography (DSE) is a well-validated, non-invasive method for the assessment of myocardial ischemia. But the conventional assessment of wall motion abnormalities (WMA) is subjective...
and relies on assessing the magnitude of myocardial thickening and endocardial excursion, neglecting the longitudinal deformation which is the most susceptible to ischemia.

Myocardial strain and strain rate (SR) are quantitative parameters measured by 2D speckle tracking echocardiography (2D-STE) and can overcome these limitations. They are angle-independent, semi-automated and reproducible.

The integration of the 2D derived global longitudinal strain (GLS) analysis with the conventional DSE protocol resulted in better diagnostic accuracy in the diagnosis of CAD. However, the diagnostic accuracy of regional longitudinal strain analysis during DSE to predict the culprit territory is still unknown.

Method

Study population

This is a prospective observational study conducted on patients presenting to the cardiology outpatient clinic of Cairo University Hospitals for evaluation of myocardial ischemia between April 2015 and February 2017. Symptomatic patients with moderate pretest probability of CAD (based on age, gender and symptoms analysis).

Patients with significant structural heart disease were excluded and also those with suboptimal acoustic windows or persistent arrhythmia to ensure adequate tracking.

All eligible patients were scheduled for DSE with offline STE analysis followed by coronary angiography (CA) within 1 month. Written informed consent was obtained from all patients. The research protocol was approved by the Cairo University Faculty of Medicine Ethical Committee.

Dobutamine stress echocardiography

DSE was performed according to a standard protocol. All studies were performed with an iE33 ultrasound machine (Philips Medical Systems, USA), equipped with the 2.5 MHz S5-1 transducer in the left lateral decubitus with continuous ECG monitoring.

A quad-screen display of equivalent views at each stage was used for analysis. The 17-segment model of the left ventricle was used. Wall motion score index (WMSI) [= sum of all scores divided by the number of analyzed segments] was calculated at peak stress and compared to baseline.

Two-dimensional Speckle tracking

Image acquisition

The apical 4-, 2-and 3-chamber views were acquired at rest and peak stress according to the American Society of Echocardiography (ASE) and European Association of Cardiovascular Imaging (EACVI) recommendations. Patients were asked to hold their breaths for few seconds during image acquisition to minimize translation movement of the heart. Gain, depth and sector width were adjusted to set the frame rate between 60 to 80 frames/sec. One stable well-defined cardiac cycle was acquired for each view and stored digitally for offline analysis.

Image analysis

Each segment of the 17-segment model was analyzed for the following 2D STE derived indices both at rest and at peak stress: (Figure 1)

- Longitudinal peak systolic strain (LS): The maximum negative deflection of the strain before the aortic valve closure (AVC) (%)

- Longitudinal peak systolic strain rate (LSR): The maximum negative deflection of the strain rate before AVC (s-1).

- Longitudinal peak early diastolic strain rate (LSRd): The maximum positive deflection immediately after the AVC (s-1).

Figure 1. Measuring the longitudinal systolic and diastolic strain rate.
Analyzed four-chamber view, the dashed curve represents the mean values of all segments. Point 1 refers to the peak systolic strain rate. Point 2 refers to the early diastolic strain rate. Point 3 refers to the late diastolic strain rate.

Regional strain was obtained by calculating the mean of the longitudinal strain parameters of all segments representing the anterior coronary circulation (ACC) supplied by the left anterior descending artery (LAD): 10 segments; or representing the posterior coronary circulation (PCC) supplied by the right coronary (RCA), left circumflex (LCX) or both arteries: 7 segments.

Patients with significant CAD were classified into isolated ACC territory and isolated PCC territory while those with mixed territory were excluded from final analysis. The mean values of different longitudinal strain parameters of the echocardiographic segments representing either group were compared to the mean values of the corresponding segments in the group of non-significant CAD (control group), both at rest and at peak stress.

Receiver operating characteristics curve (ROC) analysis was done for WMSI and for each strain parameter, to determine the optimal cut-off values that can predict the culprit artery in either territory with good accuracy. The area under the curve (AUC) was calculated: values close to 1.0 indicate high diagnostic accuracy. In all tests, a p-value < 0.05, was considered as statistically significant.

Results

Baseline characteristics

One hundred and one patients completed the study protocol. The mean age was 53 (±8) years, 43.6% were males. According to CA results, 52 patients (51.5%) had normal or mild CAD, and 49 patients (48.5%) had significant CAD. The latter group was further classified into 2: ACC group (n: 21) representing ACC territory disease, and PCC group (n: 11) representing PCC territory disease. Seventeen patients had mixed territorial affection and were excluded from the final analysis.

Diagnostic accuracy of DSE in the ACC & PCC territories

DSE had 90.57% negative predictive value (NPV) and 80% positive predictive value (PPV) to detect significant ACC territory disease; with a diagnostic accuracy of 87.67%. While for PCC territory, DSE had 92.3% NPV and 63.6% PPV to predict significant disease; with a diagnostic accuracy of 87.3%.

WMSI peak stress cut-off value of 1.05 had 62% sensitivity and 81% specificity to detect ACC territory disease (AUC: 0.82, p < 0.001) and 54% sensitivity and 81% specificity to detect PCC territory disease (AUC: 0.80, p < 0.001).
Regional strain analysis

At rest, there were no significant differences between the ACC group and the control in all longitudinal strain parameters while for the PCC, the LS and LSRs were significantly lower than in the normal/mild CAD group.

At peak stress, all patients with the ACC and PCC territorial disease had significantly lower longitudinal strain parameters compared to the normal/mild CAD group except only the LSRd in the PCC group which was only marginally lower than the normal/mild CAD group (Table 1).

ROC analysis of longitudinal strain parameters

Longitudinal peak systolic strain at peak stress had the highest AUC in both ACC & PCC territories (0.9 & 0.88 respectively with p <0.001 for both of them). The corresponding cutoff values to determine the sensitivity and specificity to predict significant CAD in different territories are shown in table 2. Case demonstrating the diagnostic performance of DSE with regional strain analysis is illustrated in figure 3.

**Table (1). The different ACC and PCC longitudinal strain parameters versus the control group at both rest and peak stress.**

<table>
<thead>
<tr>
<th>Strain</th>
<th>ACC (n:21)</th>
<th>Normal/mild CAD (n:52)</th>
<th>p</th>
<th>PCC (n:11)</th>
<th>Normal/mild CAD (n:52)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Rest</td>
<td>LS (%)</td>
<td>-21.7±1.8</td>
<td>-22.3±2.3</td>
<td>0.33</td>
<td>-19.4±2.6</td>
<td>-21.7±2.5</td>
</tr>
<tr>
<td></td>
<td>LSRs (s-1)</td>
<td>-0.91±0.17</td>
<td>-0.89±0.16</td>
<td>0.8</td>
<td>-1.23±0.17</td>
<td>-1.49±0.33</td>
</tr>
<tr>
<td></td>
<td>LSRd (s-1)</td>
<td>1.44±0.3</td>
<td>1.42±0.31</td>
<td>0.75</td>
<td>1.15±0.27</td>
<td>1.41±0.42</td>
</tr>
<tr>
<td>During stress</td>
<td>LS (%)</td>
<td>-18.09±2.8</td>
<td>-22.85±2.4</td>
<td>&lt;0.001</td>
<td>-17.59±2.8</td>
<td>-21.66±2.5</td>
</tr>
<tr>
<td></td>
<td>LSRs (s-1)</td>
<td>-1.89±0.55</td>
<td>-2.49±0.34</td>
<td>&lt;0.001</td>
<td>-1.99±0.43</td>
<td>-2.45±0.34</td>
</tr>
<tr>
<td></td>
<td>LSRd (s-1)</td>
<td>1.65±0.48</td>
<td>1.99±0.53</td>
<td>0.01</td>
<td>1.60±0.34</td>
<td>1.93±0.57</td>
</tr>
</tbody>
</table>

Values are expressed as mean ±SD. p value is statistically significant if <0.05.

**Table (2). ROC analysis for different ACC and PCC-derived strain parameters.**

<table>
<thead>
<tr>
<th>ACC Strain parameter</th>
<th>AUC</th>
<th>p</th>
<th>Cut-off value</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress LS</td>
<td>0.90</td>
<td>&lt;0.001</td>
<td>-21%</td>
<td>90.5%</td>
<td>88.5%</td>
</tr>
<tr>
<td>Stress LSRs</td>
<td>0.85</td>
<td>&lt;0.001</td>
<td>-2.34</td>
<td>85.7%</td>
<td>71.2%</td>
</tr>
<tr>
<td>Stress LSRd</td>
<td>0.66</td>
<td>0.024</td>
<td>1.93</td>
<td>76%</td>
<td>55%</td>
</tr>
<tr>
<td>PCC Strain parameter</td>
<td>AUC</td>
<td>p</td>
<td>Cut-off value</td>
<td>Sensitivity</td>
<td>Specificity</td>
</tr>
<tr>
<td>Rest LS</td>
<td>0.74</td>
<td>0.01</td>
<td>-21</td>
<td>72%</td>
<td>63.5%</td>
</tr>
<tr>
<td>Rest LSRs</td>
<td>0.72</td>
<td>0.02</td>
<td>-1.33</td>
<td>81.8%</td>
<td>63.5%</td>
</tr>
<tr>
<td>Stress LSRs</td>
<td>0.78</td>
<td>0.004</td>
<td>-2.20</td>
<td>72.7%</td>
<td>73%</td>
</tr>
</tbody>
</table>

p value <0.05 is considered statistically significant.
Figure 3. Case demonstration of the diagnostic performance of regional strain analysis.

Upper row: Bull’s eye of the 17 segments showing global and regional strain analysis (A) Rest LS of PCC and ACC territories = -18.5% and -20% respectively. GLS= -19% (B) At peak stress: LS of PCC and ACC= -15.9% and -19.3% respectively. GLS=-18%.

Lower row: (C) Right coronary angiography showed subtotal occlusion of the mid RCA. (D) Left coronary angiography showed mid LAD 70% stenosis.

Discussion

The diagnostic performance of the STE-derived strain parameters in the ACC territory was superior to those of the PCC territory. This was concordant to the results of previous studies.\textsuperscript{11,12} As 2D-STE depends on the image quality, the lateral and posterior walls (PCC territory) are usually the most susceptible to drop out and excessive “in and out” motion with subsequent poor tracking, particularly at peak DSE stress with high heart rates. Therefore, the diagnostic accuracy of regional strain analysis of this territory is reduced. Hanekomet et al\textsuperscript{11} reported the same finding; STE strain was feasible and accurate in the ACC territory only. However, in our study, we showed that the mean LS was just more accurate in the ACC territory (sensitivity and specificity: 90.5% & 88.5% respectively), but it could still be applied in the PCC territory with relatively good sensitivity and specificity (81.8% & 79% respectively). This difference in results is because of some differences in the methodology. Hanekomet et al\textsuperscript{11} studied every myocardial segment separately, then chose a single “sentinel” segment with the highest AUC that represented every artery (LAD vs LCX vs RCA). In our study, we divided the heart into two territories from the beginning (ACC vs PCC) including several segments in every territory and avoided the overlap between LCX and RCA -due to dominance- by putting them in one group. Moreover, we included patients with intermediate pretest probability and excluded those with previous MI. On the contrary, Hanekom et al.\textsuperscript{11} included patients with previous CAD and baseline RWMA.

Furthermore, we showed that even at rest, the regional strain analysis may detect significant CAD in the PCC territory, but with modest sensitivity and specificity (72% & 81.8% respectively). A similar finding was shown by Aggeli et al\textsuperscript{12} who studied a similar cohort of patients using the same vendor for 2D strain analysis. The relatively smaller number of myocardial segments in the PCC territory may explain this finding. Minor changes in few segments in response to myocardial ischemia could be easily amplified causing detectable changes in STE strain at rest in this territory.

Conclusion

Regional strain analysis could detect significant CAD in ACC and PCC territories with high sensitivity and specificity at peak stress. At rest, it could detect significant disease in the PCC territory only.

Funding: Self funding

Ethical Clearance: Cleared by the ethical committee of Cardiovascular Department, Faculty Of Medicine, Cairo University, Egypt

No Conflict of Interest

Abbreviations

ACC: Anterior coronary circulation
AUC: Area under the curve
CA: Coronary angiography
CAD: Coronary artery disease
2DSTE: Two dimensional speckle tracking echocardiography
DSE: Dobutamine stress echocardiography
LS: Longitudinal systolic strain
LSR: Longitudinal systolic strain rate
GLS: Global longitudinal strain
NPV: Negative predictive value
References


Anterolateral Versus Posterior Approach in Management of Lower Dorsal and Upper Lumbar Traumatic & Pathological Spine Fractures

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¹Assistant Lecturer, ²Lecturer, Neurosurgery Department, Faculty of Medicine, Fayoum University, Egypt, ³Professor, Neurosurgery Department, Faculty of Medicine, Cairo University, Egypt

Abstract

Purpose: comparing anterolateral versus posterior approach in decompression and stabilization of spine.

Study design: prospective comparative study.

Patients and Method: thirty patients have lower dorsal and upper lumbar spine fractures operated upon in the period from January 2016 to July 2017.

Results: Surgical management of thoracolumbar burst and pathological fractures, Anterolateral approach have not significant superior to posterior approach in terms of recovery neurological function and maintaining normal life activities. Anterior approach was better than posterior approach in rapid improvement of sphincteric control in patients with incomplete cord injury with sphincteric troubles.

Keywords: Thoracolumbar, anterolateral approach, posterior approach, laminectomy, corpectomy.

Introduction

Incidence thoracolumbar spine injuries were about 2% to 7.5% after blunt trauma to the back. 19% to 50% of these injuries have associated neurological deficits. Injuries to thoracolumbar spine could associated with disability.¹

Thoracolumbar spine was transition point between rigid thoracic spine and flexible lumbar spine and predisposed to unique fracture patterns and neurological deficits. Increase prevalence injury at T11-L1 levels than more proximal aspects of thoracic spine or distal lumbar spine.²³

The aims of surgical management of traumatic & pathological spinal fractures are similar: decompression of neural elements, correction of deformities, stabilization of the spine and obtaining tissue for pathology or culture in case of pathological fractures.⁴⁵

In general, surgery for thoracolumbar extradural compressive spine fractures could happen from posterior, anterior or combined approaches.⁶

An anterior approach used primarily for thoracolumbar burst fractures and pathological fractures in where corpectomy and anterior reconstruction required to decompress retropulsed fragments of bone directly off ventral dura or provide immediate reconstruction of the anterior weight-bearing column.⁷

Anterior approaches to pathological infective and neoplastic spine in thoracic and thoracolumbar spine have been described with the advantages of better exposure, allowing more extensive debridement or tumourenbloc excision and better decompression of the cord and more effective bone grafting and biomechanical reconstruction.⁸¹⁰
Patients and Methodology

This study was prospectively conducted on 30 patients with lower dorsal and upper lumbar traumatic and pathological spine fractures operated upon in the period from January 2016 to July 2017 in the Neurosurgery Department, Cairo University and Neurosurgery Department, Fayoum University.

Inclusion criteria:

- All cases of lower thoracic and upper lumbar traumatic and pathological spine fractures.

Exclusion criteria:

- Patients with spine fractures above level of T8 or below level of L2.
- Comorbidities that would prevent an operative procedure.

Patients subjected to thorough history and clinical studies.

Radiological investigations:

- X-Ray thoracolumbar spine with anteroposterior (AP) and lateral views.
- MRI of the thoracolumbar spine.
- CT thoracolumbar spine.

4- Surgical procedures:

Patients were classified in two groups

Group A:

15 patients were operated upon via posterior approach by pedicular screws fixation and decompressive laminectomy.

Group B:

15 patients were operated upon via anterolateral approach by decompressive corpectomy and fusion by grafting and fixation.

5- Postoperative treatment:

Medical treatment:

Antibiotics, analgesics, gastric protecting drugs, I.V fluids.

Physiotherapy:

All patients were referred to physiotherapy.

Bladder training:

All patients were conducted to bladder training.

1. Follow Up and outcome:

a. Full neurological examination.

b. Improvement of back pain were assessed.

c. Post-operative X-ray and CT of thoracolumbar spine.

Results

Table (1) illustrates that there is no statistically significant difference with p-value >0.05 between two study procedures as regards preoperative affection of motor and sphencteric dysfunction and grade of motor paralysis which indicated proper matching between both procedures before intervention.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Procedure</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posterior fixation &amp; laminectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corpectomy &amp; Lateral fixation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Sphincteric dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>73.3%</td>
<td>11</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>26.7%</td>
<td>4</td>
</tr>
<tr>
<td>Motor dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>100%</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Grades of MP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cont.. Table (1): Comparisons of pre-operative evaluation in different study procedures.

<table>
<thead>
<tr>
<th>Grade of MP operation</th>
<th>Procedure</th>
<th>Posterior fixation &amp; laminectomy</th>
<th>Corpectomy &amp; Lateral fixation</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Before operation</td>
<td>2</td>
<td>1.6</td>
<td>1.3</td>
<td>1.6</td>
<td>0.3</td>
</tr>
<tr>
<td>After operation</td>
<td>2.5</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table (2) illustrates that there is no statistically significant difference with p-value >0.05 between two study procedures as regards mean grades of MP which indicated proper matching between both procedures before intervention with mean of MP grade between grade I, and II and also both procedure achieve same outcome and improvement with increase the grade to be between grade II, and III.

Table (2): Comparisons of pre and post-operative MP grades in different study procedures.

<table>
<thead>
<tr>
<th>Grade of MP operation</th>
<th>Procedure</th>
<th>Posterior fixation &amp; laminectomy</th>
<th>Corpectomy &amp; Lateral fixation</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Before operation</td>
<td>2</td>
<td>1.6</td>
<td>1.3</td>
<td>1.6</td>
<td>0.3</td>
</tr>
<tr>
<td>After operation</td>
<td>2.5</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table (3) illustrates that there is no statistically significant difference with p-value >0.05 between two study procedures as regards improvement of sphincteric, motor functions and grades of MP which indicated that both procedure achieve same outcome.

Table (3): Comparisons of operative outcomes in different study procedures.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Procedure</th>
<th>Posterior fixation &amp; laminectomy</th>
<th>Corpectomy &amp; Lateral fixation</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Sphincteric improvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>27.3%</td>
<td>5</td>
<td>45.5%</td>
<td>0.6</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>72.7%</td>
<td>6</td>
<td>54.5%</td>
<td></td>
</tr>
<tr>
<td>Motor improvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>53.3%</td>
<td>8</td>
<td>53.3%</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>46.7%</td>
<td>7</td>
<td>46.7%</td>
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</tr>
<tr>
<td>Grades of MP after operation</td>
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<td></td>
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<tr>
<td>Grade 0</td>
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<td>33.3%</td>
<td>7</td>
<td>46.7%</td>
<td>0.4</td>
</tr>
<tr>
<td>Grade I</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>6.7%</td>
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</tr>
<tr>
<td>Grade II</td>
<td>2</td>
<td>13.3%</td>
<td>0</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Grade III</td>
<td>1</td>
<td>6.7%</td>
<td>1</td>
<td>6.7%</td>
<td></td>
</tr>
<tr>
<td>Grade IV</td>
<td>5</td>
<td>33.3%</td>
<td>2</td>
<td>13.3%</td>
<td></td>
</tr>
<tr>
<td>Grade V</td>
<td>2</td>
<td>13.3%</td>
<td>4</td>
<td>26.7%</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

Thoracic and lumbar compressive spine fractures were very prevalent, representing about 90% traumatic spine injuries. Unless contraindicated, MRI should be considered in all cases with neurologic injury.\cite{11-15}

Thoracolumbar burst & pathological fractures could treated via different approaches. Anterior approach offers many outcome such improve canal decompression,\cite{16-17} and exposure of fractured vertebrae, enabling thorough decompression.\cite{18} On the other hand, posterior approach could only support indirect decompression.\cite{19}

Our study included 30 patients complaining of back pain and different degrees of neurological deficits in both lower limbs and sphincteric troubles due to lower thoracic and upper lumbar compressive spine fractures. The patients were classified in two groups: the first group 15 patients with mean age of 38.5 years old and second group of 40.8 years old. In first group, 8 patients were males (53.3%) and 7 patients were females (46.7%). In second group, 9 patients were males (60%) and 6 patients were females (40%). Lin et al mentioned that in their study there were 64 patients with thoracolumbar burst fractures classified in two groups: first group with mean age of 39 years old and second group with mean age of 38 years old. In first group, there were 16 male patients (50%) and 16 female patients (50%). In second group, there were 14 male patients (43.75%) and 18 female patients (56.25%) which is similar to our study.\cite{20}

In contrary to our study, Denisa et al mentioned that in their study of 43 patients with thoracolumbar fractures, patients were classified into two groups: a first group of 27 patients: 19 patients were males (70.3%) and 8 patients were females (29.7%) and a second group of 16 patients: 11 of them were males (68.75%) and only 5 female patients (31.25%) which showing predominance of male gender in Denisa study.\cite{21}

Our study included various levels of fractures, in first group there were: one case with T9 fracture, one case with T10 fracture, one case with T11 fracture, 5 cases with T12 fracture and 7 cases with L1 fracture while in second group 2 cases with T10 fractures, one case with T10-11 fracture, 6 patients with T12 fracture and 4 cases with L1 fracture showing majority of fractures at T12 and L1 levels. Similar to our study, Hitchon et al said that in their study of 63 patients with lower thoracic and upper lumbar spine fractures classified in 2 groups. First group of 25 patients; one patient with T11 fracture, 3 patients with T12 fractures, 12 patients with L1 fracture and 9 patients with L2 fracture and a second group of 38 patients showed one patient with T11 fracture, 13 patients with T12 fracture, 18 patients with L1 fracture and 6 patients with L2 fractures which correlate for majority of injuries at T12 and L1 levels like our study except for presence of L2 fracture in this study which was excluded in our thesis.\cite{22}

In first group, the mean motor power preoperative was 2 and mean motor power in second group preoperative was 1.3. The postoperative results after 3 months showed motor power of 2.5 in first group and 2.1 in second group which showed no superiority of any approach over the other in our study in regaining motor power or ability to walk in paraplegic and severe paraparetic patients which was reported also by Wood et al in their study. On the other hand, there was a significant difference in the outcome of sphincteric function improvement in second group (anterior approach) by decrease in sphincteric dysfunction percentage from 73.3% preoperative to 40% postoperative while in the first group, the improvement of sphincteric dysfunction which was evident in 73.3% preoperative decreased to 53.3% postoperative showing superiority of anterior approach over posterior approach in improving sphincteric dysfunction in early postoperative few months.

Interestingly, although some authors have reported that compared to the posterior approach, the anterior approach provides better decompression of thoracolumbar fractures, which.\cite{22,24}

Correlation between extent of canal encroachment and neurological function were studied; where concerns have raised regarding inadequate spinal canal remodeling after treatment via the posterior approach, no evident between percentage of canal encroachment and clinical symptoms.\cite{25,26} Important purpose of the surgical treatment of thoracolumbar fractures is to
minimize changing in patients’ lives.

Anterior approach associated as better canal remodeling and not greater improvement in Frankel scores or higher incidence of return to normality and recovery of neurological function. (25, 27)

No difference in complication rate between first and second group in our study. Wood et al.24 reported that, 17 “events” in the posterior approach group (6 instrument removal, 2 wound dehiscence, 2 cases of instrumentation/bone failure, 2 urinary tract infections, 2 instrument breakage, 1 deep wound infection, 1 pseudarthrosis and 1 seroma).

In addition, we did not find significant in operative time, blood loss and cost between in 2 groups. Anterior approach has longer operative times due to lack of experience with this approach in first few cases but after many cases there was no significant difference between duration of anterior versus posterior approach. Higher costs were associated with anterior approach due to the special requirements of anaesthesia due to single lung ventilation and the need for titanium mesh or expandable thoracic or lumbar cage.

**Conclusion**

Surgical management of thoracolumbar burst and pathological fractures, the anterolateral approach was not significantly better than posterior approach in terms of significant recovery of neurological function, return to work and maintaining normal life activities. To some extent the anterior approach was better than posterior approach in rapid improvement of sphincteric control in patients with incomplete cord injury with sphincteric troubles. On the other hand, posterior approach was a valid approach with easy preparation and available instrumentation under current causality within few hours from the insult which serves us in emergent cases. Appropriate approach should made cautiously and on a case-by-case basis.

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**References**


The Early Detection System of Risk Factors on Pregnancy, LaboUR, and Puerperium Women (A Case Study on Midwife Private Practice) in Central Lampung District in 2018

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Abstract

Maternal mortality is a challenge for the public health field across the world, and developing countries account for 99% of maternal deaths globally. It is estimated that 15% to 20% of all pregnant women will experience a high-risk state and obstetric complication. The evidence-based comprehensive guideline provided by the midwife is expected to detect early risk factors for pregnancy, labour, and postpartum before complication occurs. The early detection system through risk factor assessment using the scoring system requires too much time to make being referred to. Risk management cannot be used to be rule for midwives, and pregnant women and their families have not been well enough informed about the mother’s risk requirement. The purpose of this research is to build an early detection system in the midwife private practice of the Central Lampung regency to detect early pregnancy, labour, and post-childbirth to perform risk assessment, to provide risk management as needed, and to design a database of pregnant mothers to be able to produce a report of maternal service. This research uses a prototyping approach as the basis for system development. The early detection system enables midwives to assess the health of pregnant, maternal, and post-childbirth women; perform case management; provide information needed by pregnant women and families; and facilitate midwives in recording and delivering a quality report.

Keywords: Early Detection, Midwife Private Practice, Pregnancy Labour Puerperium, Risk Factors, System

Introduction

It is estimated that in 2016 around 303,000 women in the world died during pregnancy, delivery, and after pregnancy¹. In other words, approximately 830 women died every day due to complications of pregnancy or childbirth¹. Globally, developing countries have accounted for 99% of maternal deaths². The global commitment to reducing maternal and infant mortality is proved through sustainable development, which is referred to as Sustainable Development Goals (SDGs). One goal is to reduce maternal mortality by the year 2030 to 70 instances per 100,000 live births (Sustainable Development Goal 3.1).

Generally, the maternal mortality level in Indonesia is high compared to other Association of South East Asia Nations (ASEAN) countries¹. Maternal deaths in Indonesia are caused by direct factors and indirect factors. The factors of maternal death are preventable if the mother is treated well when managing complications early in pregnancy and during pregnancy. It is estimated that 15% to 20% of all pregnant women will experience a high-risk condition and obstetric complications, which may end anger the life of the mother and fetus if not adequately treated³. Many conditions enable the identification of risks faced through pregnancy and allow for intervention to occur before pregnancy or at the beginning of its period. Proper preparation and effective management during pregnancy can be used to minimise the risk of mortality in mothers and infants⁴.

Midwives, as the most vital component of maternal healthcare, have an important role in reducing maternal mortality. Based on the results of Riskesdas⁵, midwives...
are health workers who provide the most Ante Natal Care (ANC) and delivery assistance labour. The evidence-based report provided by the midwife is expected to be done comprehensively to allow the detection of risk factors in pregnancy, childbirth, and puerperium. This is done to prevent complications by using early treatment\(^{(6)}\). In fact, the recording system used by midwives to indicate maternal health services has not been running well. This conclusion has been reached based on the assessment of the quality of maternal health services in 2012 in 20 districts/cities in Indonesia. The research conducted by the Ministry of Health of Indonesia, World Health Organization, and Indonesian Social Gynecology Obstetrics Association shows that the compliance of health workers, especially midwives, in documenting the results of the examination is still low in 2012\(^{(5)}\). The quality of this maternal health care record triggers the lack of early detection of risk factors in pregnant women.

Consider rephrasing for clarity: Recording the health care provided to mothers has not been optimal, which reduces the early detection of risk factors. Some obstacles in early detection are the complexity in using the mother’s cards and maternal and child health handbook, difficulty using manual documentation, the substantial burden of midwife works, and the time-consuming high-risk pregnancy-risk calculations because they must be calculated manually. Currently, there has not been any risk management for midwives that can be used as a reference in the intervention or prevention of complications. The database used to record pregnant women, delivering mothers, and puerperium mothers uses a manual cohort register. A computerized database is required to store all relevant data and provide quick and easy access to the user to generate required information. The database of high-risk pregnant women can also assist officers in monitoring mothers with risk factors and in facilitating high-risk reporting in real time. Reporting in real time is very useful when making decisions in the community. The development of technology has enabled the improvement of early detection systems for risk factors during pregnancy, childbirth, and puerperium.

**Method**

The system was designed using the System Development Life Cycle (SDLC) using a Rapid Application Development (RAD) model for the prototyping approach. RAD is used because it has a short and fast system development cycle that suits models with limited time\(^{(9)}\). In order to analyse the system needs, a qualitative approach is taken that uses document review, in-depth interviews, and observation.

This system was developed using the reference system proposed by Dennis et al\(^{(9)}\). Prototyping the system design involves four main stages: planning, analysis, design, and implementation\(^{(9)}\). In this study, the system to be built will be limited to a prototype system where the results still resemble the original system. Implementation will be done only in the form of test results of prototype that has been made. Case studies will be undertaken in the private practice of midwifery in the work area of the Public Health Center’s Bandar Jaya and Bumi Nabung district of Central Lampung. Implementation of the research has been conducted from February to June 2018.

**Results**

**Analysis of System Requirements**

Based on the results of in-depth interviews, document review, and observations, current problems found in the system are as follows:

Based on the data provided by informants, the system needs to be made into groups. They are functional needs and non-functional needs, for the long- and short-term. After analysing the current system, it has been determined that the new system should be a website for private midwives to detect risk factors early during pregnancy, childbirth, and puerperium. To see whether the system to be developed is feasible to be implemented, a feasibility analysis must be done by taking into account all existing conditions in Central Lampung District. The system feasibility analysis will be performed using technical, economic, legal, operational, and scheduling (TELOS) criteria.

**The System Design**

The design of an early detection system for risk factors during pregnancy, childbirth, and puerperium must be based upon the identification of the needs of midwives private practice and the ability to recognize opportunities to improve the existing system. This projected application is designed to resemble the current method of early detection by referring to the mother’s card. Mother’s card is used to facilitate the adaptation of midwives to the current system from pre-existing
systems. The new system is designed to provide advice on what should be provided by midwives to patients and the families of patients regarding information for early detection and what to do with regard to high-risk cases experienced by pregnant, maternal, and puerperium women.

The prototype for the early detection system of risk factors is as follows:

1. During pregnancy: Early detection of risk factors during pregnancy is achieved by answering closed questions regarding the 23 question variables that exist. Each variable is assigned a value of 4 or 8. The results of early detection of risk factors during pregnancy are divided into 3 categories: low risk with a score of 2, high risk with a score of 6 to 10, and very high risk if the score value is more than 12. From the results of this early detection, advice will be given to the midwife to do.

2. During delivery: Early detection in delivery is performed using 18 screenings of labour. Currently, screening is done manually using paper. Recording risk factors uses closed-ended questions. Based on the results of a screening, a ‘YES’ answer to a question will lead to a reference for the mother. To facilitate the process of referral, the system menu should provide information for ambulances and regarding the nearest hospital.

3. In puerperium: The early detection system of risk factors during puerperium consists of 8 question variables based on data recorded in the mother’s card. Early detection results appear after closed questions have been answered. The results are in the form of puerperium status: normal or high risk. The system should also provide advice on what midwives can do if the childbirth involves high risk.

4. Concerning mother’s card input: mother’s card is used as the basis of this system. In this system, it is then made prototype of mother’s card online. The system will output a maternal cohort register, ways to detect risk factors.

The following context diagram illustrates the scope of the information system, the entities involved, as well as the incoming and outgoing data regarding the information system process.
Fig. 3: Network Scheme

Based on the above design, the following are some interface designs in the early detection system of risk factors for pregnant, maternity and postpartum women.

Fig. 4: Interface Design of Login

Fig. 5: Interface Design of Early Detection Menu

Fig. 6: Interface Design of Pregnancy

Fig. 7: Interface Design of Labour

Fig. 8: Interface Design of Puerperium

Discussion

According to Dennis et al (10), a system should be developed by reasoning why the system should be built and how value will be provided through the system. The absence of a system that enables midwives in private
practiceto identify high-risk cases has become the basis of system-making considerations. Thus, it has been increasing the chances of maternal death. This technology allows early detection to be done quickly and easily.

The completion of clinical data forms, such as the maternal and child health handbook and mother’s cards, will allow systems management data and reporting instruments in a healthcare service will help improve the availability of reliable data to make appropriate decisions, planning and interventions[11]. Current systems are being developed to implement an early detection system for risk factors. In addition, the midwife performing the screening will not require any special qualifications, because the identification of high-risk cases will be performed automatically by the system. In addition, the system will be created using website approach so a midwife can open the system on any platform, such as a smartphone, laptop, tablet, or PC. The system will also assist the midwife to perform case management for at-risk women. Data that has been input will automatically enter the database of pregnant women in MySQL, so it can be recalled when the mother revisits.

The system to be developed will use a mother’s card for midwives who are familiar with the previous manual form. The early detection system will use closed questions to detect risk factors. The inputted data will be stored on the server so am idwife will no longer need to record the results. Midwives can immediately see the results of early detection and view the report after completing the input. Following up with high-risk mothers can be facilitated by drawing data from the database on the next visit. The cost incurred through the use of this application revolves around the cost of internet data packets and papers to print the results of early detection. The system can help midwives to improve the quality of service for mothers and families, the results of screening can assist midwives to facilitate making decisions quickly and accurately.

Conclusions

The conclusions from this study are as follows:

a. An early detection system used by midwives to identify risks is being implemented through out a woman’s pregnancy, delivery, and puerperium health services, but the early detection system has not as expected. Technical factors, behavioural factors, and organizational factors are suspected to be the causes of this problem. An early detection system is needed that would assist midwives in determining the health of pregnant, maternal, or postnatal women.

b. The early detection of risk factors in pregnancy, childbirth, and puerperium facilitates midwives in assessing the pregnancy, childbirth, and puerperium, using the categories of low risk, high-risk, and very high-risk by using assessment indicators on the mother’s card.

c. Pregnant women, women in labour, or women in puerperium who have been screened will be given case management as needed. Management of cases will involve providing information to mothers and families in accordance with the needs of mothers, so it is expected to increase mother and family more care about pregnancy and allow preparation to occur before complications arise.

d. The design of information systems should allow the collection of information into a database of women with risk factors and data facilitate the midwife in recording and providing quality reports.

Conflict of Interest: Nil

Source of Funding: This Study Is Self-Funded.

Ethical Clearance: Ethical license issued by the Indonesian University Research and Community Service Commission number 327/UN2.F10 / PPM.00.02 / 2018

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The mucous cells of both species were scattered throughout the gill filament epithelium and mostly localized apically between the pavement cells. Meanwhile, very few mucous cells were rarely observed in the secondary lamellar epithelium. The mucous cells of the Sparus aurata had fine granular light acidophilic cytoplasm. While, those of Oreochromis niloticus lacked the acidophilic cytoplasm or had faintly acidophilic vacuolated cytoplasm.

Histochemically, the granules of mucous cells of Oreochromis niloticus showed strong positive reactivities with PAS as well as, alcian blue pH 1 and pH 2.5. Whereas, these granules in Sparus aurata were PAS positive but, showed a very faint or even negative reactivity with alcian blue.

Ultrastructurally, the cytoplasmic granules of the mucous cells of Oreochromis niloticus were either scattered throughout the cytoplasm or localized in the basal part of the cell and showed some variability in their electro-density. Meanwhile, the mucous granules of Sparus aurata were always distributed all over the entire cytoplasm and showed variable electro-density within the same cell and also between the adjacent mucous cells.

**Key words:** Mucous cells, Ultrastructure, gills, Tilapia Oreochromis niloticus, Sparus aurata, Histological and Histochemical changes.

**Introduction**

Fish are a valuable source of proteins. They have some unique anatomical and physical characteristics that are different from mammals.

The fish gill is multifunctional organ and fulfills several vital functions; mainly dealing with respiration and osmoregulation. The mucous cells contribute to various functions; such as ion and gas exchange, absorption, lubrication and pH balance. However, these mucous cells were termed glycocytes by Chen et al.

None of the available literature was dealing with the normal structure of the gills of Sparus aurata. Moreover, there were a paucity of histological studies have centered their attention to the mucous cells of Oreochromis niloticus.

The present study aimed to investigate the histological, histochemical and ultrastructural features of the mucous cells in the gills of both Oreochromis niloticus as a model of freshwater fish and Sparus aurata as a marine water fish.

**Material and Method**

The total of 10 apparent healthy 20 adult samples of Tilapia nilotica (Oreochromis niloticus) fish from fisheries of the Fayoum city and 20 adult samples of gilthead sea bream (Sparus aurata), were obtained from some private fisheries near the Mediterranean Sea in Port Said, Damietta. This study adhered to ethical requirement to animal welfare in Egypt.
For light microscopic studies; the specimens were fixed in 10% neutral buffered formalin and Bouin’s fixatives. The specimens were processed and embedded in paraffin wax. Sections of 5-7 µm thick were obtained and stained with; Harris haematoxylin and eosin (H & E), Periodic acid Schiff (PAS), Alcian blue pH1.0 and pH 2.5, and Periodic acid Schiff –alcian blue pH 2.5 combination according to Bancroft and Stevens.

For transmission electron microscopy (TEM); small pieces of (1mm) of the gills were fixed in paraformaldehyde-glutaraldehyde in phosphate buffer. Specimens were post fixed in 1 % osmium tetra oxide, washed in 0.1 M phosphate buffer (pH 7.3), dehydrated in ascending grades of ethanol and embedded in Epon araldite mixture. Semi thin sections (1µm) were cut and stained with toluidine blue. Ultrathin sections were cut and stained with Uranyl acetate and lead citrate. Sections were examined with a JEOL 1010 transmission electron microscope at Regional Center for Mycology and Biotechnology Al-Azhar University, Cairo, Egypt.

Results

The gills of both species were formed of rows of primary lamellae or gill filaments. Secondary or respiratory lamellae arose from each filament; including the inter-lamellar regions in-between (Fig.1). In Sparus aurata, the free end of each secondary lamella located close to the free end of the opposite one and might touch it (Fig.2). Generally, a simple epithelium covered the secondary lamellae while, a stratified epithelium covered the gill filaments. The majority of the apical surface was covered by superficial pavement cells. However, chloride cells and mucous cells could be observed among this multilayered epithelium (Fig.3).

Concerning mucous cells, in Sparus aurata, they were scattered singly among the epithelial cells of the inter-lamellar regions or may be observed in small groups of two or three cells. They were usually located apically in the gill filament epithelium among the pavement cells and beside the chloride cells. These mucous cells were larger than the other cells. They appeared ovoid or circular in shape with fine granular light acidophilic cytoplasm and basal flattened or ovoid nuclei (Fig.3). On the other hand, the mucous cells of Oreochromis niloticus lacked the acidophilic cytoplasm or had faintly acidophilic vacuolated cytoplasm (Fig.4). However, in both species such mucous cells became more abundant at the terminal ends of the filaments. Meanwhile, very few mucous cells were rarely observed in the epithelium of some secondary lamellae (Fig.5). In the semi-thin sections, the cytoplasm of the mucous cells was darkly stained with toluidine blue (Fig.6).

Histochemically, the granules of mucous cells of Oreochromis niloticus showed strong positive reactivity with alcian blue pH 1 (Fig.7), alcian blue pH 2.5 (Fig.8), PAS (Fig.9) and alcian blue pH 2.5–PAS combination stains. Whereas, the granules of mucous cells in Sparus aurata showed very faint or even negative reactivities with alcian blue pH 2.5 (Fig.10) and alcian blue pH 1. While, these granules reacted positively with PAS (Fig.11) and alcian blue pH 2.5–PAS combination techniques. Some of the mucous cells displayed mucous secretory granules discharged from their apical surface (Figs.7 and 8). However, no histochemical differences were detected between the mucous cells of the gill filaments and the secondary lamellae.

Ultrastructurally, the mucous cells of Oreochromis niloticus appeared elongated pyramidal or ovoid in shape with basal irregular nuclei. Their cytoplasm revealed the presence of mucous secretory granules of various shapes and sizes. These granules either scattered throughout the cytoplasm (Fig.12) or localized in the basal part of the cell (Fig.13) and showed some variability in their electro-density. However, individual mucous cells were
also demonstrated in the epithelium of some secondary lamellae (Fig.14). Meanwhile, the mucous cells of Sparus aurata were characterized by the presence of numerous mucous granules distributed all over the entire cytoplasm of the cell. Such mucous cells appeared with different sizes and their granules had different shapes and sizes and showed variable electro-density within the same cell and also between the adjacent mucous cells (Fig.15). The nuclei of these cells were ovoid or irregular in shape and basely situated. Some mucous granules were frequently observed discharged from the apical surface of some cells; between the adjacent pavement cells. Such pavement cells were characteristically equipped with apical microridges (Fig.16).

Discussion

In spite of, the presence of numerous mucous cells among the gill filament epithelium, very few mucous cells were rarely observed in the secondary lamellar epithelium. This distribution, on one hand reduces the thickness of the blood–water diffusion barrier, and on the other hand, avoids the particle retention by the produced mucus. Moreover, mucus film may diminish gas diffusion and to avoid this interruption in gas diffusion; secondary lamellae either devoid of mucous cells or possess a very few number. On the other hand, the secondary lamellae have a protective covering of mucous cells in Catla catla. Also, these mucous cells were not only detected in the epithelium of secondary lamellae of Catla catla but also, observed in its core. However, the mucous cells in the secondary lamellar epithelium increase the water blood barrier for respiratory gases diffusion. Furthermore, the mucus protects the secondary lamellar surfaces against toxic and/or infectious agents.

In agreement with Oguz, some the secretory granules of mucous cells of both species were discharged from the cell apical surface between the adjacent pavement cells. Moron et al. described that, thees mucus secretory granules are liberated directly into the environmental water. Furthermore, Samajdar and Mandal noticed mucous cell openings with mucin globules over the
epithelial surface. Diaz et al.\textsuperscript{16} suggested that, the apical microridges of pavement cells prevent the loss of mucus from the gills epithelial surface. However, this mucus secretion is correlated with the increase in salinity\textsuperscript{17}.

Histochemically, the granules of mucous cells of Oreochromis niloticus showed strong positive reactivities with PAS as well as, alcian blue pH 1 and pH 2.5. Whereas, these granules in Sparus aurata were PAS positive but, showed a very faint or even negative reactivity with alcian blue. Adams and Nowak\textsuperscript{18} confirmed that, the mucous cells of Atlantic salmon, Salmosalar L. were most commonly PAS positive and alcian blue negative. However, Bansil and Turner\textsuperscript{19} speculated that the different chemical characteristics of the mucous cells are due to the carbohydrate contents of glycoprotein within their cytoplasmic granules. Also,\textsuperscript{20} may be due to the differences in water and environment conditions. The mucous cells of freshwater Tinca tinca, are generally containing a greater proportion of acid mucins than do marine species.\textsuperscript{21} This acidic glycoprotein could be engaged in the prevention of epithelial damages.\textsuperscript{22} Moreover, the existence of acid mucus over the gill epithelial surface is of crucial importance in freshwater fish, to prevent loss of ions due to the reduced osmolarity of the aquatic milieu\textsuperscript{23}. Also, in a freshwater fish, there is a continuous loss of salts and water gain; the active branchial uptake of sodium and chloride ions becomes crucial for ion homeostasis, and then the presence of neutral glycoprotein could be related to the transport of ions across the gills.\textsuperscript{22}

The histochemical results obtained herein were consistent with the electron microscopic data with regard to the heterogeneity of the chemical composition of the mucus granules and their variation in size and electro-density. Similarly, the mucous cells in Hoplias malabaricus and in Oreochromis niloticus\textsuperscript{24} are characterized by the presence of mucous containing vesicles with variable electron density. According to Diaz et al.\textsuperscript{16}, the variation in size and electro-density of mucus granules is most likely due to the fact that these cells were at different stages of the secretion processes. Furthermore, Banerjee\textsuperscript{25} clarified that, the mucous cells are active cells that respond to environmental changes.

\textbf{Conclusion}

Thus, it can be concluded that, the mucous cells present in the gills of freshwater Oreochromis niloticus differ from that of marine water Sparus aurata fish in their histochemical reactions as well as, their ultrastructural features of the mucus secretory granules. However, this variation may be a mechanism for adaptation to different conditions of the aquatic environment.

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Determination of Hormones and Some Liver Enzyme in the Patient with Gallstone in Diyala Governorate

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Abstract

The Objective of this study was to estimate the Hormones (Ghrelin, and progesterone) gallstone and making liver function test in the patient’s sera and studying the relationship between demographic factors with previous factors. Patients and methods: This study is a probable clinical study in which (100) patients with a gallstone were included in the study. Those patients were (13) males and (87) females; their ages ranged from (17-78) years. While for the control group were collected, from 50 people (31) males and (19) females, their ages ranged from (17-61) years. Serum was obtained by, usual methods and analyzed, for Hormones (Ghrelin and Progesterone) and Liver Function (GOT, GPT, ALP and GGT). Results: The result of the current study shows the mean value was high for (Progesterone) parameters in, patient than the control, with highly significantly different (P<0.005) between, the study group. The result of the current study shows the mean, the value was high, for (GOT.GPT.ALP.GGT) parameters in patients then controls with highly significant different (P<0.05) between study groups. Conclusion: the GD protective effect associated with a high level of Ghrelin in the Serum.

Keywords: Ghrelin, Gallstone, Liver Functions Test, Gallbladder.

Introduction

Gallstone disease is disease has pathological changes in the digestive, system and the stone are a solid crystalline deposit formed in the gallbladder (10). Bile stones can be, classified according to their chemical composition cholesterol and pigmented, gallstone cholesterol stone is the, highest and spread, of pigment stone (28). Three important mechanisms in the formation of gallstones (cholelithiasis) are cholesterol supersaturation gallbladder, hypomobility, and pro-nucleating or anti-nucleating factors. Through the development, of gallstones, solid mass. of cholesterol, monohydrate crystals, mucin gel, calcium bilirubin and other proteins accumulate crystallise and form gallstones (16). Gallstones are a common problem in all world countries. Percentage infected people are (10-15) % by Gallstones, however only (20) % of infected people have complications such as biliary pain acute cholecystitis, pancreatitis and cholangitis (27). Environmental factors and genetic factors have a significant role in Gallstone formation epidemiological (31). Ghrelin is an endogenous factor of the growth, it stimuli secretion growth hormone in humans (18).

Progesterone is synthesized, from cholesterol, by the descent compound, pregnant, and is the principle, revolving progestin (30). Liver function test is mostly, measured in patients, with liver and biliary tract, disease. Increase activity, of serum enzymes, is, used to sign the pathological, release of an individual, proteins from destroyed, liver cells rather than, to study a particular, function (22). ALT and AST are generally ready in human serum, saliva, cerebrospinal fluid, and bile and it’s not found in urine (26). Gamma-glutamyltransferase and alkaline phosphatase are, sensitive but not particular, to choledocholithiasis because, of their multiple sources. The amount, of their appreciation preoperatively, is that their high increase the, suspicious of the common bile duct (CBD) stone or pathology (24).
has, obstructive disease, alkaline phosphatase is the
first enzyme, to be raised, while if the disease is due to
damage, of liver cells, and the aminotransferases will
be marked. This produces enzyme analysis helpful,
to recognize the disease condition, cholestatic and
hepatocellular, respectively (11). The enzyme is created in
the liver microvilli. Therefore it used as large, marker
for biliary detection obstruction, extrahepatic biliary (12).

Material and Method

Patients:

This study is a likely, clinical study, in which 100
patients, with a gallstone, included in the study. The
study was, started from December 2017 during, March
2018 at the segment, of general surgery in Baquba
Teaching Hospital. Those patients were (13) males and
(87) females; their ages ranged from (17-78) years.

While, for the control, the group were composed,
from 50 people (31) males and (19) females, their ages,
ranged from (17-61) years. Ten milliliters of blood was
composed, into test tubes without anticoagulant. After
coagulation, the blood samples were centrifuged at
(4000 x g) for 10 minutes, and the serum stored on an
ice bath and was used on the same day for the enzymatic
activity assays of the liver function. The residuum
of the sera were stored at -20°C, to be used for other
parameters appreciation. All subjects were required
several factors that have direct influences including
age, gender, family history, date of birth, previous
surgery and former medical. Serum ghrelin level was
determined by using RIA kits in the radioimmunoassay
technique. The levels of GOT and GPT were evaluated,
according to the colorimetric method, respectively (2).
Alkaline phosphatase also, determined according to the
colorimetric method (6) and gamma-glutamyl transferase
determined according to the colorimetric method
(13).

Statistical Analysis

Our Data were analyzed by using, Chi-square (X²)
test for comparative between, percentages. Odd ratio
(OR) and relative, risk (RR) were used to, measure
strength association, between presence factor and
appear happened. The numeric date was described by
(Mean ± SD). T-test used to compare between two
numeric variables, while the F test (ANOVA) used to
differentiate between three numeric variables or more.
Pearson correlation (R) accounted to explain type and
strength, of the relationship between variables. At
significance level is α=0.05 was applied to test (SPSS
v.22 and Graph, pad prism v.6) software used to analyze
data.

Results and Discussion

This study carried, on (100) Gallstone patients from
December 2017 and March 2018 cholecystectomy,
was carried on (100) patients 87(87%) were women,
13 (13%) men. Similar finding has been, observed in
previously, studies Figure (1)
Table (1): Comparison between sex and age periods according to the patient’s group

<table>
<thead>
<tr>
<th>Age periods</th>
<th>Sex</th>
<th>Total</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>female</td>
<td></td>
</tr>
<tr>
<td>20-39</td>
<td>N 4</td>
<td>38</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>% 30.8%</td>
<td>43.7%</td>
<td>42.0%</td>
</tr>
<tr>
<td>40-59</td>
<td>N 9</td>
<td>39</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>% 69.2%</td>
<td>44.8%</td>
<td>48.0%</td>
</tr>
<tr>
<td>60-79</td>
<td>N 0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>% 0.0%</td>
<td>11.5%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Total</td>
<td>N 13</td>
<td>87</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>% 100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The cumulative prevalence, of GS, increases with age, and the GS average increases by 1% to 3% per annum with the highest rate in the first four contracts of life (5).

1-Hormones and Enzyme:

In the present study, Result of current study shows the mean value, was low for (Ghrelin) parameters, in patients than controls with high significant different (P<0.05) between study groups but the result of the current research shows the mean value was high for (Progesterone) parameters in patient than the control with highly significantly different (P<0.005) between the study group.

The result of the current study shows the mean value was high for (GOT, GPT, ALP, GGT) parameters in patients than controls with highly significantly different (P<0.05) between study groups.

Table (2): Comparison hormonal parameters between study groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghrelin Hormone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>0.03</td>
<td>0.02</td>
<td>T=12 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>4.66</td>
<td>3.93</td>
<td></td>
</tr>
<tr>
<td>Progesterone Hormone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>5.18</td>
<td>2.81</td>
<td>T=11 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>0.77</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>GOT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>15.91</td>
<td>3.09</td>
<td>T=15.34 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>7.64</td>
<td>3.14</td>
<td></td>
</tr>
<tr>
<td>GPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>17.21</td>
<td>5.85</td>
<td>T=10.52 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>8.00</td>
<td>2.79</td>
<td></td>
</tr>
<tr>
<td>ALP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>118.66</td>
<td>16.08</td>
<td>T=22.28 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>49.78</td>
<td>20.93</td>
<td></td>
</tr>
<tr>
<td>GGT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>54.83</td>
<td>6.05</td>
<td>T=17.20 DF=148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>34.96</td>
<td>7.76</td>
<td></td>
</tr>
</tbody>
</table>
Our results founded that protective influence of GD associated with high level of serum ghrelin concentrations, wherever the chronic ghrelin management is increased body fat content in humans in visceral adipose tissue, Un acylated ghrelin (UAG) and acylated ghrelin (AG) are increase metabolism of the lipid by increasing of the expression of adipogenic genes (20).

However, we approved that there are large facts to be considered Ghrelin stimulates positive energy balance and stimulates obesity in rodents by reducing using of fat. The concentrations of ghrelin are said to decrease in obesity and increase, after weight loss caused by the diet (8).

The current study with Langenberg and his, colleagues agrees that low levels of ghrelin were connected with a higher prevalence of metabolic syndrome, with lower serum ghrelin levels and increased metabolic syndrome (19).

Estrogen receptors and PR have important play a part in gallbladder function through sex hormones (ER and PR) by changing the movement of the gallbladder by adjusting the affinity of the receptors in the gallbladder to octapeptide and carbachol cholecystokinin. Specifically, the presence of public relations in the gallbladder makes them more volatile in the circulation of hormones and their influence on their movement. The inhibitory influence of progesterone on the movement of the gallbladder may include its abnormal movement across multiple signalling pathways, including inhibition of, the L-type calcium channel by cAMP / PKA pathways in the smooth, muscle of the gallbladder to develop gallstones and malignancy (21).

The transaminases enzymes are increased in liver damage, but GOT is also present in skeletal muscle, cardiac muscle and red blood cells. Also, it used as a cardiac sign for example muscle inflammation due to dermatomyositis, GOT are not specific measures at the liver function, but we can use as an indicator in muscle inflammation or damage (25).

Previous research has Assured that the increase in the effectiveness of the enzyme GGT to several times (10-20 years) of the normal state refers to sharp biliary inflammation or obstruction of the bile ducts. As well as the level of the enzyme increase in heart disease cases, diabetes (type II), acute pancreatitis, kidney failure, liver disease and addicts to alcohol consumption. The presence of GGT in cell membranes of the biliary system makes it very critical to diseases of the biliary system, both within the mother and outside the liver so in the case of bile duct obstruction, the enzyme level reaches ten times normal. Studies showed that patients with extracranial cholestasis increased the effectiveness of the extra-liver GGT due to necrosis of the biliary epithelial cells (containing a high concentration of GGT) (1).

The result of the current study shows the mean value was high for (Total Serum Bilirubin, Direct Bilirubin and indirect Bilirubin) parameters in patients than controls with highly significantly different (P<0.05) between study groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Bilirubin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>1.02</td>
<td>0.19</td>
<td>T =11.088</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF= 148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>0.65</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>indirect Bilirubin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>0.62</td>
<td>0.17</td>
<td>T =13.796</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF= 148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>0.26</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>TSB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>100</td>
<td>1.64</td>
<td>0.16</td>
<td>T =21.554</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DF= 148 P=0.001***</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
<td>0.90</td>
<td>0.26</td>
<td></td>
</tr>
</tbody>
</table>
Measurement of total bilirubin is included plus conjugated and unconjugated bilirubin. Bilirubin is a product from hemolytic. Bilirubin is turbid and combines with albumin and circulates in the blood to the addition of that high concentration drugs (some antibiotics and diuretics) and high fatty acids to unconjugated bilirubin. Hemi is produced from myoglobin (in muscle, mitochondria). The liver does the function of removing unconjugated bilirubin.

The final diagnosis is done by measurement of the direct bilirubin concentration. If direct bilirubin is increased which will results problem in the liver, internal bleeding and hemolysis. If direct bilirubin has a high level but the liver cant secret it outside of the body that associated with several cases such as cancer, hepatitis and cirrhosis. In this study, the mean levels of (DB) showed a significant increase (P<0.001) in patients: group when compared to the control group. That means that all patients in this: a study has the liver disease to interactions with gallstone. This study is contravened with other reviews (4). Which have shown there is no significant difference between liver function tests: and gallstone disease only without another liver disease (14).

3-Differences in Selected Parameters:

Some selected parameters were, detected for patients with gallstones and, control group.

3-1-Age:

The present study shows, non- significant differences, in mean age among all studied groups, among all patients. And all control groups, as well as amonge Male patients and control groups between female patients and control groups.

The result of the current study shows the least, age periods for male, and female patients Was (60 -79) years and high age periods for male and female patients were (40-59 years with non-significant different (P>0.05) among patients, according to sex and age periods.

<table>
<thead>
<tr>
<th>Table (4): comparison between sex and age periods according to patients group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Age periods</td>
</tr>
<tr>
<td>20-39</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>40-59</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>60-79</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

In terms of age division, the ratio (40-59) contains the highest percentage, and this result agrees with a future randomized study done by Kolla S.B et al. (2004) (24). Also, our finding regarding age is in agreement with a survey conducted by Mohammed S. et al. (2008) (26).

Sex division as a result of our study group had females (87) % and males (13) %, these results are regular with Mohamed S. et al. (2008). In this study also, females were found in the majority which shows that; acute gallbladder inflammation is common in females (23).

The increase in female lithogenicity may be due to the female sex hormone, which activates its compensatory influence by disrupting the emptying of the gall bladder in full particularly during pregnancy reflecting the high level of serum progesterone on the smooth muscle and increase the secretion of bile cholesterol (7).

3-4-Bady Mass Index (BMI):

Obesity is one of the high-risk factors for gallstones.
The most important factor simulating secretion and the concentration of infectious and inhibitory substances is diet and related metabolic disorders. Increased incidence of urolithiasis in the world in recent contracts due to changes in lifestyle, factors that increase, attention to food habits and nutritional cases of stone makers, Body Mass Index was showing a strong correlation with growing risk of stone formation (3).

Table (5) comparison between sex and BMI according to the patient’s group.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Sex</th>
<th>Total</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>female</td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>N 3</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>%</td>
<td>23.1%</td>
<td>20.7%</td>
<td>21.0%</td>
</tr>
<tr>
<td>25</td>
<td>N 0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>%</td>
<td>0.0%</td>
<td>5.7%</td>
<td>5.0%</td>
</tr>
<tr>
<td>&gt;25</td>
<td>N 10</td>
<td>64</td>
<td>74</td>
</tr>
<tr>
<td>%</td>
<td>76.9%</td>
<td>73.6%</td>
<td>74.0%</td>
</tr>
<tr>
<td>Total</td>
<td>N 13</td>
<td>87</td>
<td>100</td>
</tr>
<tr>
<td>%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Result of current study shows the male: percentage is (23.1%) for (<25), (0.0%) for (25) and (76.9%) for (>25) respectively, while the female: percentage is (20.7%) for (<25), (5.7%) for (25) and (73.6%) for (>25) respectively with non-significant different (P>0.05) among patients according to sex and BMI.

Recurrent stones are usually associated with obese and overweight. How does it work? That is unclear yet (29).

A large clinical study showed that big weight gain increases the risk of gallstones. The most probable reason is that the amount of bile salts in the bile has decreased, leading to more cholesterol (15). Because obesity is considered a risk factor, therefore the people must be made body weight is meddled (9).

Ethical Approval: Before the start of the study, it was approved by the ethics committee of university, ministry of education, schools managers, teachers and a written consent from parents of the participating students after detailed discussion with them about the importance if the research and there was no harm for their patient.

Funding: Self-funding

Conflict of Interest: The authors declare that no conflicts of interest.

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Prevalence of Stunted Growth among Primary School Children in Egypt

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Abstract

Stunting is an important pediatric problem; it might be the first presentation of underline disease. School age is specific period where’s children undergo rapidly development. So monitoring of the growth among school children with Z score should be mandatory in all schools. Methods: A cross sectional survey was done on students aged (6-11 years) at Egypt. The children were assessed for stunting by clinical examination and anthropometric assessment by Z scores, during April-December 2018. Results: 32170 children were studied. Prevalence of stunting was 15.3%. Boys more stunted (16.7%) compared to girls (13.7%), urban more than rural and average socioeconomic standard. Stunting was lower among (9-10) years while the reverse in (6-8) years. Conclusion and recommendation: Stunting was 15.3% higher among male, urban and (6-8 years) aged. School intervention programs can reduce the stunting problems by early pickup and intervention.

Key words: Children, Egyptian, prevalence, school age, stunting.

Introduction

Childhood short stature is common in family practice. Familial short stature and constitutional growth delay account for most cases, and there are clear guidelines for differentiating these from each other and from less common pathologic conditions.

Although GHD, hypothyroidism, CD and other potentially treatable causes accounted for a considerable percentage of short stature, the majority of children had normal variations of growth.

Stunting is defined as height-for-age z-score equal to or less than (-2 SD) below the mean. It is a well-established child-health indicator of chronic malnutrition.

Stunting is a major public-health problem in low and middle-income countries because of its association with increased risk of mortality during childhood.

So we aimed to determine prevalence of stunting in children in Egypt.

Method

An approval from Menoufia Faculty ethical committee was taken.

A cross section study was conducted in 6 – 11 years children. The sample includes 31270 students. The sample was taken from 9 Egyptian governorates, 6 of them from delta region and 3 from Upper Egypt. The chosen child was with inclusion criteria: Both sexes, Live in Egypt, Apparent healthy and exclusion criteria was: Children below 6 or above 11 years, Children with major medical disorder.

Age and sex were collected in a sheet including height, weight and BMI. If the child suffered from any health problems and families were informed.

The screening was done in the school from 1st April to December 2018.

A written consent form was signed by the managers and authorities in education ministry.
Ethics approvals and a written consents where the study were conducted. The students families were informed about the research also were informed regarding what measurements would undergo and their written consents were to allow their children to participate and there were no invasive maneuvers.

All cases were subjected to:

Clinical history: name, age, sex and residence. Assessment of socioeconomic standard of family with questions about the father’s and mother’s education, occupation and income according to Egyptian families classification.

Physical examination: Height: It was measured by a tape measure permanently fixed to a wall, the head was held firmly at the top of the board. The knees were flattened firmly to fully extend legs. The feet were together and flexed to a 90° angle with the child fully stretched. The child was standing erect with the heels, buttocks, and back of the head against the wall and the arms was down and relaxed.

The data were analyzed by SPSS (statistical package for social science) version 17.0 On IBM computer. We used two types of statistical analysis: Descriptive statistics e.g. percentage, mean and standard deviation and analytic statistics e.g. Chi-square test. P-value of < 0.05 was considered statistically significant.

Results

This tables show that the percentage of the age groups and sex, 6-7 y (30.28%) was higher than 7-8 y (21.68%) and 8-9 y was (18.01%)same as 9-10 y (19.95%) and 10 y < was 10.08% (table 2), according to sex there were 51.62% male, female 48.38% (table 3), according to age the mean was 7.95 ± 1.52. (Table 2)

Tables shows frequency and percentage for area and socioeconomic. according to area, rural and urban (56.79% and 43.21%) respectively( table 5), according to socioeconomic, low, average and high (8.81%, 69.91% and 21.29 %) respectively. (Table 4)

This table show that, very stunted 332 (1.06%), Stunted 4776 (15.27 %), Normal 23540 (75.28 %), Tall 769 (2.46 %) and very tall 237 (0.76 %). (Table 1)

### Table (1): frequency and percentage for age groups and sex, mean, standard deviation (SD) and range for age. (N=31270):

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups (y):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-7</td>
<td>9467</td>
<td>30.28</td>
</tr>
<tr>
<td>7-8</td>
<td>6780</td>
<td>21.68</td>
</tr>
<tr>
<td>8-9</td>
<td>5631</td>
<td>18.01</td>
</tr>
<tr>
<td>9-10</td>
<td>6239</td>
<td>19.95</td>
</tr>
<tr>
<td>10-11</td>
<td>3153</td>
<td>10.08</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16143</td>
<td>51.62</td>
</tr>
<tr>
<td>Female</td>
<td>15127</td>
<td>48.38</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>7.95 ± 1.52</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>6.00 – 10.9</td>
<td></td>
</tr>
</tbody>
</table>

### Table (2): frequency and percentage for area and Socioeconomic. (N=31270):

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>17757</td>
<td>56.79</td>
</tr>
<tr>
<td>Urban</td>
<td>13513</td>
<td>43.21</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
</tbody>
</table>
**Table (3):** prevalence of stunting among studied groups. (N=31270):

<table>
<thead>
<tr>
<th>Height</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-scores:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very stunted</td>
<td>332</td>
<td>1.06</td>
</tr>
<tr>
<td>Stunted</td>
<td>4776</td>
<td>15.27</td>
</tr>
<tr>
<td>Normal</td>
<td>23540</td>
<td>75.28</td>
</tr>
<tr>
<td>Tall</td>
<td>769</td>
<td>2.46</td>
</tr>
<tr>
<td>very tall</td>
<td>237</td>
<td>0.76</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**Table (4):** Distribution of the studied groups according to socioeconomic (N=31270):

<table>
<thead>
<tr>
<th>Socioeconomic</th>
<th>No.</th>
<th>Z-score for height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>very stunted</td>
</tr>
<tr>
<td>Low</td>
<td>No.</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Average</td>
<td>No.</td>
<td>235</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.1%</td>
</tr>
<tr>
<td>High</td>
<td>No.</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>332</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Chi-Square \( \chi^2 \) = 107.90

**P-value** = 0.00 **

** indicate \( P <0.01 \). Chi square is significant at the 0.01 level.
Table (5): Distribution of the studied groups by sex and areas (N= 31270):

<table>
<thead>
<tr>
<th>Sex and areas</th>
<th>No.</th>
<th>Z-score for height</th>
<th>%</th>
<th>Very stunted</th>
<th>Stunted</th>
<th>Normal</th>
<th>Tall</th>
<th>Very tall</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>No.</td>
<td>237</td>
<td>1.5%</td>
<td>2699</td>
<td>77.8%</td>
<td>3.2%</td>
<td>0.9%</td>
<td>140</td>
<td>16143</td>
</tr>
<tr>
<td>Female</td>
<td>No.</td>
<td>95</td>
<td>0.6%</td>
<td>2077</td>
<td>83.3%</td>
<td>1.7%</td>
<td>0.6%</td>
<td>97</td>
<td>15127</td>
</tr>
<tr>
<td>Rural</td>
<td>No.</td>
<td>250</td>
<td>1.4%</td>
<td>2600</td>
<td>81.1%</td>
<td>2.2%</td>
<td>0.7%</td>
<td>118</td>
<td>17757</td>
</tr>
<tr>
<td>Urban</td>
<td>No.</td>
<td>82</td>
<td>0.6%</td>
<td>2176</td>
<td>79.6%</td>
<td>2.8%</td>
<td>0.9%</td>
<td>119</td>
<td>13513</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>332</td>
<td>1.1%</td>
<td>4776</td>
<td>80.4%</td>
<td>2.5%</td>
<td>0.8%</td>
<td>237</td>
<td>31270</td>
</tr>
</tbody>
</table>

P-value: 0.00 **

** indicate P <0.01. Chi square is significant at the 0.01 level.

Table (6): Distribution of the studied groups by age groups (N=31270):

<table>
<thead>
<tr>
<th>Age groups</th>
<th>No.</th>
<th>Z-score for height</th>
<th>%</th>
<th>Very stunted</th>
<th>Stunted</th>
<th>Normal</th>
<th>Tall</th>
<th>Very tall</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-7</td>
<td>No.</td>
<td>207</td>
<td>2.2%</td>
<td>1799</td>
<td>75.0%</td>
<td>3.3%</td>
<td>0.4%</td>
<td>40</td>
<td>9467</td>
</tr>
<tr>
<td>7-8</td>
<td>No.</td>
<td>48</td>
<td>0.7%</td>
<td>1350</td>
<td>76.0%</td>
<td>2.4%</td>
<td>1.0%</td>
<td>70</td>
<td>6780</td>
</tr>
<tr>
<td>8-9</td>
<td>No.</td>
<td>38</td>
<td>0.7%</td>
<td>940</td>
<td>79.7%</td>
<td>2.2%</td>
<td>0.8%</td>
<td>45</td>
<td>5631</td>
</tr>
<tr>
<td>9-10</td>
<td>No.</td>
<td>19</td>
<td>0.3%</td>
<td>350</td>
<td>92.0%</td>
<td>1.4%</td>
<td>0.6%</td>
<td>40</td>
<td>6239</td>
</tr>
<tr>
<td>10-11</td>
<td>No.</td>
<td>20</td>
<td>0.6%</td>
<td>337</td>
<td>84.8%</td>
<td>2.5%</td>
<td>1.3%</td>
<td>42</td>
<td>3153</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>332</td>
<td>1.1%</td>
<td>4776</td>
<td>80.4%</td>
<td>2.5%</td>
<td>0.8%</td>
<td>237</td>
<td>31270</td>
</tr>
</tbody>
</table>

Chi-Square $\chi^2$: 1040.34
P-value: 0.00 **

** indicate P <0.01. Chi square is significant at the 0.01 level.
Discussion

Our study showed that, prevalence of stunting (short stature) among the studied group is 15.3%

This is similar to the finding of 16.64% among Kenyan middle-school children, 17.9% among Santal children of Puruliya district in India.

It is high when compared with Turkish children where only 5.7% are stunted. This difference is likely to stem from differential nutritional intake, socioeconomic and cultural differences rather than differences in their genetic potential to achieve maximum height.

This disagrees Roushman et al. the study that done in WHO and NCH on 11 low income countries was 32.6%and 32.6% respectively

Also it is lower than Esfarjaniet al. study who found that, stunting was prevalent among 3.7% of the studied population (n = 3147)

This is disagrees with Mushtaq et al. who aimed to assess the prevalence and socio-demographic correlates of stunting among Pakistani primary school children. A population-based cross-sectional study was conducted with a representative multistage cluster sample of 1860 children aged 5-12 years in Lahore, Pakistan. They found 8% children were stunted, while mild stunting and severe stunting were observed in 18% and 1% children respectively.

Our study revealed that stunting among male (16.7%) was higher than in female (13.7%).

This agrees with El mouzan et al. whose study in Saudia, stunted among males (11.3%) was higher than females (10.5%).

This disagrees with Mushtaq et al. who found stunting was not significantly associated with gender.

The relationship between stunting and gender varied. While some studies demonstrated a higher prevalence among males, others demonstrated a higher among females.

Explanation for the higher prevalence of stunting among female could have been due to the effect of extension of cultural preference for boys at birth.

Our study revealed that prevalence of stunting among urban (16.1%) was higher than in rural (14.6%).

This is consistent with Mushtaq et al. But disagrees with Van de Poel et al. who found higher stunting among rural in Pakistan.

Unlike Zayed et al. in Jordan that confirm stunting was high in rural than urban.

The study found that stunting was high among average socioeconomic standard than higher.

This disagreement with Janevic et al. who reported low socioeconomic status had a more detrimental effect on linear growth than on body weight. Economic inequality is an independent determinant for childhood under nutrition and studies have illustrated that the poor children tend to be at higher risk of being undernourished and restricted growth.

Also agrees with El Mouzan et al. that show improvement in socioeconomic standard decrease stunting in high socioeconomic standard.

Countries with a greater degree of economic inequality tend to have a poor health status than countries with more economic equality. The developing countries remain vulnerable to food insecurity, poor access to health services, under-nutrition and increased morbidity and mortality, and the health and nutritional benefits from economic growth tend to be concentrated only among the economically advantaged population groups.

In the study, stunting was lower among aged 9-10 years while the reverse was among lower age.

This could be due to increased access to food at the older age when the females are culturally involved in the cooking of family-food, and their better nutritional state.

Conclusion and Recommendation

Our study showed that, prevalence of stunting is 15.3%. Prevalence of stunting among male (16.7%) was higher than in female (13.7%). Prevalence of stunting among urban was higher than in rural. Stunting was high in average socioeconomic standard. Prevalence of stunting was lower among aged 9-10 years while the reverse was among lower age. With the help of school intervention programs and ministry of healthy might be the first step in early detection of stunting by yearly recording weight and height the stunted child and give their families information and assurance. Also ministry
of health should help by building programs for detection the causes and the ways for intervention.

**Funding Source:** This article received no specific grant from any funding agency in the public, commercial.

**Ethical Approval:** Before the start of the study, it was approved by the ethics committee of meniuofia university, ministry of education, schools managers, teachers and a written consent from parents of the participating students after detailed discussion with them about the importance if the research and there was no harm for their children.

**Funding:** Self-funding

**No Conflict of Interest**

**Competing Interests:** Each author certifies that he or she, or any member of his or her immediate family, has no funding or commercial associations that might pose a conflict of interest in connection with the article.

**Author’s contributions**

AE devised the idea for the beginning of the research. All authors helped in collecting the data and the result analysis. AE and ZO supervised the research. AE, ZO and WB greatly contributed to the manuscript revision. ZO and EE wrote the article. All authors read and approved the manuscript.

**References**


Serum Adiponectin in Relation to Endothelial Dysfunction and Atherosclerosis in Rheumatoid Arthritis Patients with Renal Dysfunction and Influence on Cardiovascular Risk

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\(^1\)Nephrology Department, Theodor Bilharz Research Institute, Egypt, \(^2\)Internal Medicine Department, National Research Centre, Egypt, \(^3\)Clinical Pathology Department, National Research Center, Egypt.

Abstract

Rheumatoid arthritis (RA) is a very common autoimmune disease in the population which leads to progressive destruction of the joints. Cardiovascular diseases are the common causes of death in RA patients. An unfavorable prognosis in patients with RA can be associated with kidney damage. The development of chronic kidney disease (CKD) in RA can be associated with cardiovascular pathology, while renal pathology itself is a risk factor for cardiovascular diseases. Purpose: To evaluate serum level of adiponectin and its relation to endothelial dysfunction and atherosclerosis in rheumatoid arthritis patients with renal dysfunction and prevalence on cardiovascular risk in these patients. Materials and method: This study was done with 52 patients with established diagnosis of RA divided into two groups {group of rheumatoid arthritis (RA) patients with renal dysfunction and group of RA patients without renal dysfunction}. Serum adiponectin level were measured, GFR was calculated. Determination of flow mediated vasodilation was performed and assessment of atherosclerosis and cardiovascular risk. Results: In RA patients with renal dysfunction serum adiponectin level was significantly higher (p<0.05). EDVD was significantly lower (p<0.05) than in RA patients without renal dysfunction. There was increase in cardiovascular risk in RA patients with renal dysfunction. Conclusions: In this study patients with rheumatoid arthritis and more in those with renal dysfunction high adiponectin level was found and in spite of its cardioprotective effect, it has paradoxical effect in these patients with endothelial dysfunction changes and increased cardiovascular risk and mortality with high significant correlation to kidney function.

Keywords: Rheumatoid arthritis; Renal dysfunction; Endothelial dysfunction

Introduction

Rheumatoid arthritis (RA) is a very common autoimmune diseases in the population\(^1\), leads to progressive destruction of the joints. Cardiovascular diseases, primarily ischemic heart disease have been known the common causes of death in RA patients\(^2\).

A bad prognosis in patients with RA can be associated with kidney damage\(^3\). According to different studies, about 57 to 73% have kidney damage in RA\(^4\).

The occurrence of nephropathy in RA is complicated and presenting in various clinical and morphological forms\(^5\).

The development of chronic kidney disease (CKD) in RA is associated with cardiovascular pathology, while renal pathology itself is a risk factor for CVD\(^6\). Biomarkers of subclinical atherosclerosis should be studied in patients with RA to improve the assessment of cardiovascular risk and early prevention\(^7\). From these biomarkers adiponectin which is one of Adipocytokines; (adipocyte-derived cytokines regulating). Recent data proved role of these adipocytokines in the inflammation, immune response and tissue destruction and revealed several links between them and arthritis as in RA patients\(^8\).
Adiponectin, has potent anti-inflammatory properties by inhibiting pro-inflammatory TNF-α, macrophage phagocytic activity production, and myelomonocytic cell proliferation by inducing apoptosis and inducing the production of the anti-inflammatory mediators IL-10 and IL-1 receptor antagonist (IL-1RA). Although adiponectin is a potent driving force of arthritis by stimulating the production of pro-inflammatory and key mediators of destructive arthritis, IL-6 and pro-matrix metallo-proteinase-1 (MMP-1) from RA synovial fibroblasts in vitro, Ohashi N, et al.

Adiponectin may have an important role in development of endothelial dysfunction. It regulates enzymatic activity of the endothelial nitric oxide synthase (eNOS) and NO production through increasing mRNA stability, Ser1179 phosphorylation, and an association with the scaffolding heat-shock protein 90(Hsp90) molecule. In addition, it has been shown that adiponectin, by means of a phosphatidylinositol 3-kinase-dependent mechanism, stimulates, AMPK mediated phosphorylation of eNOS at Ser1179, increasing eNOS enzymatic activity. Lastly, in addition to the AMPK mechanism, adiponectin may promote endothelial cell function through expression of cyclooxygenase-2 (COX-2).

We aimed in this study to evaluate serum adiponectin level in rheumatoid arthritis patients with and without renal dysfunction and its relation to endothelial dysfunction and cardiovascular risk in these patients and effect of associated kidney damage on this risk.

It is promising to study these cardiometabolic factors and their correction in RA patients with considering the function of the kidneys.

Materials and Method

Patients

The present study was done with approval from Theodor Bilharz Research Institute and National Research Center.

52 patients ageing from 45 to 65 years with established diagnosis of RA according to the 2010 American College of Rheumatology and EULAR criteria for RA and renal dysfunction which detected by estimation of glomerular filtration rate (GFR)<90 mL/min/1.73 m2 and/or presence of positive proteinuria (not more than 3 months). All patients received stable therapy of RA more than 6 months. We exclude patients with ischemic heart disease related to other causes, diabetes mellitus, chronic kidney disease patients with estimated GFR<60 mL/min/1.73 m2 and/or positive proteinuria test for ≥ 3 months and patients with disease activity of RA DAS28 >3.2.

The RA activity index on the DAS28 scale was 2.5 [2.1; 2.9] points, the median BMI - 28.4 [25.7; 32.4] kg/m2, GFR - 92.5 [78; 100.5] mL/min/1.73 m2. We estimate hypertension in 29 (42%) RA patients with renal dysfunction, the median systolic blood pressure was 128.5 [125.5; 133.7] mm Hg, diastolic - 76.4 [72.5; 79.3] mm Hg.

All the patients receive Basic disease-modifying RA treatment e.g methotrexate with the average dose 15 [10; 15] mg per week, the average duration of treatment with methotrexate 62 [50; 84] months. 34 patients (65.5%) receive glucocorticoids with average daily dose of methylprednisolone 3.8 [2.5; 4.0] mg, the mean duration of glucocorticoid therapy 39 [29; 50] months. The hypertensive RA patients received antihypertensive treatment e.g ACE inhibitors, angiotensin II receptor antagonist, β-blockers, calcium antagonists, diuretics or combination of antihypertensive drugs. About 15 patients (28.9%) received Statins.

Study design

Main group consist of 29 (55.3%) patients with RA and renal dysfunction (median GFR 75.3 [70.3; 86.2] m/min/1.73 m2), compare group of 23 (44.7%) RA patients without renal dysfunction (median GFR 95.8 [88.6; 102.1] mL/min/1.73 m2).

Assessments

All patients were subjected to the following: history taking, full clinical examination. Height, weight, and waist and hip circumference were measured using standard approaches. We assessed disease activity for RA by the Disease Activity Score for 28 joints based on erythrocyte sedimentation rate (DAS28-ESR). C-reactive protein concentrations were determined using immunoturbidimetric methods. Standard laboratory blood tests of erythrocyte sedimentation rate, renal and liver function, hematological parameters, and glucose were performed. The GFR was estimated using the CKD-EPI formula. Cardiovascular risk was assessed by SCORE models adapted for patients without established diagnosis of RA according to the 2010 American College of Rheumatology and EULAR criteria for RA and renal dysfunction which detected by estimation of glomerular filtration rate (GFR)<90 mL/min/1.73 m2 and/or presence of positive proteinuria (not more than 3 months). All patients received stable therapy of RA more than 6 months. We exclude patients with ischemic heart disease related to other causes, diabetes mellitus, chronic kidney disease patients with estimated GFR<60 mL/min/1.73 m2 and/or positive proteinuria test for ≥ 3 months and patients with disease activity of RA DAS28 >3.2.
RA by introducing a 1.5 multiplication factor and total cholesterol/HDL cholesterol ratio according to EULAR evidence based recommendations for cardiovascular risk management in patients with RA and other forms of inflammatory arthritis. Adiponectin concentrations were measured with commercially available an enzyme-linked immuno-osorbent assay (ELISA) kit according to the manufacturer’s protocol (Ray Biotech, Inc cat, ELH adiponectin-001).

Determination of flow mediated vasodilation of brachial artery was performed based on Celermajer’s methodic. The diameter of the brachial artery was measured with 7.5 MHz transducer of Philips Evisor C to evaluate EDVD (End Diastolic Vaso-Dilatation).

Duplex scanning of extracranial carotid arteries was performed according to recommendations of the American Society of Echocardiography. Scanning was performed on Teodorbilharz research institute in the presence of pulsed color Doppler and Tissue Doppler, using linear sensors 5, 7.5 MHz and 3.5 MHz convex transducer.

**Statistical Analysis**

Data were collected and analyzed by computer program SPSS “version 17” (The Statistical Pack-age for the Social Science Program), Chicago, USA. Data were expressed as mean, SD, number and percentage. t-test was used to determine significance for numeric variables. Significance was considered according to the level of (p-value) as follows: p>0.05 = Non significant, p=0.05 = Significant, P<0.01 = Highly significant and p<0.001 = Very highly significant.

**Results**

Serum adiponectin correlates positively with duration of the disease, CRP, DAS28- ESR in both RA groups with and without renal dysfunction with higher significant correlation has been found in RA with renal dysfunction group.

The median cardiovascular risk level matched by mSCORE in RA patients with renal dysfunction was 4.4 [2.3; 5.2] % and in patients with normal renal function was 3.9 [2.2; 4.8] % (p>0.05). The majority 16 (53.5 %) of main group patients had moderate risk level {1-5} while the number of high {5} risk level patients was 4 (14%) and the number of low {1} risk level patients was 9 (32.6 %) but there was no significant differences in cardiovascular risk structure comparing with compare group (p>0.05). In 22 (76.2 %) RA females with renal dysfunction carotid atherosclerosis has been estimated as well as in 12 (52.6 %) compare group patients (p<0.05), higher prevalence of atherosclerotic plaques (AP) was significantly determined among main group patients with estimated carotid atherosclerosis (Figure 1). Regarding the number of traditional cardiovascular risk factors, the higher incidence of AP in RA patients with renal dysfunction also remained statistically significant. The majority of RA patients with renal dysfunction and carotid atherosclerosis had moderate cardiovascular risk level (Figure 2).

**Figure 1**: Estimated subclinical atherosclerosis in RA patients.

**Figure 2**: The structure of cardiovascular risk level in RA patients with renal dysfunction and estimated subclinical atherosclerosis.

The discrepancy of cardiovascular risk level and subclinical atherosclerosis manifestations may be associated with additional factors. Endothelial dysfunction was estimated in the majority of observed patients {40 patients (76.9 %)}. Regarding EDVD, it was significantly lower among the RA patients with renal dysfunction (median level 3.5 [2.0; 5.3] %) while in patients with normal renal function {5.9 [4.2; 10.5] %} (p<0.05). There was significant correlation between EDVD level and GFR (R=0.72, p<0.05) as well as
significant correlation between EDVD and SCORE level (R=-0.65, p<0.001), diastolic blood pressure (R=-0.58, p<0.05).

Median serum adiponectin level in RA patients was 16.3 [14.7; 17.9] mg/ml and significantly higher in RA patients with renal dysfunction (Figure 3) (p<0.05). Factors showed associated with increased adiponectin level, was as following GFR <90 ml/min/1.73 m2 (OR=2.11, p=0.003, 95% CI 1.56-2.12), endothelial dysfunction (OR=2.21, p=0.001, 95% CI 1.56-2.54) and glucocorticosteroid therapy (OR=1.54, p=0.001, 95% CI 1.02-1.87).

There is significant decrease of adiponectin in patients with endothelial dysfunction correction in compare to preserved endothelial dysfunction patients (15.3 % (p=0.01)) and GFR increasing on 18.2% (p=0.001) in those patients.

![Figure 3:Adiponectin level in RA patients depending on renal dysfunction](image)

**Table (1): Different characteristics measure in RA patients with or without renal dysfunction**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Patients with RA with renal dysfunction(n:29)</th>
<th>Patients with RA without renal dysfunction(n:23)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease duration (years)</td>
<td>6.35±2.53</td>
<td>4.35±2.47</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>BMI (Kg/m2)</td>
<td>20.65±1.25</td>
<td>23.54±0.74</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>DAS28-ESR</td>
<td>3.17±0.93</td>
<td>2.06±0.71</td>
<td>NS</td>
</tr>
<tr>
<td>CRP (mg/L)</td>
<td>4.29±1.32</td>
<td>3.52±0.27</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>GFR</td>
<td>75.3 [70.3; 86.2] ml/min/1.73 m2</td>
<td>95.8 [88.6; 102.1] ml/min/1.73 m2</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Adiponectin (pg/ml)</td>
<td>24.2±1.8</td>
<td>16.3±1.6</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>m-score of CVR</td>
<td>4.4 [2.3; 5.2] %</td>
<td>3.9 [2.2; 4.8] %</td>
<td>(p&gt;0.05)</td>
</tr>
</tbody>
</table>

**Table (2): Correlation of adiponectin with clinical and laboratory characteristics in RA patients**

<table>
<thead>
<tr>
<th></th>
<th>Serum adiponectin in patients with RA and renal dysfunction</th>
<th>Serum adiponectin in patients with RA without renal dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.121</td>
<td>0.134</td>
</tr>
<tr>
<td>Duration of disease</td>
<td>0.481**</td>
<td>0.367*</td>
</tr>
<tr>
<td>BMI</td>
<td>0.049</td>
<td>0.065</td>
</tr>
<tr>
<td>CRP</td>
<td>0.896**</td>
<td>0.407*</td>
</tr>
<tr>
<td>DAS28</td>
<td>0.984**</td>
<td>0.864**</td>
</tr>
<tr>
<td>EDVD</td>
<td>0.398*</td>
<td>0.156</td>
</tr>
<tr>
<td>m-score</td>
<td>0.652**</td>
<td>0.423**</td>
</tr>
</tbody>
</table>

**Significant.**

**Table 2**: Correlation of adiponectin with clinical and laboratory characteristics in RA patients

<table>
<thead>
<tr>
<th>DAS28 m-score **</th>
<th>Erythrosedimentation rate first hour.</th>
<th>Disease activity score 28 joints.</th>
<th>m-score of CVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI CRP EDVD *</td>
<td>Body mass index.</td>
<td>C-reactive protein.</td>
<td>End diastolic vaso-dilatation</td>
</tr>
</tbody>
</table>

Highly significant.
Discussion

Epidemiological studies in different groups demonstrate that a low serum level of adiponectin, is an independent risk factor for CVD.\textsuperscript{17}

A strong correlation between hypoadiponectinaemia and coronary heart disease has been documented in a number of studies. Two independent studies have consistently demonstrated that hypoadiponectinaemia is an independent risk factor for hypertension.\textsuperscript{18} Hyperadiponectinaemia is also an independent risk factor for diabetic cardiomyopathy.\textsuperscript{19}

Many studies first suggested that adiponectin is a protective molecule for myocardial infarction and coronary artery disease,\textsuperscript{20,21} while other larger group of studies have clearly indicated that low serum adiponectin concentrations do not predict future cardiovascular events. In a study carried out in more than 250,000 individuals, there is no association between adiponectin-increasing alleles and reduced risk of coronary heart disease.\textsuperscript{20}

Recently, it was reported that adiponectin levels seem to predict cardiovascular mortality in a sex-specific manner, with the paradoxical effect being observed in men but not women.\textsuperscript{19} This is not found in our study on RA patients whether males or females.

In this study there is association between high serum adiponectin concentration and increased cardiovascular risk and then mortality rate in RA patients especially with renal dysfunction. This indicates that under some chronic inflammatory conditions, adiponectin, rather than being an anti-inflammatory factor, exacerbates inflammation in several tissues and cell types so operating during low-grade chronic inflammation characterizing CVD. This may explain the adiponectin paradox on CVD risk and mortality that is found in patients with RA with or without renal dysfunction with unexpected association of high adiponectin level and increased CVD risk.

In our study, increased frequency of carotid atherosclerosis, including AP presence with instability signs was observed in RA patients especially those with renal dysfunction. However, the majority of these patients had established renal dysfunction and moderate cardiovascular risk level. High adiponectin level was found and in spite of its cardioprotective effect, it has paradoxical effect in these patients with endothelial dysfunction changes and increased cardiovascular risk and mortality. And this agree with what suggested by Otero, et al. that adiponectin role in RA is controversial.\textsuperscript{21} Also in this study, high significant correlation to kidney function was found.

As regarding, endothelial dysfunction, it was associated with increased adiponectin level and this indicates a complex relationship between muscle and adipose tissue exchange. Present study shows that the endothelial dysfunction correction in RA patients with renal dysfunction may cause benefit effects on range of cardio-metabolic factors.

These results support the need for RA specific cardiovascular risk stratification models with the consideration of renal function, potentially, the use of novel CVD risk biomarkers. The study results reinforce the need for more awareness in daily clinical practice of increased cardiovascular risk in RA patients with renal dysfunction.

In fact, several epidemiological data wonder about the anti-inflammatory and cardioprotective effects of adiponectin described in basic studies and disappointment cast doubts on adiponectin as a promising therapeutic target. Much has been done on adiponectin, but more has to be done.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of Nephrology Department, Teodor Bilharz Research Institute, Egypt and Internal Medicine Department, National Research Centre, Egypt.

No Conflict of Interest

References

4. Baghdadi L, Woodman R, Shanahan E The


Prevalence of BCR/ABL Fusion Gene Expression in Acute Myeloid Leukemia Patients: A Single Center Study

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\textsuperscript{1}Clinical Pathology department, \textsuperscript{2}Medical Oncology department, \textsuperscript{3}Biostatistics and Cancer Epidemiology Department, National Cancer Institute, Cairo University, Egypt

Abstract

Introduction: One of the evolving defects in acute myeloid leukemia (AML) is the BCR/ABL fusion which is the trigger of chronic myeloid leukemia (CML). Differentiating Ph +ve AML from CML in blast crisis is an ongoing challenge. In our study, we tried to differentiate between both categories and determine the prevalence of this rare entity as well as its clinical and laboratory features.

Patients and Method: We enrolled in our study 175 patients from the National Cancer Institute, Egypt; Conventional Karyotyping and qualitative RT PCR for BCR/ABL fusion proteins were done for all the patients. Positive cases were confirmed by FISH.

Results: Five/175 patients were shown to have BCR/ABL translocation with an incidence of 2.8%. Four out of the five cases were having fusion protein p210 by RT PCR, while the fifth case was having neither p210 nor p190. Most criteria of differentiation were intermingling together.

Conclusion: Further studies should be done to confirm or exclude this provisional entity. Moreover, introduction of BCR/ABL analysis in the routine may be a useful tool for introducing TKIs in these patients, which may improve the survival.

Key words: BCR/ABL, Ph +ve AML, qualitative RT PCR.

Introduction

Acute myeloid leukemia (AML) is characterized by the expansion of a clone of myeloid blasts in the peripheral blood and the bone marrow\textsuperscript{1} reducing the normal blood cells\textsuperscript{2}. AML involves single or multiple myeloid lineages\textsuperscript{3} due to the accumulation of many genetic defects in hematopoietic progenitor cells\textsuperscript{4}.

The Philadelphia chromosome (ph) is the cytogenetic hallmark of chronic myeloid leukemia (CML) and it corresponds to the BCR/ABL rearrangement. Also, it is present in high-risk acute lymphoblastic leukemia (ALL)\textsuperscript{5}. BCR/ABL proteins lead to an unbalanced activated cell cycle even without growth factors\textsuperscript{6} leading to oncogenic effects\textsuperscript{7}.

During the previous years, many data in the literature favors the presence of Ph +ve, AML, which is now included as a new provisional entity in the 2016 revised WHO classification of hematopoietic malignancies\textsuperscript{8}.

BCR-ABL1 has been described in AML together with other recurrent genetic abnormalities\textsuperscript{8,9,10}. While according to the WHO, Ph +ve AML is a de novo AML in patients with no history of CML and don’t meet the criteria of neither mixed-phenotype acute leukaemia nor other AML subtypes\textsuperscript{3}. Also, late acquisition of BCR-ABL1 fusion on top of pre-existing AML has also been reported and should not be diagnosed as AML with BCR-ABL1\textsuperscript{11}.

Some authors stated that AML with BCR-ABL1 accounts for 0.5-3.0% of all AML cases\textsuperscript{5,12}. Most cases demonstrated the p210 fusion, while p190 transcripts were encountered in a minority\textsuperscript{3}. However, a case with p230 fusion was reported\textsuperscript{13}.

Since AML with BCR-ABL1 appeared to be an aggressive disease and have a poor response to the
traditional AML therapy or to tyrosine kinase inhibitor therapy alone\textsuperscript{3,14}, it is better to be treated with tyrosine kinase inhibitor therapy followed by allogeneic haematopoietic cell transplantation\textsuperscript{15}.

We aimed to determine the prevalence of the BCR-ABL fusion gene in AML cases with determination of the clinical and laboratory criteria of these cases.

**Subjects and Method**

In our study, 175 de novo AML patients were enrolled, with no previous history of any haematological disorder. They presented to the outpatient clinics in the National Cancer Institute between March 2016 and January 2018. All the patients were subjected to clinical and routine laboratory work up for the suspected AML patients, and the diagnosis of AML was based on WHO criteria analysis.

**RNA extraction and cDNA formation**

Total RNA was extracted from K-EDTA preserved BM cells using QIAamp RNA extraction blood Mini kit (QIAGEN® Austin, Texas, USA catalogue no.52304). Then complementary DNA (cDNA) was prepared from RNA by High Capacity cDNA Reverse Transcription Kit (Applied Biosystems, Thermo Fisher Scientific, USA; catalogue no. 4368814). Finally, cDNA purity and concentration was evaluated using spectrophotometer nano-drop (Quawell, Q-500, Scribner, USA) and used in qualititative RT PCR. All the procedures were done according to the manufacturer’s instructions.

**Qualitative detection of BCR/ABL fusion transcripts (p210 & p190):**

**Reagents:**

1-One PCR™ HotStar mix (Genedirex; Cat. No. MB206-0100):
2- Primers for RT PCR analysis of t(9;22)(q34;q11) with the BCR-ABL p210 and p190 fusion genes [16] (Table 1).

**Table 1: Used primers in our study [16].**

<table>
<thead>
<tr>
<th></th>
<th>BCR primer</th>
<th>ABL primer</th>
</tr>
</thead>
<tbody>
<tr>
<td>P210</td>
<td>BCR-b1-A: 5' GAA GTG TTT CAG AAG CTT CTC C 3'</td>
<td>ABL-a3-B: 5' GTT TGG GCT TCA CAC CAT TCC 3'</td>
</tr>
<tr>
<td>P190</td>
<td>BCR-e1-A: 5' GAC TGC AGC TCC AAT GAG AAC 3'</td>
<td></td>
</tr>
</tbody>
</table>

Stock primer solution was prepared using TE buffer, then a final working primer solution with final concentration of 10 pmol/µl.

PCR reaction was performed under laminar flow cabinet using a mixture of forward primer, reverse primer, master mix, cDNA and distilled water. The tube was centrifuged briefly, then placed in the Biometra thermal cycler for 35 cycles according to the manufacturer protocol.

The amplified products were detected by agarose gel electrophoresis with subsequent examination and photographing in UV epi-illuminator as shown in figure (1).

![Figure (1): Ethidium bromide-stained agarose gel electrophoresis for 16 AML cases; +ve:Positive control, L:ladder, lane(9):showing one BCR-ABL + AML with p210 b3–a2 transcript, lanes(1-8, 10-16):BCR-ABL negative AML cases.](image-url)
Interpretation of the results:

Interpretation was done. For p210, M-bcr breakpoints resulted in different sizes of PCR products were visualized at 417, 342, 243, or 168 bp for the fusion transcripts b3–a2, b2–a2, b3–a3 and b2–a3 respectively. For p190, the sizes of PCR products were expected at 521 or 347 bp, which corresponds to e1-a2 and e1-a3, respectively [16].

Statistical Methods

Survival analysis was done using Kaplan-Meier method. Comparison between two survival curves was done using log rank test.

Results

Patients were 93 males (53.1%) and 82 females (46.9%) with a male to female ratio of 1.13:1. Five/175 AML cases (2.8%) were found to have BCR/ABL fusion gene. All the cases were confirmed by Karyotyping and FISH analysis as shown in figure(2). However by conventional PCR and gel electrophoresis, only 4 cases were having p210 fusion gene while the 5th case was having neither p210 nor p190 fusion genes.

The demographic, clinical characteristics and laboratory data are shown in table(2).

BCR/ABL survival analysis

Regarding the OS, there was no statistically significant influence of BCR/ABL fusion gene on the OS of the AML patients with p value = 0.699 (Table 3). The DFS of the BCR/ABL positive AML patients wasn’t evaluated due to small sample size.

Figure (2): Examples of BCR/ABL translocation in the different cases;
(a) Case 1: 46,XX, del(19p), t(9;22)(q34.1;q11.2),
(b) Case 2: 46,XY, t(9;22)(q34.1;q11.2)
(c) Case 4: Variant BCR/ABL translocation pattern by FISH (Dual colour dual fusion probe);
(t;v9;22)(p?q34.1;q11.2)
(d) Case 5: BCR/ABL translocation with extra philadelphia chromosome by FISH; nuc ish (BCRx4, ABLx4)(BCR con ABLx3)
<table>
<thead>
<tr>
<th></th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>32 yrs</td>
<td>36 yrs</td>
<td>53 yrs</td>
<td>45 yrs</td>
<td>51 yrs</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Hb</strong></td>
<td>9.2</td>
<td>8.6</td>
<td>10.9</td>
<td>7</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>PLTs x10³/µl</strong></td>
<td>826</td>
<td>69</td>
<td>217</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td><strong>TLC x10³/µl</strong></td>
<td>85</td>
<td>270</td>
<td>162</td>
<td>104</td>
<td>132</td>
</tr>
<tr>
<td><strong>PB blasts %</strong></td>
<td>13</td>
<td>42</td>
<td>35</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td><strong>BM cellularity</strong></td>
<td>Normocellular</td>
<td>Hypercellular</td>
<td>Hypercellular</td>
<td>Hypercellular</td>
<td>Hypercellular</td>
</tr>
<tr>
<td><strong>FAB classification</strong></td>
<td>M2</td>
<td>M2</td>
<td>M2</td>
<td>M2</td>
<td>M2</td>
</tr>
<tr>
<td><strong>BM blasts %</strong></td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>43</td>
<td>46</td>
</tr>
<tr>
<td><strong>BM basophils %</strong></td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>BM esinophils</strong></td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>FLT3</strong></td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
</tr>
<tr>
<td>NPM1</td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
<td>Wild</td>
</tr>
<tr>
<td><strong>Organomegally</strong></td>
<td>Splenomegaly</td>
<td>Huge splenomegaly</td>
<td>None</td>
<td>None</td>
<td>Splenomegaly</td>
</tr>
<tr>
<td>Lymphad-enopathy</td>
<td>None</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Recurrent cytogenetic abnormality</td>
<td>none</td>
<td>none</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Karyotype</strong></td>
<td>46.XX, del(19p), (9;22)q34.1;q11.2[10]/46.XX, t(9;22)(q34.1;q11.2)[17]/47.XY, t(9;22)(q34.1;q11.2), der(22)[3]</td>
<td>46.XY, t(9;22)q34.1;q11.2</td>
<td>46.XY, t(9;22)(p;34.1;q11.2)[18]/46.XX[2]</td>
<td>47.XY, t(9;22)(q34.1;q11.2), der(22)[14]/46.XY, t(9;22)(q34.1;q11.2)[6]</td>
<td></td>
</tr>
<tr>
<td><strong>BCR/ABL+ cells % by FISH</strong></td>
<td>97% positive</td>
<td>90% positive/ 8% double ph</td>
<td>97% positive</td>
<td>80% positive; variant translocation</td>
<td>76% positive/ 24% extra ph</td>
</tr>
<tr>
<td>Fusion protein by PCR</td>
<td>b3 – a2</td>
<td>b2 – a2</td>
<td>b2 – a2</td>
<td>-------</td>
<td>b3 – a2</td>
</tr>
<tr>
<td>Treatment</td>
<td>3&amp;7 + TKI</td>
<td>TKI</td>
<td>3&amp;7 then HDAC 3 cycles</td>
<td>3&amp;7</td>
<td>3&amp;7</td>
</tr>
<tr>
<td>Initial Response</td>
<td>Complete remission</td>
<td>Persistent disease</td>
<td>Complete remission</td>
<td>Persistent disease</td>
<td>Early death</td>
</tr>
<tr>
<td>Day14 blasts</td>
<td>0</td>
<td>13</td>
<td>0</td>
<td>71</td>
<td>NA</td>
</tr>
<tr>
<td>Day28 blasts</td>
<td>0</td>
<td>NA</td>
<td>4</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Duration till CR</td>
<td>At D14</td>
<td>No CR</td>
<td>At D14</td>
<td>No CR</td>
<td>Early death</td>
</tr>
<tr>
<td>Final outcome</td>
<td>Alive</td>
<td>Dead</td>
<td>Dead</td>
<td>Dead</td>
<td>Dead</td>
</tr>
</tbody>
</table>

**ABL**: v-abl Abelson murine leukemia viral oncogene homolog 1, **BCR**: Breakpoint cluster region, **BM**: bone marrow, **CR**: complete remission, **DVT**: deep venous thrombosis, **FISH**: fluorescence in situ hybridization, **FAB**: French American British, **FLT3**: FMS-like tyrosine kinase 3, **Hb**: hemoglobin, **HiDAC**: High-Dose Cytarabine, **PB**: peripheral blood, **PCR**: polymerase chain reaction, **PLTs**: platelets, **NA**: not available, **NPM1**: nucleophosmin, **TLC**: total leucocytic count, **TKI**: tyrosine kinase inhibitors.
Table (3): Overall Survival (OS) of the BCR/ABL group

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>No. of events</th>
<th>Median survival time (months)</th>
<th>Cumulative survival at 12 months (%)</th>
<th>Cumulative survival at 24 months (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole group</td>
<td>164</td>
<td>113</td>
<td>3.98</td>
<td>35.6</td>
<td>26.3</td>
<td>-</td>
</tr>
<tr>
<td>BCR/ABL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>159</td>
<td>109</td>
<td>4</td>
<td>36.2</td>
<td>26.7</td>
<td>0.699</td>
</tr>
<tr>
<td>Positive</td>
<td>5</td>
<td>4</td>
<td>2.9</td>
<td>NR</td>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>

NR: not reached

**Discussion**

During the past years, there was an increasing number of data favoring the existence of Ph +ve AML. Many researchers reported its incidence from 0.5 to 3%.

Differentiation between Ph +ve AML and acute blastic crisis on top of CML is an ongoing challenge; however, no single clinical or hematologic feature distinguishes Ph +ve AML from CML blast crisis.

In our study, 5/175 AML patients were having Philadelphia chromosome in the karyotype and BCR/ABL fusion by FISH carrying an incidence of 2.8%; Four out of the five cases were having fusion protein p210 by conventional RT PCR, while the fifth case was having neither p210 nor p190. We attributed this result to the occurrence of a rare form of BCR/ABL translocation rather than p210 or 190.

Moreover, similar to the previous studies, all our patients had an acute course with no history of previous CML or antecedent hematologic disorder and none of our patients had dwarf megakaryocytes which are one of the hallmarks of CML.

All the 5 patients were having the FAB subtype AML M2, which is the most prevalent subtype among Ph +ve AML cases, and none of our patients was having recurrent cytogenetic abnormality, which goes with the WHO definition.

Patients with de novo Ph-positive AML are less likely to have additional chromosomal abnormalities compared to patients with CML with blast crisis (approximately 20% vs 80% respectively). However one study has reported more frequent additional cytogenetic abnormalities in the Ph +ve AML cases (55% to 57%). Similar to the literature, only 1 patient in our study (20%) had an additional cytogenetic abnormality (deletion 19p) which is also not characteristic to CML and favored the diagnosis of Ph +ve AML.

Two of our patients were having an extra Philadelphia chromosome which is one of the common additional cytogenetic abnormalities in CML, while it also occurred in about 2/9 and 2/16 of Ph +ve AML in previous studies. And this may be due to the less number of Ph +ve AML cases in our study, compared to the previous studies.

All the 5 cases are exhibiting wild forms of NPM1, which is reported to be mutant in 22% of Ph +ve AML rather than CML. However this difference may be due to the small sample size.

Commonly, Ph +ve AML patients also tend not to have splenomegaly or have only mild splenomegaly at presentation, lower incidence of basophilia and normal M:E ratio compared to patients with CML. However, these criteria were not typical for our patients, where 3 out of the 5 patients had splenomegaly. One case was having 11 basophils in the BM, 1 was having no basophils and the resting 3 cases ranged from 2 to 4 basophils.

Only the case which received a combination of chemotherapy with TKIs was still alive till the end of the study. The median survival time of the 5 positive cases was 2.9 months, setting the disease as a high risk AML when treated with either chemotherapy or TKIs alone.

The different discriminative criteria are shown in table (4). To summarize, the common criteria in all the cases were the absence of H/O of CML or any antecedent hematological disorder, like all the previous studies collectively, as well as the absence of dwarf megakaryocytes. However the other criteria are
intermingling together with no sharp cutoff. Further studies should be done to confirm or exclude this provisional entity.

Table (4): Criteria of discrimination between Ph+ AML and Acute blastic crisis in our cases

<table>
<thead>
<tr>
<th></th>
<th>H/O of previous CML</th>
<th>Dwarf megakaryocytes</th>
<th>Additional cytogenetic abnormalities</th>
<th>Spleno-megaly</th>
<th>BM basophils</th>
<th>NPM1 mutation</th>
<th>M/E ratio</th>
<th>No. of criteria favouring Ph+AML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>None</td>
<td>None</td>
<td>Del(19p)</td>
<td>Moderate</td>
<td>11</td>
<td>Wild</td>
<td>2.2</td>
<td>4/7</td>
</tr>
<tr>
<td>Case 2</td>
<td>None</td>
<td>None</td>
<td>Extra Ph</td>
<td>Huge</td>
<td>3</td>
<td>Wild</td>
<td>26</td>
<td>2/7</td>
</tr>
<tr>
<td>Case 3</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>2</td>
<td>Wild</td>
<td>15</td>
<td>4/7</td>
</tr>
<tr>
<td>Case 4</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>0</td>
<td>Wild</td>
<td>16.3</td>
<td>5/7</td>
</tr>
<tr>
<td>Case 5</td>
<td>None</td>
<td>None</td>
<td>Extra Ph</td>
<td>Moderate</td>
<td>2</td>
<td>Wild</td>
<td>25.5</td>
<td>2/7</td>
</tr>
</tbody>
</table>

**Conclusion**

Ph+ve AML is still a rare provisional category with no sharp cut off with the CML in blast crisis. Further studies should be done to confirm or exclude this entity and setting a treatment protocol to improve the prognosis.

**Funding**

This work is submitted in partial fulfillment of the requirement for the Medical Doctorate degree in the National Cancer institute, Cairo University, Egypt, and was funded from the same University.

**Ethical Clearance:** This study was approved by the ethical committee, review board of NCI, Cairo University in accordance with Helsinki guidelines. Written informed consent was obtained from all adult patients and from guardians of pediatric patients.

**Conflict of Interest:** The authors declare no competing financial interests.

**References**


Early Outcome of Tricuspid Valve Repair Using Prosthetic Ring Annuloplasty versus Suture Annuloplasty

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Cardiothoracic Surgery Department, Faculty of Medicine, Cairo University, Egypt

Abstract

The purpose of this study is to compare the early outcome of tricuspid valve repair using prosthetic ring annuloplasty versus suture annuloplasty. Methods: In the period between March 2016 and September 2017, 40 patients with severe functional tricuspid regurgitation (TR) secondary to rheumatic mitral with or without aortic valve pathology divided into two equal groups underwent open heart surgery at Kasr Al-Aini Hospitals, Cardiothoracic surgery department. Group (1) had tricuspid valve repair using suture annuloplasty, while Group (2) had tricuspid valve repair using prosthetic ring annuloplasty. All patients were evaluated thoroughly preoperative, intra-operative, and post-operative. Particular attention was paid to clinical and echocardiographic findings of presence of tricuspid regurgitation (TR), its nature and degree, postoperative intensive care unit (ICU) events, ICU stay, hospital stay and follow up of the degree of TR post-operatively. Results: Evaluation showed that there is no significant difference between results of suture annuloplasty and prosthetic ring annuloplasty early postoperative, while late postoperative studies had proven significantly better outcomes with prosthetic ring annuloplasty than with suture annuloplasty techniques concerning low rate of recurrent TR. Conclusion: we concluded that using prosthetic ring for tricuspid valve repair was better than suture annuloplasty techniques as it was associated with less frequent rates of late postoperative recurrent TR.

Key words: Tricuspid regurgitation, Tricuspid valve repair, prosthetic ring, suture annuloplasty.

Introduction

The most common cause of Tricuspid regurgitation (TR) in adults is functional Tricuspid, as leaflets and chords are morphologically normal, but with right ventricular enlargement and dilatation with flattening of the tricuspid annulus. Distorted relation between leaflets, chords, and papillary muscles leads to leaflet tethering which prevents proper leaflet coaptation and increases valve regurgitation.¹

TR is commonly found in many patients undergoing left-sided heart valve surgery. Recent studies showed that TR is important to determine and surgically correct as significant TR usually does not improve after left-sided heart valve surgery and may also progress.²

Another important issue is choosing an appropriate technique for tricuspid valve repair. Many studies showed better long-term results with prosthetic ring repair³, while other studies showed better results with suture annuloplasty techniques⁴.

Patients and Method

Study Patients

This is a prospective, randomized, comparative clinical study done at cardiothoracic surgery department, Cairo University hospitals, in a period between March 2016 and September 2017. The study was conducted on 40 patients who underwent tricuspid valve surgery for repair of severe functional TR secondary to rheumatic mitral with or without aortic valve pathology. In all patients, left sided lesions were corrected during the same surgical procedure before tricuspid valve repair. In all patients, tricuspid valve repair was performed using annuloplasty techniques. Patients with organic tricuspid valve affection whatever the etiology were excluded.

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Patients were allocated in one of two groups: group (A): 20 patients underwent tricuspid valve repair using suture annuloplasty, while in group (B): 20 patients underwent tricuspid valve repair using prosthetic ring annuloplasty (Edwards MC3 ring).

The grade of TR was evaluated by using transthoracic echocardiography (TTE) at resting conditions preoperatively. Baseline characteristics of the population are presented in Table 1. Each patient signed an informed consent form.

Clinical study end points

The end points of the study were to evaluate and compare suture annuloplasty versus prosthetic ring annuloplasty in repair of severe functional TR.

Study procedures

Echocardiography was performed at baseline, postoperatively in hospital, then in outpatient clinic 6 months after surgery for all patients in both groups. The severity of TR was assessed by means of TTE, M mode, two dimension and Doppler echocardiography.

Surgical procedures:

Suture annuloplasty was performed by standard operative techniques using either DeVega annuloplasty, modified DeVega annuloplasty and segmental annuloplasty.

Prosthetic ring annuloplasty was performed using Edwards MC3 ring.

Table 1. Preoperative patients’ characteristics:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (Suture group). ((n=20))</th>
<th>Group 2 (Ring group). (n=20)</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>24.6 ± 3.67</td>
<td>26.85 ± 4.28</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Male sex</td>
<td>9 (45 %)</td>
<td>12(60 %)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Female sex</td>
<td>11 (55 %)</td>
<td>8 (40%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Neck vein engorgement</td>
<td>15 (75%)</td>
<td>17 (85%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Enlarged liver (fingers)</td>
<td>3.8 ± 0.76</td>
<td>3.95 ± 0.75</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Ascites</td>
<td>4 (20%)</td>
<td>3 (15%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Pitting edema</td>
<td>13 (65%)</td>
<td>15 (75 %)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>NYHA class(mean value)</td>
<td>3.3</td>
<td>3.4</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
</tbody>
</table>

Statistical Analysis

Data were collected, coded, translated to English to facilitate data manipulation and double entered into Microsoft Access and data analysis was performed using SPSS software version 18 under windows 7.

Simple descriptive analysis in the form of numbers and percentages for qualitative data, and arithmetic means as central tendency measurement, standard deviations as measure of dispersion for quantitative parametric data, and inferential statistic test:

For quantitative parametric data :

In-depended student t-Test used to compare measures of two independent groups of quantitative data

Paired t-test in comparing two dependent quantitative data.

For qualitative data

Chi square test to compare two of more than two qualitative groups.

Mc-Nemartest for paired dependant qualitative data.

The level P ≤ 0.05 was considered the cut-off value for significance.

Results

The preoperative demographics, clinical and echocardiographic characteristics are shown in (Table 1).
Table 1. Preoperative patients’ characteristics:

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (Suture group). (n=20)</th>
<th>Group 2 (Ring group). (n=20)</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV affection</td>
<td>20 (100%)</td>
<td>20 (100%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>AV affection</td>
<td>4 (20%)</td>
<td>2 (10 %)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Liver function tests:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total bilirubin</td>
<td>1.76 ± 0.41</td>
<td>1.9 ± 0.49</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Albumin</td>
<td>3.24 ± 0.21</td>
<td>3.32 ± 0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>17(85%)</td>
<td>18 (90%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>TR grade(+)</td>
<td>20 (100%)</td>
<td>20 (100%)</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>PASP (mmHg)</td>
<td>62.50 ± 8.95</td>
<td>61.25 ± 10.24</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>RV short axis (cm)</td>
<td>2.93 ± 0.37</td>
<td>2.99 ± 0.40</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>LA (cm)</td>
<td>7.10 ± 0.97</td>
<td>7.27 ± 1.00</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>LVESD (cm)</td>
<td>3.92 ± 0.36</td>
<td>3.90 ± 0.45</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>LVEDD (cm)</td>
<td>5.80 ± 0.64</td>
<td>5.72 ± 0.75</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>EF(%)</td>
<td>50.30 ± 3.13</td>
<td>52.35 ± 3.26</td>
<td>P &gt; 0.05</td>
<td>NS</td>
</tr>
</tbody>
</table>

P > 0.05 = NS   P< 0.05 = S   P < 0.01 = HS

Means ± standard deviation or number (percentage) as shown. NYHA class= New York Heart Association functional class of dyspnea, MV= Mitral valve, AV= Aortic valve, TR= Tricuspid regurgitation, PASP= Pulmonary artery systolic pressure, RV= Right ventricle, LA= Left atrium, LVEDD= Left ventricle End diastolic diameter, ESD= End systolic diameter, EF= Ejection fraction. N.B: Pulmonary hypertension= Preoperative PASP (> 40 mm Hg).

Operative Data:

No differences were noted between two groups concerning intraoperative data with the exception of cardiopulmonary bypass (CPB) time and aortic cross clamp time (P <0.05) with high mean among 2nd group as depicted in table (2).

Postoperative Data:

Table (2) shows mean values for total period of mechanical ventilation, total ICU stay and hospital stay between both study groups. All differences were insignificant.

Table (2) also depicts the post-operative complications among patients in the two studied groups. All differences were insignificant, but we can notice that there was a case of postoperative bleeding that needed re-exploration in the 1st group and another 2 cases complicated with postoperative heart block and needed a permanent pacemaker occurred in the 2nd group.

Early Mortality and Outcome

There was no evidence of in-hospital (<30 days) mortality between study groups.

Table 2. Intraoperative and postoperative patients’ data:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (Suture group). (n=20)</th>
<th>Group 2 (Ring group). (n=20)</th>
<th>p-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraoperative data:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV repair</td>
<td>2 (10%)</td>
<td>3 (15%)</td>
<td>0.63</td>
<td>NS</td>
</tr>
<tr>
<td>MVR</td>
<td>14 (70%)</td>
<td>15 (75%)</td>
<td>0.72</td>
<td>NS</td>
</tr>
</tbody>
</table>
### Table 2. Intraoperative and postoperative patients’ data:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (Suture group)- (n = 20)</th>
<th>Group 2 (Ring group)- (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preoperative</td>
<td>Postoperative</td>
</tr>
<tr>
<td></td>
<td>Mean value (Mean value)</td>
<td>Mean value (Mean value)</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P value</td>
</tr>
<tr>
<td>DVR</td>
<td>4 (20%)</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Bypass time (min)</td>
<td>141.2±28.2</td>
<td>161.5±15.1</td>
</tr>
<tr>
<td>Cross clamp time (min)</td>
<td>91.7±19.5</td>
<td>118±13.6</td>
</tr>
<tr>
<td>Inotropic support</td>
<td>16 (80%)</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>Early outcomes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>6.5±1.2</td>
<td>5.2±1.1</td>
</tr>
<tr>
<td>ICU stay(days)</td>
<td>3.9±0.96</td>
<td>3.6±1.1</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>11.1±1.5</td>
<td>10.8±1.4</td>
</tr>
<tr>
<td>LCOS</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Re-exploration for Bleeding</td>
<td>1 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Permanent pacemaker implant</td>
<td>1 (5%)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Early reoperation for residual TR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

P > 0.05 = NS

MVR= Mitral valve replacement, DVR= Double valve replacement, LCOS= low cardiac output syndrome, ICU= intensive care unit.

**Follow up (6 months duration):**

Clinical results

Significant reduction in preoperative symptoms of right-side heart failure was noticed in all patients. NYHA class was improved (from 3.3 to 1.25) and (from 3.4 to 2.2) in 1st and 2nd groups, respectively.

### Table 3. Clinical and laboratory follow-up data in all Patients:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (Suture group)- (n = 20)</th>
<th>Group 2 (Ring group)- (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preoperative</td>
<td>Postoperative</td>
</tr>
<tr>
<td></td>
<td>Mean value (Mean value)</td>
<td>Mean value (Mean value)</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P value</td>
</tr>
<tr>
<td>Neck vein engorgement</td>
<td>15(75%)</td>
<td>6(30%)</td>
</tr>
<tr>
<td>Enlarged liver (fingers)</td>
<td>3.8±0.76</td>
<td>2.3±0.86</td>
</tr>
<tr>
<td>Ascites</td>
<td>4 (20%)</td>
<td>0</td>
</tr>
<tr>
<td>Pitting edema</td>
<td>13 (65%)</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>NYHA class</td>
<td>3.3</td>
<td>1.25</td>
</tr>
<tr>
<td>Total bilirubin</td>
<td>1.76±0.41</td>
<td>1.24±0.29</td>
</tr>
<tr>
<td>Albumin</td>
<td>3.24±0.21</td>
<td>3.41±0.31</td>
</tr>
</tbody>
</table>

P > 0.05 = NS

P< 0.05 = S P < 0.01 = HS
N.B: Mean postoperative values measured from in-hospital period till 6 months after discharge.

**Echocardiographic results:**

Postoperative follow up revealed good function of the mitral and aortic valves. After surgical intervention, left atrial and left ventricular dimensions were decreased in all patients, as well as PASP, which was decreased significantly from baseline (p < 0.05). Right ventricular dimension decreased significantly without difference between both groups.

Figure (1) shows the severity of TR after tricuspid valve repair. All annuloplasty types were efficient at reducing TR. Mean TR grade differed significantly at last follow-up between both groups (p < 0.01). Also, TR degree became worse in 1st group.

**Table 4. Echocardiographic follow-up data in all Patients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (Suture group)- (n = 20)</th>
<th>Group 2 (Ring group)- (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>At discharge</td>
</tr>
<tr>
<td>TR grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>+1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>+2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>+3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>+4</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>PASP (mmHg)</td>
<td>62.50</td>
<td>54.25</td>
</tr>
<tr>
<td>RV (cm)</td>
<td>2.93 ± 0.37</td>
<td>2.79 ± 0.37</td>
</tr>
<tr>
<td>LA (cm)</td>
<td>7.10 ± 0.97</td>
<td>6.41 ± 0.87</td>
</tr>
<tr>
<td>LVEDD (cm)</td>
<td>3.92 ± 0.36</td>
<td>3.90 ± 0.33</td>
</tr>
<tr>
<td>LVEEDD (cm)</td>
<td>5.80 ± 0.64</td>
<td>5.68 ± 0.43</td>
</tr>
<tr>
<td>EF(%)</td>
<td>50.30 ± 3.13</td>
<td>52.35 ± 1.97</td>
</tr>
</tbody>
</table>

P > 0.05 = NS     P< 0.05 = S P< 0.01 = HS

N.B: P value is related to comparison of preoperative values versus values measured after 6 months.
Figure (1): Severity of tricuspid regurgitation (TR) after tricuspid valve repair: (A) at discharge; (B) at follow-up.

Discussion

The ideal management of tricuspid valve disease is still controversial. Most of the patients have normal valve leaflets and a coaptation defect is related to annular dilatation. Surgical repair was directed mainly towards annular or commissural level, so there is a debate on repairing tricuspid valve using either suture or prosthetic ring annuloplasty techniques.

Among the suture annuloplasty techniques, De Vega annuloplasty is the most commonly used technique as it preserves the anatomy and flexibility of the annulus while being also easy, fast and more cost effective.

Some series have showed good short-term and long-term outcomes of De Vega annuloplasty, while other authors have denied these results due to high prevalence of recurrent postoperative TR at follow-up, especially when there is pulmonary hypertension and severe tricuspid annular dilatation.

Annuloplasty with a prosthetic ring was considered a solution to recurrent TR of suture annuloplasty techniques.

Significant correlation between degree of elevation of pulmonary artery pressure and the severity of tricuspid regurgitation was found. These results were similar to the results obtained by Mutlak et al.

Intraoperative exploration of the tricuspid valve revealed that leaflets are thin and normal and subvalvular apparatus is normal and redundant, but the annulus is dilated in all patients (100%) proving functional etiology as stated by Brest and Navia JL et al.

The use of prosthetic ring for tricuspid valve repair resulted in longer durations of CPB time and significantly longer cross clamp time. This is similar to the results obtained by Xinsheng Huang et al.

There is statistically significant difference as regards duration of mechanical ventilation with low mean among 2nd group, otherwise there is no statistical significance between study groups in the duration of ICU and hospital stay. This reflects the efficacy of both techniques in proper management of severe TR in early post-operative period.

In our study, comparison between suture annuloplasty group and prosthetic ring annuloplasty group in the follow-up period showed that improvement in left sided manifestations was highly significant for functional class of dyspnea with no statistical significance between values in both groups (p>0.05) reflecting adequate left sided lesions correction. These results were similar to the results obtained by Xinsheng Huang et al.

Also the improvement in right sided manifestations was highly significant with no statistically significant difference between values in both groups (p>0.05) reflecting adequate right sided lesions correction. These results were also similar to the results obtained by Xinsheng Huang et al.

On the other hand, PASP decreased significantly in both groups after 6 months. Xinsheng Huang et al. also reported a significant reduction in PASP from baseline in both groups (p < 0.05) during follow up period.

Color Doppler flow mapping is useful in evaluating the adequacy of repair. It accurately predicts the presence and severity of any residual TR early and late postoperative.

In our study, recurrence of TR was detected by echocardiography in 3 of the suture annuloplasty group of patients during the 6 months follow-up period. This may be due to occurrence of suture cut-through the tricuspid annulus (string- sign) during cardiac contraction. The previously-mentioned explanation for the early-term failure of suture annuloplasty repair was also endorsed by different surgeons.

Prosthetic ring repairs are better than other mentioned techniques, since, theoretically, the artificial ring takes tension away from the suture line and prevents recurrent annular dilatation. As residual TR after surgical repair can lead to biventricular failure, death or reoperation, the choice of repair should be founded mainly on the recurrence rate of the procedure.

Our study revealed that tricuspid valve repair using suture annuloplasty had been associated with
encouraging clinical results for treating functional TR, but postoperative follow up evaluation had suggested lack of uniform success. Recurrence rates with De Vega annuloplasty appear to be higher than those with prosthetic ring repair. Conclusion

After assessing all our results, it is evident that prosthetic ring annuloplasty is associated with good results compared with suture annuloplasty techniques as it protects from late recurrence of TR after surgery.

Funding: Self-funding.

No Conflict of Interest

Ethical Clearance: Cleared by the ethical committee of Cardiothoracic surgery Department Faculty of Medicine, Cairo University, Egypt

References


2. Song, ZZ. Does tricuspid annular plane systolic excursion or systolic velocity allow a precise determination of right ventricular function after heart transplantation?: J Heart Lung Transplant. 2007;26: 868


PI-RADS V2 as a Prostate Cancer Detectability Tool is it Dependable for Usage in Diagnosis?

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1Radio Diagnosis Department, Faculty of Medicine, Cairo University, Cairo, Egypt, 2Uro-Surgery Department, Faculty of Medicine, Cairo University, Cairo, Egypt

Abstract

Background: Prostate Imaging Reporting and Data System (PI-RADS) is a scoring system that aims to enable consistent interpretation, communication, and reporting of prostate multiparametric MRI (mpMRI) findings.

Aim: To evaluate and investigate the upgrade of the multi-parametric MRI prostate besides the role of PI-RADS as a reporting and grading system in prostatic diseases.

Methodology: A clinical research trial conducted on 52 male study subjects having prostatic symptoms (from February 2015 till October 2016), the research was conducted within the radiology department of the Kasr AL-Ainy hospitals, and Egyptian national cancer institute. Cases recruited were referred from the Outpatient clinics of the urology department.

Results: All cases 100% of pathologically proven carcinoma were suspected to be in the peripheral zone by MRI, with T2 scoring PI-RADS 3 were 8 cases (24.2%), PI-RADS 4 were 12 cases (36.4%) and PI-RADS 5 were 13 cases (39.4%). Only 3 cases had mild hemorrhage after TRUS guided biopsy with no major symptomatic adverse effects noted.

Conclusions: Multi-parametric MRI prostate is cornerstone advanced tool for diagnosis and gives better results in the diagnosis of prostatic diseases. PI-RADS is an efficient way to help in the diagnosis that will result resulting in better management and aids in guiding TRUS biopsy for better visualization of lesions pre-biopsy leading to more precise biopsy and accurate diagnosis.

Keywords: Prostate Cancer, PI-RADS V2, Multi-parametric MRI prostate

Introduction

Technological advances in MRI imaging procedures lead to the evolution of multiparametric MRI (mpMRI), that integrates anatomic T2W with functional and physiologic evaluation, involving diffusion weighted imaging (DWI) and its derivative apparent diffusion coefficient (ADC) maps, dynamic contrast enhanced (DCE) MRI, and sometimes other techniques e.g in-vivo MR proton spectroscopy. Technological1,2,3

MpMRI includes morphological (T2-weighted Imaging, or T2WI) and functional imaging (Diffusion Weighted Imaging (DWI), Dynamic Contrast and Enhanced (DCE). While the performance of the individual sequences is being investigated, and the acquisition techniques are being refined, integration of mpMRI into the clinical practice has been challenging due to the lack of consistent approaches for assessing mpMRI and reporting of the clinical findings. 4, 5, 6
Prostate Imaging Reporting and Data System (PI-RADS) is a scoring system that aims to enable consistent interpretation, communication, and reporting of prostate multiparametric MRI (mpMRI) findings.\(^7\)\(^8\)

**Aim of the work.**

To evaluate and investigate the upgrade of the multiparametric MRI prostate besides the role of PIRADS as a reporting and grading system in prostatic diseases.

**Methodology**

A clinical prospective research study conducted on 52 male study subjects having prostatic symptoms (from February 2015 till October 2016), the research was conducted within the radiology department of the Kasr AL-Ainy hospitals, and Egyptian national cancer institute. Cases recruited were referred from the Outpatient clinics of the urology department.

Inclusive research criteria involved; Male patients having abnormal prostatic symptoms or raised value of PSA >4-6ng/ml. Exclusive research Criteria involved the following cases subjected to prostatic adenomectomy (open adenomectomy or TURP), impaired renal functions, presence of anal complications or rectal mass, refusal of examination, bleeding tendency.

All research study subjects recruited have undergone the following procedures:

Full relevant clinical examination, multiparametric MRI assessment, Cases having MR findings of suspicious prostatic carcinoma or high PSA >4-6ng/ml (according to their age) had further conventional B-mode sonographic examination and trans rectal biopsy.

**Equipment used:**

Multiparametric MRI prostate have been performed using high field strength 1.5 and 3 Tesla on Signa system (Philips Intera) using dedicated pelvic phased array coil. TRUS and biopsy was conducted under guidance of a digital sonographic scanner (EUB-7500; Hitachi medical, Tokyo, Japan). By placing a high frequency (7.5 MHz) endorectal end-fire probe in close proximity to the prostate.

**Techniques:**

**MR imaging protocol**

Fast <30-min protocol without an endorectal coil (ERC). Images on entire prostate as well as include T2WI, DWI and DCE-MRI. sequences are done at 1.5 T using a good 8- to 16-channel pelvic phased array (PPA), T2WI axial+ sagittal: 4mm at 1.5 T, 3mm at 3 T; in plane resolution: 0.5×0.5 mm to 0.7×0.7 mm at both 1.5 T and 3 T, DWI axial: 5mm cuts at 1.5 T, 4mm cuts at 3 T; in-plane resolution: 1.5×1.5mm to 2.0×2.0 mm at 1.5 T & 1.0×1.0mm to 1.5×1.5mm at 3 T. The ADC map should be calculated. At least 3 b-values should be acquired in three orthogonal directions and adapted to quality of SNR: 0, 100 and 800–1000s/mm2. For calculation of ADC, the highest b-value that should be used was 1000 s/mm2,DCE-MRI axial: 4mm at 1.5 T and 3 T; in plane resolution: 1.0×1.0mm at 1.5 T and 0.7×0.7mm at 3 T. concerning Quantitative or semi-quantitative DCE-MRI analysis is not essential to be performed. Maximum temporal resolution should be 15 s following single dose of contrast agent with an injection rate of 3mL/s. For DCE-MRI, imaging acquisition was continued for 5 min to detect washout. Unenhanced T1WI images from this sequence was used for detection of post-biopsy hematomas.

**Conventional TRUS**

In the beginning prostatic lesions were assessed using conventional B-mode sonographic examination. Optimal evaluation of the prostate gland by TRUS requires images in multiple planes, involving transverse, sagittal, and oblique, special attention was paid to the symmetry and echogenicity of the PZ. Cancer was only suspected when the PZ architecture was observed to be distorted.

**Histopathologic Diagnoses:**

Lesions were biopsied by US guided interventional procedures by true cut needle biopsy (via 22-gauge spinal needle). Imaging findings were correlated to sextant prostate biopsies and targeted biopsies on suspicious areas and 10-12 systemic core biopsy in equivocal cases. Pathological analysis of prostatic lesions samples was conducted within the pathology department of Kasr AL-Ainy and at the Egyptian National Cancer Institute by group of well-trained expert histopathologists.

**Statistical Analysis**

Research Data were coded and entered by usage of the statistical package SPSS (Statistical Package for the Social Sciences) version 23. Obtained research data have been summarized using frequency (count) and relative
frequency (percentage) for categorical research data. For comparing categorical research data, Chi square test was implemented. Exact test was used instead when the expected frequency is less than 5. P-values less than 0.05 were considered as statistically significant.

Results

Current research study had a cohort of 52 patients.

After TRUS biopsy, Pathological correlation showed 33 cases to have a prostatic carcinoma (figure 1), 17 patients with benign prostatic hyperplasia (figure 2) and 2 cases had prostatitis (figure 3).

As regards benign prostatic hyperplasia cases, central and transitional zone T2 highest PIRADS were PIRADS 3 in 3 cases (17.6 %) while peripheral zone highest PIRADS were PIRADS 4 in 2 cases (11.8% ) as represented in table (3), 2 cases of prostatitis (100%) were included in our study their results showing peripheral zone lesions with T2 PIRADS grading III.

All cases 100% of pathologically proven carcinoma were suspected to be in the peripheral zone by MRI, with T2 scoring PIRADS 3 were 8 cases (24.2%), PIRADS 4 were 12 cases (36.4%) and PIRADS 5 were 13 cases (39.4%). Only 3 cases had mild hemorrhage after TRUS guided biopsy with no major symptomatic adverse effects noted.

Fig (1) 75 years old patient presented with urinary hesitance and difficult micturition and increased PSA level. (a) Axial T2W reveals right ill-defined hypointense lesion PIRADS 4 (blue arrow), evidence of bone metastatic lesion “red arrow” (b) dynamic images reveal early homogeneous enhancement of the lesion. (c& d) DWI and ADC mapping showing a restricted pattern of diffusion PIRADS grade V. TRUS guided biopsy was done and pathology showed: Prostatic carcinoma.
Figure (2): Sixty-two years old patient presented with history of prostatic manifestations as difficult and frequency in micturation. (a) Axial T2WI showing rather homogeneous peripheral zone with no definite lesions, enlarged central zone with well marginated areas giving PIRADS 1 for peripheral zone and PIRADS 2 for central zone. (b) Post contrast enhancement reveals diffuse homogenous enhancement of the central and peripheral zones. (c & d): Diffusion and ADC mapping reveal normal signal with no areas of restricted diffusion PIRADS 1. TRUS: No definite sizable focal lesion enlarged central zone with well-defined margins. Biopsy revealed BPH with no neoplastic features.

Figure (3) Fifty-one years old patient presented with burning micturition. (a& b): T2WI showing right peripheral zone well-defined iso to low signal lesion PIRADS 3 (blue arrows) while its curve shows plateau curve (type II). (c & d): Diffusion and ADC mapping reveal suspected focus of low ADC signal with normal surrounding signal of the right peripheral zone PIRADS 3 (blue arrows). TRUS: A well-defined right iso-to hypoechoic focal lesion, enlarged central zone with cystic foci. Biopsy proved prostatitis.
Table (1): percentage of different PIRADS T2W grading of carcinoma cases (pathologically proven) and benign prostatic hyperplasia cases regarding peripheral zone lesions.

<table>
<thead>
<tr>
<th>T2W PIRADS</th>
<th>Count</th>
<th>%</th>
<th>Count</th>
<th>%</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>.0%</td>
<td>8</td>
<td>47.1%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>.0%</td>
<td>7</td>
<td>41.2%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>24.2%</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>36.4%</td>
<td>2</td>
<td>11.8%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>39.4%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table (2): comparison between peripheral zone assessment in individual T2W scoring, individual Diffusion scoring and combined T2W and diffusion PIRADS scoring for cancer cases.

<table>
<thead>
<tr>
<th>Cancer cases</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2W</td>
<td>3</td>
<td>24.2%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>36.4%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>39.4%</td>
</tr>
<tr>
<td>Diffusion</td>
<td>3</td>
<td>6.06%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>54.54%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>39.39%</td>
</tr>
<tr>
<td>COMBINED T2W AND DWI</td>
<td>3</td>
<td>6.06%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>54.54%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>39.39%</td>
</tr>
</tbody>
</table>

Table (3): percentages of different T2W scoring for central zone and peripheral zone in cases of Benign prostatic hyperplasia cases.

<table>
<thead>
<tr>
<th>BPH</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>central and transition ZONE T2W PIRADS</td>
<td>1</td>
<td>35.3%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>47.1%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>17.6%</td>
</tr>
<tr>
<td>peripheral zone T2W PIRADS</td>
<td>1</td>
<td>47.1%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>41.2%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

Discussion

Prostate cancer is the 2nd most common cancer worldwide for males, and the 5th most common cancer overall. 9,10

Multi-parametric magnetic resonance (MR) imaging uses anatomic and functional imaging techniques for proper evaluation of the prostate.11,12

MR imaging is nowadays playing a role in the clinical pathways of detection, local staging, active surveillance, and posttreatment follow-up. 13,14

In our study we were aiming to discuss the role of PIRADS system as a diagnostic tool for proper
interpretation with better results and outcomes as well as better localization of prostatic lesions and determining their nature.

Our study included 52 cases from them 33 patients pathologically proven to have prostatic carcinoma, 17 patients with benign prostatic hyperplasia and 2 cases with prostatitis.

2 cases of prostatitis was included in our study their results showing peripheral zone lesions with PIRADS grading III (clinically significant disease is equivocal) with pathology showed prostatitis and the follow up MRI for one of them showed resolution of the lesion.

The individual T2W PIRADS analysis for carcinoma cases showed specificity 24.2% for diagnosis of equivocal carcinoma (grade III) and 36.4% for grade IV (clinically significant cancer is likely to be present) and 39.4% for grade V (clinically significant cancer is highly likely to be present).

Higher specificity results on combining T2W and diffusion PIRADS analysis showing that 54.5% for diagnosis of grade IV (clinically significant cancer is likely to be present) and 39.39 % for grade V (clinically significant cancer is highly likely to be present).

Overall PIRADS analysis for carcinoma cases showed specificity 54.5% for diagnosis of grade IV (clinically significant cancer is likely to be present) and 39.39 % for grade V.

The current research study results revealed and displayed that there was the similarities in findings between overall PIRADS and combination of T2W and diffusion, as overall PIRADS depending on diffusion sequence mainly only when diffusion results grade III we use dynamic with a positive dynamic add to higher staging grades and that occurred in our 2 cases of prostatitis was included in our study their results showing peripheral zone lesions with PIRADS grading III (clinically significant disease is equivocal) with pathology showed prostatitis and the follow up MRI showed resolution of the lesion.

PIRADS T2W sequences alone showed higher sensitivity but lower specificity but still it is the golden sequence for anatomical view and description for peripheral zone lesions and it has very important role in cases with benign prostatic hyperplasia.

Furthermore, prior research studies similar to the current study in approach and methodology have shown that overall staging of prostate cancer using T2-weighted magnetic resonance (MR) imaging at 1.5 T had statistical specificity values that ranged from 67% to 87%.1,3,6

In harmony to the current research study a prior research group of investigators have implemented T2W, DW, DCE, and MRS imaging protocols, have revealed and displayed among their findings that the positive predictive values (PPVs) for multiparametric MRI’s detectability of prostate cancer in the overall prostate, PZ, and CG to be 98%, 98%, and 100%, consecutively.4,7,9

Furthermore, it was previously shown that integration of T2WI, DWI, and DCE imaging was statistically significantly better regarding PZ tumor detection than either T2WI+DWI or T2WI alone.2,10

Prior research studies evaluating and assessing the addition of DWI to T2WI for the accuracy of prostate cancer detection, determined that DWI+T2WI was significantly more sensitive throughout the whole prostate compared to T2WI alone and was significantly more accurate in the PZ.11,13

Conclusions

Multi-parametric MRI prostate is cornerstone advanced tool for diagnosis and gives better results in the diagnosis of prostatic diseases. PIRADS is an efficient way to help in the diagnosis that will result resulting in better management and aids in guiding TRUS biopsy for better visualization of lesions pre-biopsy leading to more precise biopsy and accurate diagnosis. Guidelines with recommendations on prostate MR imaging should be further implemented in clinical routine.

Funding: No funding sources

Conflict of Interest: None declared

Ethical approval: The Institutional Ethics Committee approved the study

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3. Barrett T, Haider MA. The emerging role of MRI in prostate cancer active surveillance and ongoing challenges. AJR, 2017; 208(1):131–139

4. Hoffmann R et al. Does the Prostate Imaging-Reporting and Data System (PI-RADS) version 2 improve accuracy in reporting anterior lesions on multiparametric magnetic resonance imaging (mpMRI)? Int Urol Nephrol, 2018; 50(1):13–19


Antiatherogenic Effect of L-Arginine in Streptozotocin-Induced Diabetic Rats

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Abstract

L-Arginine is one of the essential amino acids elaborated in numerous areas of human physiology which produce nitric oxide (NO). Current study was designed to examine the antiatherogenic and anti-diabetic activities of L-arginine in experimental diabetic rats’ model. Fifty rats were divided into; Control group, L-Arginine group, Diabetic group, Treated group and Prophylactic group. Fasting blood samples were collected from all groups for determination of fasting blood glucose, insulin, insulin resistance, atherogenic index (AI), cardiac risk ratio (CRR), atherogenic coefficient(AC), intercellular adhesion molecule-1 (I-CAM-1), tumor necrosis factor alpha (TNF-α), and nitric oxide (NO). The result showed that oral administration of L-arginine induced significant decrease in the plasma level of I-CAM-1, TNF-α, AC, AI, CRR, glucose, and insulin resistance while induced significant increase in NO, and insulin levels in the treated group . In conclusion, L-arginine may be a novel nutrient, which improves the endothelial function and protects against the development of atherosclerosis in diabetic rats.

Key words: Diabetes, TNF-α, I-CAM-1, L-arginine, Atherogenic Index.

Introduction

Endothelial dysfunction plays a critical role in atherosclerosis and cardiovascular complications in diabetic patients.

The occurrence of both decreased high-density lipoprotein cholesterol (HDL-C) and increased serum triglyceride (TG) levels were referred to as Atherogenic dyslipidemia which was an important risk factor for the development of coronary artery diseases. A new indicator of atherogeneity called atherogenic index of plasma (AIP) which increased significantly with atherogenic risk.

Inflammation and oxidative stress were responsible for tissue damage in diabetic patients. There were high levels of pro-inflammatory cytokines such as interleukin-1β (IL-1β), 5-lipoxygenase (5-LOX) and (TNF-α) in diabetic patients with insulin resistance triggered by free radicals as a result of hyperglycemia. TNFα has a specific role in the development of vascular dysfunction which can be considered as another risk factor for CVD.

The endothelial I-CAM-1 is an important intercellular adhesion molecules that are involved in atherogenesis, whose expression leads to migration and attachment of leukocytes into the vessel wall. This is an early lesion of atherogenesis. TNF-α, several inflammatory mediators, and oxidized LDL induce release of ICAM-1 from endothelial cells.

Reduction of atherosclerosis and platelet aggregation can be achieved by L-Arginine supplementation which can also inhibit the adhesion of monocyte to endothelial cells. As these are important steps in atherogenesis. The beneficial effects of L-Arginine can be achieved by increasing nitric oxide availability in the wall of the blood vessels.

Materials and Method

Drugs and reagents

L-arginine, Streptozotocin and all other using chemicals were purchased from Sigma-Aldrich (St. Louis, MO, USA)

Animals

Fifty male albino rats (weighing 180–200 g body weight) were individually housed and maintained in a controlled temperature room (22 ±2°C) with free access to water and standard diet.
Experimental Design:

Fifty rats were divided into five groups (10 rats each) Group I (Control group): healthy rats. Group II (L-arginine group): healthy rats received (10 mM L-arginine/Kg b.w./day orally). Group III (Diabetic group): diabetic rats. Group IV :( Treated group): diabetic rats received (10 mM L-arginine /Kg b.w./day orally). Group V (Prophylactic group): rats received L-arginine before (two months) and after (two months) induction of diabetes (10 mM L-arginine /Kg b.w./day orally) during the experimental period (8 weeks).

Induction of Diabetes:

Diabetes was induced by multiple intraperitoneal injections of freshly prepared streptozotocin (40 mg/kg of bodyweight) dissolved in 0.1 mol/l sodium citrate buffer (pH 4.5) for 5 consecutive days. The animals were allowed drinking 5% glucose solution overnight to prevent initial streptozotocin-induced hypoglycemic mortality. Forty eight hours after last streptozotocin dose, fasting blood glucose levels was monitored and animals with glucose levels > 200 mg/dl were considered diabetic and assigned for different treatment regimens.

Collection of Samples:

After the experimental period, animals were kept fasting for 8 hours before blood sampling, blood was withdrawn from the retro-orbital venous plexus of the eye using capillary tubes and collected in a tubes contain sodium fluoride for blood glucose estimation, b- Heparinized tubes for other biochemical parameters and c- plain tubes to obtain serum for lipids profile test.

Blood was centrifuged at 3000 rpm for 10 minutes using cooling centrifuge. Plasma was separated and immediately frozen.

The following parameters were estimated:

- Plasma glucose was determined using enzymatic colorimetric method Centronic, Germany.
- Insulin level, I-CAM-1 and TNF-α were estimated by Enzyme-linked immunosorbent Assay (ELISA) using BioSoure INS-EASIA Kit
- Insulin resistance was calculated from the equation:
  \[ \text{Insulin resistance} = \frac{\text{fasting glucose (mg dl}^{-1}) \times \text{fasting insulin (mIU ml}^{-1})}{405} \]

Statistical Analysis

All data were expressed as mean ± SE. Distribution of the data were verified to be normal using Tests of Normality – (SPSS package) (version 18). Statistical significance will be tested by one way analysis of variance (ANOVA) followed by Bonferroni post hoc analysis. P< 0.05 was considered to be statistically significant.

Results

Table (1) showed remarkable increase in glucose level and insulin resistance with remarkable decrease in insulin level in diabetic, prophylactic, diabetic treated groups as compared with control group; these results improved after treatment with L-Arginine.

Also results recorded; there were significant decrease in glucose level and insulin resistance with significant increase in insulin level in L-Arginine, prophylactic and diabetic treated groups as compared with diabetic group.

Table (2) recorded significant increase in I-CAM and TNF-α level in diabetic, prophylactic and diabetic treated groups as compared with control group. These results improved after the treatment with L-Arginine. Regarding NO level there was significant decrease in diabetic and diabetic treated groups as compared with
control group.

L-Arginine group showed significant decrease in I-CAM and TNF-α level with significant increase in NO level compared to diabetic group.

Table (1): Levels of blood glucose, plasma insulin, insulin resistance in the different studied groups.

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>L-arginine group</th>
<th>Diabetic group</th>
<th>Prophylactic group</th>
<th>Diabetic treated group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose (mg/dl)</td>
<td>81.7±1.1</td>
<td>81.2±1.4b</td>
<td>245.2±2.7 a</td>
<td>182.3±1.6 a,b</td>
<td>205.5±1.7 a,b</td>
</tr>
<tr>
<td>Mean ± SEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin (µIU/ml)</td>
<td>13.7±0.4</td>
<td>13.4±0.4b</td>
<td>10.5±0.2 a</td>
<td>11.5±0.3 a,b</td>
<td>11.0±0.3 a</td>
</tr>
<tr>
<td>Mean ± SEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin Resistance</td>
<td>2.8±0.1</td>
<td>2.7±0.1b</td>
<td>6.4±0.9 a</td>
<td>5.2±0.1 a,b</td>
<td>5.6±0.1 a,b</td>
</tr>
<tr>
<td>mddl-1 µIU ml      -1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All values are expressed as mean±SEM. *a* Significant difference than control group at P<0.05. *b* Significant difference than diabetic group at P<0.05.

Also results showed decrease in I-CAM and TNF-α levels with significant increase in NO level in both prophylactic and diabetic treated groups as compared with diabetic group.

Table (3) showed significant increase in atherogenic index, atherogenic coefficient and cardiac risk ratio in diabetic, prophylactic and diabetic treated groups as compared with control group while results showed significant decrease in atherogenic index, atherogenic coefficient and cardiac risk ratio in L-Arginine, prophylactic and diabetic treated groups compared to diabetic group.

L-Arginine group showed significant decrease in Atherogenic index as compared with control group.

Table (2): Plasma levels of I-CAM, TNF-α and NO in the different studied groups.

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>L-arginine group</th>
<th>Diabetic group</th>
<th>Prophylactic group</th>
<th>Diabetic treated group</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-CAM (pg/ml)</td>
<td>110±2.7</td>
<td>105±4.5 b</td>
<td>155±5.6 a</td>
<td>140±3.7 a</td>
<td>150±7.1 a</td>
</tr>
<tr>
<td>Mean ± SEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TNF-α (ng/L)</td>
<td>42.5±2.1</td>
<td>40.1±2.5 b</td>
<td>190.0±16.0 a</td>
<td>164.0±12.5 a,b</td>
<td>183.0±13.0 a</td>
</tr>
<tr>
<td>Mean ± SEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NO) (µmol/L)</td>
<td>123.5±1.6</td>
<td>158.3±1.4 b</td>
<td>64.3±3.1 a</td>
<td>118.6±1.8 b</td>
<td>94.3±1.9 ab</td>
</tr>
<tr>
<td>mddl-1 µIU ml      -1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All values are expressed as mean±SEM. *a* Significant difference than control group at P<0.05. *b* Significant difference than diabetic group at P<0.05.
Table (3): Levels of atherogenic index, atherogenic coefficient and Cardiac risk ratio in the different studied groups.

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>L-arginine group</th>
<th>Diabetic group</th>
<th>Prophylactic group</th>
<th>Diabetic treated group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atherogenic index</td>
<td>0.21±0.02</td>
<td>0.15±0.01a,b</td>
<td>0.70±0.04 a</td>
<td>0.53±0.02a,b</td>
<td>0.59±0.03a,b</td>
</tr>
<tr>
<td>Atherogenic coefficient</td>
<td>0.99±0.07</td>
<td>0.88±0.08b</td>
<td>3.07±0.17 a</td>
<td>1.42±0.09a,b</td>
<td>1.78±0.10a,b</td>
</tr>
<tr>
<td>Cardiac risk ratio</td>
<td>1.32±0.06</td>
<td>1.17±0.01 b</td>
<td>3.86±0.2 a</td>
<td>2.17±0.09a,b</td>
<td>2.65±0.14a,b</td>
</tr>
</tbody>
</table>

All values are expressed as mean±SEM. a Significant difference than control group at P<0.05. b Significant difference than diabetic group at P<0.05.

**Discussion**

Morbidity and mortality are mainly determined by cardiovascular disease (CVD) in diabetic patients, whose risk is 2 to 4 times higher than in non-diabetic 1.

Supplementation of L-arginine has an effective treatment that help in improving the insulin sensitivity and endothelial function which was related to major cardiovascular risk factors including hypertension, hypercholesterolemia, obesity and diabetes through the NO/c-GMP pathway 19.

In this study, fasting blood glucose was increased in diabetic group compared to control, while this value was obviously decreased by L-arginine supplementation in both treated and prophylactic groups compared to diabetic group (Table 1). Destruction of the B- cells by STZ was the cause of failure to produce insulin and excess accumulation of glucose in blood instead of its use and storage. The deterioration in insulin values in this study has also been reported in our previous work 20.

L-arginine administration caused an increase in secretion of insulin. Stimulation of NO generation in vascular smooth muscles and skeletal muscles is caused by the insulin signaling cascade mediating the insulin action in responsive tissues. NO stimulates the transport of glucose in skeletal muscles with increase in GLUT4 levels at its surface, leading to improvement in insulin resistance which is in agreement with our study 21.

The decrease in antioxidant capacity which was caused by hyperglycemia and increase in pro-oxidative and pro-inflammatory cytokines secretion contribute to diabetic complications. Increased levels of IL-1, IL-6, TNF-α, and other inflammatory cytokines were found in different insulin-resistant and diabetic states 22.

The study showed that ICAM-1 concentration was considerably elevated in diabetics compared to controls and considerably decreased in treated and prophylactic groups compared to diabetic group. (Table 2). Lehle et al. 22 reported that diabetes cause induction of TNF-α which lead to cytokines over expression, IL-1, monocyte chemoattractant protein-1 (MCP-1), IL-6 and IL-8. ICAM-1 receptors were stated following induction by these cytokines and then expression of ICAM-1. Also, ICAM-1 expression on endothelial cells is increased under high-glucose conditions. It was also possible that increased advanced glycation end products in diabetic states was responsible for increasing the circulating adhesion molecules. Poston et al. 23 demonstrated noticeable expression of ICAM-1 in human atherosclerotic arteries, and it was also possible that atherosclerotic lesions in diabetic patients with macroangiopathy contribute to the increased circulating ICAM-1 concentrations in these patients.

This study showed that TNF-α level was significantly high in diabetic group compared with control group, but these levels were improved after treatment with L-arginine (Table 2). This was due to L-arginine inhibits TNF-α, neutrophil infiltration, reactive oxygen species formation, release of elastase, and biosynthesis of eicosanoids [through COX-1 and 5-LOX inhibition in vitro and receptor blockage coupled in vivo mobilization of Ca2+]; which all contribute to initiation of the inflammatory process 5.
Study showed decrease significantly of NO concentration in diabetic group compared to control group. These results were compatible with finding of those of Suresh and Undurti\(^24\) who stated that diabetes mellitus was associated with increase of blood glucose, oxidative stress and decreased production of nitric oxide from endothelial cells, and this hyperglycemia was intensified by aldose reductase increased activity leading to depletion of the required NADPH for the nitric oxide generation from L-arginine by nitric oxide synthase.

Supplementation of L-arginine caused significant increase of NO in treated and prophylactic group compared to diabetic group. The NO formation from L-Arg played a major role in the cardiovascular functions regulation.

Through this study, it was found that the diabetic group showed significant decreased in HDL-C and also significant increase in LDL-C, total cholesterol and triglyceride compared to control group. These results were compatible with the previous studies which suggested that lipoprotein abnormalities were higher in diabetics than in non-diabetics \(^20\). It was suggested that high blood glucose levels lead to increase LDL-C and the LDL receptors in the liver became Glycosylated, leading to impairment of the ability of the liver to remove cholesterol from the blood. also, it leads to lipoprotein lipase inhibition and hyperlipidemia aggravation.

It was found in this study that the group received L-arginine (Prophylactic and treated groups) showed remarkable increase in HDL-C and decrease in LDL-C, total cholesterol and triglyceride compared to diabetic group. These results were compatible with Gad \(^25\) who stated that L-arginine not only participates as insulin secretagogue, but also, its antilipolytic action of polyamines formed from L-arginine, which caused enhancement of glucose oxidation and inhibition of lipolysis by endogenous cyclic AMP levels suppression in a way similar to insulin in isolated rat fat cells. Accordingly, atherogenic index, atherogenic coefficient and cardiac risk ratio showed in (Table 3) were significantly decreased in both treated and prophylactic groups compared to diabetic group.

**Conclusion**

Oral administration of L-arginine might be a novel nutrient which has a protected effect when took as a prophylactic and also had the ability to reduce endothelial dysfunction associated with diabetes. So this study aimed to evaluate the effect of the atherogenic index on vascular complications in diabetes.

**Conflicts of Interest:** The authors declare that no conflicts of interest.

**Funding:** No funding sources

**Ethical Clearance:** Cleared by the ethical committee of National Research Centre with registration number 18-088

**References**


Antegrade Intramedullary Nailing Versus Plating for Treatment of Humeral Shaft Fractures

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1 Orthopedic Surgery Department, Faculty of Medicine, Cairo University, Cairo. Egypt,
2 El Helal Hospital, Cairo, Egypt

Abstract

Background: Fractures of the humeral shaft are commonly encountered by orthopaedic surgeons, accounting for approximately 3% of all fractures.

Objective: The present study aims to analyze and compare both the techniques in terms of functional and radiological outcome.

Method: The present prospective study conducted at Al helal hospital between December 2014 to December 2016, compared two groups of patients (n=20, n=20, total n=40) with either DCP or IMN. The results were compared both radiologically and clinically. The functional outcome was assessed using the constant score.

Results: Our results failed to establish convincingly that either technique is superior to other.

Conclusions: Nailing and plating have equal functional outcomes in cases with shaft humerus fracture.

Key Words: Trauma, fracture humerus, intramedullary nail.

Introduction

Fractures of the humeral shaft are relatively common injuries. They represent approximately 3% of all fractures.1 There is a bimodal distribution of humeral shaft fractures, with a peak in young male patients and a larger peak in older females usually by simple falls.2 Several fracture patterns have been identified for humeral shaft fractures.3

The conservative methods include U-shaped slab, hanging plaster cast, body bandage, prefabricated functional braces, and simple sling.4 The indications for surgical treatment of humeral diaphyseal fractures are failure of closed reduction, open fractures, segmental fractures, bilateral fractures, floating elbow injuries, fracture nonunion, fractures associated with vascular injuries or progressive neurological injury, and fractures in patients with multiple injuries.5

Several operative methods are available, including open reduction and plate fixation, external fixation, intramedullary nailing with Rush rods or Ender nails, and locked intramedullary nailing.6 Open reduction has several disadvantages7

Locked intramedullary nails usually can be inserted using closed techniques, avoiding the extensive soft tissue dissection required for plating. Interlocking nails give rotational stability, decrease the need for postoperative bracing and allow early mobilization of the extremity.8 When performing distal interlocking of an intramedullary humeral nail, there is risk of iatrogenic injury to the neurovascular structures.9

The anatomy and the function of the humerus are quite different from the long bones of the lower extremity.10

Aim of the Work:

The aim of the work was to compare the results...
of internal fixation of humeral shaft fractures by either using interlocking nail or dynamic compression plate.

**Patients and Method**

The current study is prospective comparative study included forty patients were operated up on at Al-Helal Hospital, suffering from humeral shaft fracture between December 2014 till December 2016.

Twenty cases of them were fixed by DC plates (group 1) and the other twenty by IM nails (group 2). They were operated under supervision of more than one consultant. All cases were followed for 12 months. They were all evaluated both clinically and radiologically. The clinical results were assessed according to The Constant-Murley shoulder scoring system. Radiological evaluation included assessment of union, malunion, failure of fixation and implant failure.

**Surgical technique**

**Intramedullary nailing**

General anaesthesia combined with interscalene block was used in majority of the patients. In supine position, a bolster was kept in between the scapula. Affected limb was scrubbed, draped and prepared. 3 cm incision was taken from the anterolateral edge of acromian extending distally. Once the deltoid fibers were split and retracted, the supraspinatus tendon was incised along the length of its tendon. Entry was made with the help of awl just lateral to the articular cartilage in the line of the medullary canal. Guide wire was passed and reduction of the fracture was achieved. After initial reaming of the canal, the expert humerus nail (Depuy Synthes®, Switzerland) was mounted on the zig and inserted over the guide wire. Proximal locking was done with the help of zig while the distal locking was executed by free hand technique. The position of the nail was checked in C arm in both the orthogonal views at all the major steps. Meticulous closure of the rotator cuff and distal part of humerus was done.

**Plating**

General anaesthesia combined with interscalene block was used in majority of the cases. All the patients were operated in lateral position. Affected limb was scrubbed, draped and prepared. 8-10 cm incision, centered at the fracture site was taken. Interval between long and lateral head of triceps followed by isolation of radial nerve and subperiosteal elevation of the medial head of triceps was performed with utmost care. A 3.5 mm dynamic compression plate (Depuy Synthes®, Switzerland) was applied in compression mode after the preliminary reduction of fracture was achieved. Position of the plate was assessed in both the orthogonal planes. The wound was closed over layers. Immediate postoperative x rays were taken to confirm the position of the implant (Figures 1-7).
Results

The prospective study included 40 patients were assessed after two weeks, six weeks, twelve weeks and twenty-four weeks. Results were assessed according to Constant’s scoring system. The range of movement was assessed according to degree of restriction of flexion and extension in comparison to normal elbow, and of a single direction of shoulder motion.

Regarding the demographic and basic clinical data, it was found that there was no significant difference between the two studied groups regarding demographic and basic clinical data as shown in table (1).

According to Constant-Murley scoring system, the results obtained were excellent in 29 patients (72.5%) 16 patient fixed with plate (80.0%) and 13 patient fixed with nail (65%), good in 7 patients (17.5%) 3 fixed with plate (15%) and 4 with nail (20%), and poor in 4 patients (10%)one fixed with plate (5%) and 3 with nails (15%). The excellent and good results were considered satisfactory while fair and poor results were considered unsatisfactory as shown in table (2).

| Table (1): Demographic and basic clinical characteristic of the two studied groups. |
|---------------------------------|-----------------|-----------------|------|
| Age (years)                     | Plate (N=20)    | Nail (N=20)     | p    |
|                                 | 37.53±10.92     | 35.84±10.77     | 0.441|
| Gender                          |                 |                 |      |
| Male                            | 15 (75.0%)      | 12 (60.0%)      | 0.388|
| Female                          | 5 (25.0%)       | 8 (40.0%)       |      |
| Side                            |                 |                 |      |
| Right                           | 9 (45.0%)       | 12 (60.0%)      | 0.410|
| Left                            | 11 (55.0%)      | 8 (40.0%)       |      |

The inter and post operative complications show that there was a significant increase in blood loss in plate group more than nail group, also the radiation time was significantly higher in nail group more than plate group, regarding the incidence of post operative complication it was found that there was no significant difference between the two studied groups as shown in table (3).
Cont... Table (1): Demographic and basic clinical characteristic of the two studied groups.

<table>
<thead>
<tr>
<th>Mechanism of trauma</th>
<th>Plate (N=20)</th>
<th>Nail (N=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall from height</td>
<td>7 (35.0%)</td>
<td>5 (25.0%)</td>
<td>0.884</td>
</tr>
<tr>
<td>RTA</td>
<td>13 (65.0%)</td>
<td>15 (75.0%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of fracture</th>
<th>Plate (N=20)</th>
<th>Nail (N=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8 (40.0%)</td>
<td>11 (55.0%)</td>
<td>0.75</td>
</tr>
<tr>
<td>B</td>
<td>7 (35.0%)</td>
<td>4 (20.0%)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>5 (25.0%)</td>
<td>5 (25.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Table (2): Comparison between the two studied groups regarding the final functional score.

<table>
<thead>
<tr>
<th>Final functional result</th>
<th>Plate (N=20)</th>
<th>Nail (N=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>16 (85.0%)</td>
<td>13 (65.0%)</td>
<td>0.821</td>
</tr>
<tr>
<td>Good</td>
<td>3 (15.0%)</td>
<td>4 (20.0%)</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>1 (5.0%)</td>
<td>3 (15.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Table (3): Comparison between the two studied groups regarding the operative and post operative complication data.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Plate (N=20)</th>
<th>Nail (N=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma-surgery time interval</td>
<td>4.60±2.20</td>
<td>3.60±2.06</td>
<td>0.175</td>
</tr>
<tr>
<td>Operative time</td>
<td>2.47±0.52</td>
<td>2.53±0.52</td>
<td>0.634</td>
</tr>
<tr>
<td>Blood loss</td>
<td>223.00±70.50</td>
<td>40.00±7.56</td>
<td>0.001*</td>
</tr>
<tr>
<td>Radiation time</td>
<td>3.67±2.20</td>
<td>41.73±7.00</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

**Discussion**

The average age in group I was 37.53±10.92 year, and in Group II was 35.84±10.77 The shortest average time to union occurred in the age group 23-30 years (7.8 weeks), while the longest average time to union (10.5 weeks) occurred in elderly patients (above 50 years). This results was agreement with study carried out in 2007 by *Verbruggen and his colleagues*, included 40 patients with a mean age of 75 years showed union rate of an average of 16 weeks. The average time of union in both sexes was almost similar to each other’s; males have an average of 8.6 weeks while females had an average of 9.4 weeks.

Most current operative methods for stabilization of humeral shaft fractures have acceptable rates of union. *(12) Dabezies et al.,* all reported union in 97% of humeral shaft fractures treated with AO plating techniques. In these three series, 14% to 35% of fractures received bone grafting as part of the plating procedure. *(12,13) Dabezies et al.,* all reported union in 97% of humeral shaft fractures treated with AO plating techniques.

Heineman in 2010 found no difference in the rate of union between plate fixation and intramedullary nailing. Because they lack rotational control, flexible intramedullary nails more frequently are associated with non-union. *(14) Durbin et al.* reported union in 92% of 30 humeral fractures treated with Hackethal nailing.

In 2009 another series of 71 patients treated with interlocking nail in both antegrade (45 cases) and retrograde (26 cases) manners, there were no non-union with ante grade and 4 non-union with retrograde. *(16) Mamood et al.* found 85% of plating patients & 50% of nailing patients showed evidence of union on or before 16 weeks. One case of nonunion plating (5%) was treated by bone grafting as a secondary procedure. One case of nonunion interlocking (5.5%) was treated with closed exchange nailing with reaming.

In 2017 *Mamood et al.* found 85% of plating patients & 50% of nailing patients showed evidence of union on or before 16 weeks. One case of nonunion plating (5%) was treated by bone grafting as a secondary procedure. One case of nonunion interlocking (5.5%) was treated with closed exchange nailing with reaming.

In this series the rate of union compared favourably with these results as we had four cases (10.0%) of non union one case in Group I and 3 cases in Group II, the other 36 patients (90.0%) progressed to union in an average time of 8.8 weeks.

In 1987, *Hall et al.* observed that spiral and comminuted fractures gave better results than transverse fractures of the humeral shaft.

Middle third fractures were reported by *Martinez et al.* to be difficult to heal, possibly because of injury to the nutrient vessels at this level. The same was noted...
by Chao et al., in 2005. In this study, the middle third fractures tend to unite (average 9.5 weeks) but this tendency was not statistically significant.¹⁹,²⁰

Rodriguez-Merchán²¹ reported one (5%) superficial infection in 20 humeral fractures treated with plating. Hereported infection in 2.9% of 34 plated humeral fractures. Hall and Pankovich reported no infections in 86 humeral fractures treated with closed Ender nailing.¹⁸

A single deep infection reported by Henley et al.²² in a series of 33 humeral fractures treated with closed Hackethal nailing occurred in a fracture previously treated with external fixation. But Robinson et al. reported a 6.7% incidence of infection in 30 humeral fractures stabilized by the same methods. In this series there were 2 cases of superficial infection encountered in the 40 cases in Group I treated by debridement and antibiotic.²³

In this study we have two patients with radial nerve palsy postoperatively in Group I, one of them showed complete recovery within 3 months, the other did not show any improvement and planned for tendon transfer on the other side no patient in Group II with radial nerve injury.

The management of radial nerve palsy associated with humeral shaft fracture is a topic of debate. Although it is known that the majority of these injuries are neuropraxia that will recover spontaneously, the indication and need for operative exploration has been disputed, with authors offering conflicting opinions.²⁴

In 2013 series Pal et al., reported Radial nerve palsy was present in six patients after injury (10% incidence). Of the six patients who had undergone open reduction internal fixation with plating with associated nerve injury, three had a full recovery of function and one had partial recovery of motor function and two didn’t recover. There were no cases of post-operative radial nerve palsy after stack nailing while two patients who had a neuropraxia after plating had a full recovery on conservative treatment.²⁵

The lost degrees of elbow extension in group 1 patients may be explained by fibrosis that occur through triceps splitting affect extensor mechanism. This affect the full action of the triceps muscle. Jens et al. concluded that plate fixation offered an anatomic reduction of the fracture and predictable healing results. He included in his study 46 patients treated with open reduction and internal fixation.²⁶

The most frequent criticism of antegrade humeral nailing has been its potentially deleterious effect on shoulder function. In a series of humeral fractures stabilized predominantly by Rush rods, Stern et al. reported the development of adhesive capsulitis in 56% of cases treated with antegrade nailing.²⁷

The insertion point violated the rotator cuff in most of these patients, and nails frequently migrated proximally. Shoulder function returned to near normal after hardware removal.

Brumback et al. attributed loss of extremity function to factors other than the fracture or surgical treatment (neurological injury, soft tissue injury, heterotopic ossification) in 16 of 58 (28%) humeral fractures in patients with multiple injuries treated with flexible intramedullary nails.¹⁴

Conclusions

This prospective study demonstrated no statistically significant differences in healing outcomes assessed between humeral diaphyseal fractures treated with IM nails and those treated with plates. The two treatment groups were comparable with respect to demographics, fracture location and type, indications for surgery, and time to treatment. Healing occurred in a high percentage of patients within four months in both groups.

Although not quantifiable, it was our impression that antegrade nails were advantageous in comminuted AO Type C fractures. Despite the best attempts at minimizing and repairing rotator cuff trauma during antegrade humeral shaft nailing, the etiology of shoulder pain and dysfunction remains unexplained.

Conflict of Interest: The authors declare that no conflicts of interest.

Funding: No funding sources

Ethical Clearance: Cleared by the ethical committee of Cairo University

References


Expression of MicroRNAs 31, 155 and 29C and Their Relation to Pathogenesis and Severity of Alopecia Areata

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2Biochemistry Department, Faculty of Medicine, Cairo University, Egypt

Abstract

Alopecia areata (AA) is a common autoimmune disorder that targets anagen hair follicles. The most widely accepted hypothesis in its pathogenesis is that it is a T-cell–mediated autoimmune condition in genetically predisposed individuals. MicroRNAs (miRNAs) are implicated in disease etiology and treatment. Interestingly, miRNAs 31, 155 and 29c have shown an important role in alopecia areata. Since miRNA can be used as serum biomarker in other autoimmune diseases. This study aimed to assess and compare serum levels of miRNAs 31, 155 and 29c in 50 AA patients with their levels in 50 healthy subjects & correlate their levels to severity of AA. Serum levels of miRNAs 31, 155 and 29c were estimated by qRT-PCR technique and miRNAs 31 and 29c were found to be significantly higher in AA patients compared to controls. MicroRNA 155 however, showed no significant difference between serum levels of AA patients compared to controls. These findings suggest the important role of miRNAs 31, 29c and 155 in the pathogenesis of AA.

Key words: Alopecia areata (AA). miRNA 31. miRNA 155 . miRNA 29c.

Introduction

AA is the most prevalent autoimmune disorder and the second most prevalent hair loss disorder after androgenetic alopecia 1. The estimated prevalence of AA is approximately 1 in 1000 people2,3.

The exact pathogenesis of AA is still not completely clarified, but it is believed that it is a T-cell mediated autoimmune process which is trigged by endogenous or exogenous stimuli and maintained by the interaction of several molecules. In genetically predisposed individuals, under the effect of stress hormones, the HF enters a cycle of autoimmune growth inhibition 4.

The major pathomechanisms in AA include the anagen HF immune privilege loss, peribulbar inflammation, disturbed cycling, anagen arrest then peribulbar fibrosis. A lot of factors play a role in these mechanisms as cytokines, innate, adaptive immunity, proapoptotic mediators and profibrotic molecules under control of genetic and epigenetic mechanisms which leads us to the master role of miRNAs 5.

MiRNA is a small non-coding RNA molecule containing about 20-22 nucleotides and is found in humans, plants, animals and some viruses 6. It functions in RNA silencing and post-transcriptional regulation of gene expression 5.

MiRNA 31, 155 and 29c can be involved in peribulbar inflammation, fibrosis and arrested anagen phase 7, 8. MiRNA 31 regulates the production of mediators of inflammation and/or fibrosis 7, 9.

MiRNA 29c has a role in breakage of HF immune privilege as miRNA29c down-regulates TGF-β which keeps immune privilege intact 10. It contributes to apoptosis of target HF matrix cells expressing autoantigens 10, 11.

MiRNA-155 is a typical multifunctional miRNA. MiRNA-155 is involved in numerous biological processes including inflammation and immunity 12. Thus miRNAs 155, 31 and 29c can be potential therapeutic targets in treatment of AA in the future research 13.
Materials and Method

In this case-control study 50 patients were recruited from the outpatient clinic of the Dermatology Department, Cairo University Hospitals. The patient’s group included 35 males (70%) and 15 females (30%), whose ages ranged from 4 to 47 years (mean 25.86± SD 12.32 years). Any type of AA was included. The control group included 35 males (70%) and 15 females (30%), with ages ranging from 16 to 50 years (mean 28.85± SD 9.23 years). Both groups were sex matched (p = 0.147) and age matched age (p = 0.477).

i. Clinical evaluation

Skin lesions were evaluated with regard to onset, course, duration, types of alopecia areata and relation to stress. The extent and the severity of the disease were assessed using SALT score.

ii. Blood sampling and technique

Five ml venous blood samples were withdrawn from all patients and control subjects using BD vacutainer system. The mononuclear cells were separated by centrifugation. The cells collected were stored at -80 °C until the time of analysis.

Determination of miRNA was achieved across three consecutive steps: 1. Total RNA purification, including miRNA. 2. Quantitation of purified RNA, including miRNA. 3. miRNA reverse transcription into complementary DNA (cDNA). 4. Amplification and qRT-PCR analysis of the targeted miRNAs (miRNA-155, miRNA-31, miRNA-29 and SNORD 68 as an internal control using SYBR Green detection.

Table 1: Clinical data of patients

<table>
<thead>
<tr>
<th>onset (alopecia Areata)</th>
<th>cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>18</td>
<td>36.0%</td>
</tr>
<tr>
<td>chronic</td>
<td>32</td>
<td>64.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALT score</td>
<td>6.31</td>
<td>20.59</td>
<td>0.58</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 2: Differential miRNA 31, 29c and 155 expression in patients and controls

<table>
<thead>
<tr>
<th>miRNA</th>
<th>cases</th>
<th>control</th>
<th>P value</th>
<th>Fold change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Median</td>
<td>Minimum</td>
</tr>
<tr>
<td>miRNA 31</td>
<td>9.00</td>
<td>10.25</td>
<td>4.99</td>
<td>0.01</td>
</tr>
<tr>
<td>miRNA 29C</td>
<td>17.18</td>
<td>20.56</td>
<td>12.72</td>
<td>0.24</td>
</tr>
<tr>
<td>miRNA 155</td>
<td>5.49</td>
<td>11.96</td>
<td>0.76</td>
<td>0.00</td>
</tr>
</tbody>
</table>

P value < 0.05 is significant

Results

The miRNA 31 and 29c expressions were higher in patient’s sera compared to controls, which was statistically significant (p = < 0.001). The miRNA 155 expression was higher in patient’s sera compared to controls, but the difference was not statistically significant (table 2).

Figure 1: Types of alopecia areata cases

The miRNA 31 and 29c expressions were higher in patient’s sera compared to controls, which was statistically significant (p = < 0.001). The miRNA 155 expression was higher in patient’s sera compared to controls, but the difference was not statistically significant (table 2).
Figure 2: Comparison between serum miRNA 31 in patients and controls

Figure 3: Comparison between serum miRNA 29c in patients and controls

No statistically significant correlations were detected between serum expression of miRNA 155, miRNA 31 nor miRNA 29c and other variables including AA types and SALT score; neither to each other.

<table>
<thead>
<tr>
<th>miRNA 31</th>
<th>SALT score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Coefficient</td>
<td>0.203</td>
</tr>
<tr>
<td>P value</td>
<td>0.157</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>miRNA 129C</th>
<th>SALT score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Coefficient</td>
<td>-0.169</td>
</tr>
<tr>
<td>P value</td>
<td>0.241</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>miRNA 155</th>
<th>SALT score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Coefficient</td>
<td>0.119</td>
</tr>
<tr>
<td>P value</td>
<td>0.408</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
</tr>
</tbody>
</table>

P value < 0.05 is significant

Discussion

In AA patients, serum expression of miRNA31 in this study was significantly higher in patients compared to controls. MiR-31 negatively targets Serine/threonine kinase 40 (STK40) in keratinocytes which inhibits the proinflammatory NF-kB signaling pathway. It also regulates the production of proinflammatory and profibrotic mediators as TGF-β, and leucocyte chemotaxis contributing to peribulbar inflammation early in AA and peribulbar fibrosis later. It is known to inhibit peripheral regulatory T-cell generation so breaking the immune privilege. The inhibitory effects of miR-31 on anagen development were realized, as it inhibits Fgf and Wnt but stimulates Bmp pathway. Fgf and Wnt pathways promote the HF anagen stimulatory signals to the HF stem cells, while Bmp signaling operates as an anagen inhibitor antagonizing the activity of the Fgf and Wnt pathways. It also controls hair shaft formation via inhibiting hair matrix keratinocyte differentiation. In addition, it inhibits the expression of the keratin 17 which maintains keratinocyte and anagen integrity. Taken together, the role of miR-31 in clinical conditions with arrested anagen phase such as AA is proven.

In current study; miRNA 29c was found upregulated in patients’ sera but Wang et al found it downregulated in AA mice tissues. They explained their results by the fact that miRNA29c has been shown to suppress BAK1, that mediates apoptosis via granzyme B.

In current study, miRNA29c was found to be significantly increased in serum of AA patients when compared to controls. It may be explained by its proinflammatory role found in diabetic nephropathy as it up-regulates IL6/TNFα. It has a role in breakage of HF immune privilege as miRNA29c down-regulates TGF-β which keeps immune privilege intact. Its proapoptotic role is indicated by its ability to suppress p85α and CDC42 genes that normally suppress p53 expression so relieving p53 suppression causing apoptosis.

It can also cause cell cycle arrest in G1 phase by targeting CDK6. It was found that miR-29c directly bound with the 3’- UTR of VEGFA led to suppressed VEGF expression. VEGF was found to be significantly reduced in HF in the skin of AA patients compared with normal individuals. This reduction of VEGF production by hair follicles may lead to a loss
of vascular support to affected skin. With subsequent inflammatory changes resulting from inadequate tissue vascularization, this could lead to atrophy of HF. This hypothesis is supported by the finding that loss of capillaries is found early in alopecia areata and revascularization precedes hair regrowth.

Finally, a reduced HPA axis response was found to be associated with the increased expression of miR29c following chronic stress exposure, so miRNA29c can decrease POMC disturbing the immune privilege participating in AA pathogenesis.

In current study, miRNA 155 expression was higher in patient’s sera compared to controls, but the difference was not statistically significant. MiRNA-155 is upregulated by inflammatory mediators including TNF-α during innate immune response and was found to be important in Th 17 cells differentiation and function by directly inhibiting SOCS1. Accordingly, IL-17A production was found to be induced by miRNA 155. Moreover, miRNA155 is required for optimum DCs production of cytokines that promotes Th17 cell formation thus contributing to the chronic inflammation in AA. It targets CTLA-4, a major inhibitory molecule of T-cell responses leading to T cell proliferation.

Wang et al. detected upregulation of miRNA 155 in AA mice skin tissue samples. In the current work, miRNA-155 showed serum upregulation in AA patients, which was unexpectedly insignificant. The fact that most of our patients were of recent onset and therefore they are in the phase of acute inflammation, may explain the immature upregulation of miRNA155 which may possibly mature and be significant later in the course of the disease. It activates signal transducer and activator of transcription 3 (STAT3) and factors involved in TGF-β and IL-6 signaling contributing to chronic peribulbar inflammation and fibrosis. It has a tight relation to chronic inflammation evidenced by its relation to Th17 cells and chronic atopic dermatitis.

MiRNA 155 also contributes to immune privilege breakage as it negatively targets IL-10 and TGF-β 1, which are major immunosuppressant factors against autoreactive T cells. Its association with variable autoimmune diseases as myasthenia gravis and rheumatoid arthritis suggests its role in AA as both may be associated with AA. In this work patient selection excluded associated other autoimmune diseases by history. This may explain the insignificant upregulation present in this study.

MiRNA155 activates Stat pathway which leads to infiltration of autoreactive T cells attacking HFs. Other proposed mechanisms include, miR-155 as a critical posttranscriptional PD-L1 negative regulator in response to inflammation, so preventing its immunosuppressive action leading to persistent chronic inflammation. It can also help in peribulbar fibrosis late in the disease in a similar way to its mechanism in systemic sclerosis; miR-155 expression requires the NLRP3 inflammasome processing of IL-1 leading to fibrosis. Thus, the inflammasome is the initiator causing IL-1 transcription and autocrine signaling that drives the expression of miR-155 via an IL-1 signaling mechanism. MiR-155 synergizes with the inflammasome to induce a positive feed-forward signal that further promotes IL-1 release and autocrine signaling leading to continual collagen expression and fibrosis. MiRNA155 is expressed in Epstein-Barr virus (EBV)-infected cells and CMV infection also resulted in an upregulation of miR155, both viruses are considered major environmental factors in AA pathogenesis.

To the best of our knowledge, this study is the first to detect the serum expression levels of miRNA155,31 and 29c in human AA patients; Our findings paves the way for studying the possibility of being used as prognostic markers and therapeutic targets for AA.

Limitations

The low variety of onset (chronic 64%) and extent (92% of extent ≤ 10%) of AA patients included in this study so the exact relationship between the three miRNAs and AA types and extent cannot be established.

Conclusion

The current study highlights the contribution of miRNA155, miRNA31 and miRNA29c in the pathogenesis of AA. Their elevated serum expression in patients’ sera in comparison to controls; identifies their important role in the development of AA.

Funding: Self-funding

No Conflict of Interest

Ethical Clearance: Cleared by the ethical committee of Dermatology Department, Faculty of Medicine, Cairo University, Egypt


Evaluation of Different Techniques in the Management of Craniocervical Instability

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²Neurosurgery Department, Faculty of Medicine, Beni-suef University, Egypt

Abstract

Objectives: Evaluation of clinical picture and results of occipitocervical and atlanto-axial fusion with craniocervical instabilities

Patients and Method: The investigation included 22 patients, 14 males (63.6%) and 8 females (36.4%). Ages ranged (10 to 70) years. Instability resulted from fracture of the odontoid process in 8 cases (36.4%), transverse atlantal ligament injury with C1 C2 sub laxation in 6 cases (27.3%), osodontodium in 4 cases (18.2%), Morquio’s syndrome in 2 cases (9%), C2 Hangman’s fracture type III one case (4.5%), and transverse atlantal ligament injury associated with sub axial sublaxation in one case (4.5%). Trauma was the most common cause of instability (73%). Single hollow titanium anterior odontoid screw was done in 4 cases (18.2%), posterior atlanto-axial fixation in 12 patients (54.5%), three of them (25%) needed trans oral odontoidectomy prior to fixation, fixation was performed from C1 to C4 in one patient (4.5%), and occipitocervical fixation in 5 patients (22.7%). Postoperative Philadelphia neck collar was applied for 8-12 weeks.

Results: Postoperative clinical evaluation revealed good outcome of neurological ASIA grading. 10 patients improved (45.5%), while 11 patients (50%) remained at the same ASIA score as pre-operative, and only one patient (4.5%) deteriorated from ASIA score D to A. Pain and neck disability scores reduced postoperatively compared to preoperative. Fusion was achieved in 18 cases (81.8%) at last follow-up. Instrumentation failure occurred in only 2 cases (9%). Three mortality cases due to respiratory problems (2 cases died in the first week after surgery and the third case died one month after the surgery).

Keywords: Craniocervical instability, Occipitocervical fusion, Odontoid screw, Trauma.

Introduction

The craniocervical junction (CCJ) has unique anatomical and functional properties. It represents the interface between the cranium and the upper cervical spines. Ligaments and muscles have an important role in maintaining the stability ¹, ².

Craniocervical instability may be caused by different mechanisms such as, traumatic, inflammatory (rheumatoid arthritis), neoplastic, and congenital disorders (Morquio and Down syndromes) ³, ⁴.

Relatively wide cross-sectional area of the spinal canal at the CCJ, spinal cord injury is less common than expected. CCJ instability may present by disabling pain, cranial nerve palsy, sensory disorders, weakness, or even sudden death ².

The craniocervical junction encloses vital neurological and vascular structures. So special consideration is necessary for surgery at the CCJ ³.

Occipitocervical fixation has evolution due to advances in operative techniques. Surgical approaches of stabilization are classified as either anterior or
posterior approaches. Anterior approaches as transoral C1 and C2 fixation using T shaped plate, anterior odontoid screw (AOS) for type II odontoid fracture, and trans oral odontoidectomy for irreducible odontoid fractures. In contrast, several posterior approaches could be largely classified as either atlanto-axial fixation or occipito-cervical fixations. For challenging anatomy, a 3-dimensional computer navigation system may be used for trajectory planning intraoperative.

The aim of this study is to evaluate different techniques in the management of craniocervical instability and to compare the results with other results reported in the literature.

**Patients and Method**

This prospective study was conducted at the departments of Neurosurgery, Cairo University and Beni-suef University hospitals to allow 6-12 months follow-up for the last case operated upon. The study included 22 patients who suffered from craniocervical instability indicated for craniocervical or atlanto–axial fixation.

There were 14 males (63.6%), and 8 females (36.4%) and their ages ranged from 10 to 70 years, with mean age of 36.1 years ± S.D 16.57.

The causes of instability were fracture of the odontoid process in 8 cases (36.4%), transverse atlantal ligament injury with atlanto-axial sub laxation in 6 cases (27.3%), Osodontoidum in 4 cases (18.2%), Morquio’s syndrome in 2 cases (9%), Hangman’s fracture in one case (4.5%), and transverse atlantal ligament injury associated with sub axial sub laxation in one case (4.5%). Trauma was the most common cause of injury in our study 16 cases (73%).

As regards the clinical presentation, all patients had presented with posterior cervical pain with variable degrees of radiation to the occipital region. Pre-operative motor power according to ASIA motor score, one patient had ASIA grade A (4.5%), 2 patients were classified as ASIA grade B (9%), 6 patients had ASIA grade C (27%), 8 patients had ASIA grade D (36%), and 5 patients had ASIA grade E (22.5%) as illustrated in fig (1).

<table>
<thead>
<tr>
<th>Table (1): Showing ASIA score grading system</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASIA Impairment Scale</td>
</tr>
<tr>
<td>A Complete lesion</td>
</tr>
<tr>
<td>B Incomplete sensory preservation</td>
</tr>
<tr>
<td>C Incomplete motor preservation &lt; motor power grade 3</td>
</tr>
<tr>
<td>D Incomplete motor preservation &gt; motor power grade 3</td>
</tr>
<tr>
<td>E Normal neurological function</td>
</tr>
</tbody>
</table>

Fig (1): Showing pre-operative patients’ distribution according to ASIA motor score

All cases had preoperative craniocervical X-ray, CT, and MRI examinations.

In our study, anterior odontoid screw was used in 4 cases (single hallow titanium screw) (18.2%), posterior atlanto-axial fixation with facet fusion in 12 patients (54.5%) three of them needed trans oral odontoidectomy prior to fixation, fixation was performed from C1 to C4 in one patient (4.5%), and occipitocervical fixation in 5 patients (22.7%), (occipit +C3 C4 C5 in 4 cases and occipit + C3 C4 C5 C6 in one case) as illustrated intable (2).

ASIA score grading system was used post-operative to assess neurological outcome. Fusion was assessed by cervical plain X-ray films and CT scan. All patients wore rigid neck collar postoperative until fusion was achieved.
Table (2): Showing different techniques were used in fixation.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Frequency</th>
<th>Percept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior odontoid screw (single hallow titanium screw)</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>Atlanto- axial fixation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ C1 lateral mass and C2 transpedicular screws.</td>
<td>12</td>
<td>54.5%</td>
</tr>
<tr>
<td>□ C1 lateral mass and C2 trans laminar screws</td>
<td>10</td>
<td>45.5%</td>
</tr>
<tr>
<td>□ C1 lateral mass and C2 trans pedicular screw</td>
<td>2</td>
<td>9%</td>
</tr>
<tr>
<td>C1+ C2+C3+C4 fixation (C1 C3 C4 lateral mass and C2 one right side trans pedicular screw)</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Occipito-cervical fixation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Occipit+C3+ C4+ C5</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td>□ Occipit+C3 C4 C5 C6</td>
<td>41</td>
<td>18.2%</td>
</tr>
<tr>
<td>□ Occipit+C3 C4 C5 C6</td>
<td>41</td>
<td>4.5%</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>100%</td>
</tr>
</tbody>
</table>

Results

All surgeries were conducted smoothly without intraoperative complications or vascular injury. The mean duration of the procedure was 260 min (range 100– 420 min) and the average estimated blood loss was 225ml (range 50– 400 ml).

Regarding postoperative clinical evaluation according to ASIA grading, 10 patients had improved (45.5%) (four patients improved from ASIA score D to E, three patients from C to D, one patient from B to D, one patient from B to C, and one patient from A to C), while 11 patients remained at the same ASIA score as pre-operative(50%) (5 patients were ASIA score E, 3 patients were C, and 3 patients were D), and only one patient deteriorated from ASIA score D to A (4.5%) as illustrated in fig (2). Paresthesia in the area innervated by the greater occipital nerve was observed in only 4 patients. While in 3 patients improved through 40 weeks, only one patient paresthesiapersisted even 20 weeks later.

Fig (2): Showing post-operative patients’ distribution according to ASIA motor score

Postoperative X rays and CT detected proper reduction and alignment with evidence of bone fusion in 18 cases (81.8%). The rest 4 cases (18.2%), one case with atlanto-axial fixation suffered from progressive neck pain with limitation of neck mobility X rays and CT were done that detected fracture of right C2 screw with evidence of instability and cord compression that needed a second surgery, and the other 3 cases died from respiratory problems, 2 cases in the first week after surgery (the two cases of Morquio’s syndrome that were managed by occipitocervical fixation (occipit +C3 C4 C5), and the third case died after one month from surgery (the patient had odontoid fracture and managed by transoralodontoidectomy prior to posterior C1+C2 fixation, and was complicated by system failure and deep wound infection) as illustrated in fig (3).

Fig (3): Showing outcome at end of follow up period.
Fig. 4 (A) CT sagittal reconstruction of CCJ shows atlanto-axial sub-laxation (B) MRI T2WI sagittal view of CCJ shows marked compression of spinal cord (C) post-operative CT sagittal reconstruction of CCJ shows proper reduction of sub-laxation with average area of central canal (D) CT axial view shows proper direction of C1 lateral mass and C2 transpedicular screws.

Fig. 5 (A) CT sagittal reconstruction of CCJ shows odontoid fracture type II (B) MRI T2WI sagittal view of CCJ shows cord signal (C) Post-operative plain x-ray lateral view shows atlanto-axial fixation with rod-screws system

Fig. 6 (A) CT sagittal reconstruction of CCJ shows odontoid fracture type II (B) Post-operative CT sagittal reconstruction shows anterior odontoid screw

Discussion

Occipito-cervical fixation is a difficult process in spinal surgery. Different techniques for occipitocervical fixation reported in previous studies using different internal fixation instruments.

Surgical approaches for stabilizing the craniovertebral junction (CVJ) are classified as either anterior or posterior approaches. Between anterior approaches anterior odontoid screw fixation is the most common. Posterior was classified as atlanto-axial or occipito-cervical (O-C) fixation.

Our study was carried out on 22 patients who suffered from craniocervical instability, and underwent occipitocervical fixation, where in 63.6% and 36.4% in males and females, respectively. Ages average were from ten to seventy years.

In this study trauma was the most common mechanism of injury in 16 patients (73%), similar to Songet al. whose found trauma was a common mechanism of injury. Instability resulted from trauma in 14 cases (44%), followed by rheumatoid arthritis in 8 cases (25%). Also in Goelet al. study trauma was the
cause of instability in 6 cases (75%).

Instability resulted from fracture of the odontoid process in 8 cases (36.4%), transverse atlantal ligament injury with C1 C2 subluxation in 6 cases (27.3%), os odontoideum in 4 cases (18.2%), Morquio’s syndrome in 2 cases (9%), C2 Hangman’s fracture type III in one case (4.5%), and transverse atlantal ligament injury with sub axial sub luxation in one case (4.5%). In Panigrahi et al.\textsuperscript{10} reported 91 fractures involving craniovertebral junction. Where 59% of patients had odontoid fractures, 24% had Hangman’s fractures, 10% had miscellaneous fractures of C2, 5.5% had isolated C1 fractures, and 1.1% presented with occipitoatlantal dislocation.

In our study neck pain was a presenting symptom in all patients. Neurological deficits were found as a common clinical presentation in (75%) with neurological deficit at variable degrees according to ASIA score, and this like the previously published studies as Hsu et al.\textsuperscript{5} and Lee et al.\textsuperscript{11}.

In this study, anterior odontoid screw was utilized in 4 cases (18.2%) with odontoid fractures. All cases showed proper reduction and alignment with evidence of bone fusion. This was consistent with Bhattarai et al.\textsuperscript{12}, included fifteen patients with odontoid fractures, who underwent AOS placement.

Posterior atlantoaxial fixation using screw-rod system was done in 12 cases (54.5%), C1 lateral mass screws and C2 trans pedicular screws in 10 cases, only 2 cases underwent C2 trans laminar screws. 10 cases of them (83%) showed proper reduction and alignment with evidence of bone fusion, while the other 2 cases (17%) had instrumentation failure (one case had right C2 screw fracture with evidence of instability and cord compression, the other case had deep wound infection with loose system) that needed another surgery and died one month after surgery due to respiratory problems. One case in our study (4.5%) had Hangman’s fracture, which was operated by C1 C2 C3 C4 fixation (C1 C3 C4 lateral mass and C2 one right side trans pedicular screw, left screw couldn’t be inserted due to comminuted fracture of left pedicle) proper reduction and alignment with evidence of bone fusion was achieved in the follow up. This was consistent with Stulik et al.\textsuperscript{13} and Goel et al.\textsuperscript{9} studies, all patients underwent atlanto-axial fixation using screw–rod system and all patients showed proper reduction and alignment with evidence of bone fusion.

In our study occipitocervical fixation was done in 5 patients (22.7%), (occipit + C3 C4 C5 in 4 cases and occipit + C3 C4 C5 C6 in one case). Three cases of them (60%) showed proper reduction and alignment with evidence of bone fusion, the other 2 cases with Morquio’s syndrome died post-operative during the first week due to respiratory problems. In Song et al.\textsuperscript{8} study, the fusion was achieved in 27 patients (84%) at last follow-up.

In our study all surgeries were conducted smoothly without intraoperative complications or vascular injury. These findings correspond to the results of Goel et al.\textsuperscript{9} study, that all surgeries were conducted smoothly without intraoperative complications or vascular injury, while other studies reported intra operative vertebral artery injury as in Stulik et al.\textsuperscript{13} study, which reported that in 2 cases during placement of C2 screw, without any clinical consequences after that.

In this study neck pain had improved in 95% and clinical evaluation revealed 10 patients (45.5%) had neurological improvement, while 11 patients (50%) remained at the same ASIA score as pre-operative, and only one patient (4.5%) deteriorated from ASIA score D to A. Consistent to observation of Song et al.\textsuperscript{8} that neck pain improved in all patients. Among 23 patients with cervical myelopathy, (78.3%) had improvement of the Japanese Orthopedic Association (JOA) scores at last follow-up, and the nine neurologically intact patients remained the same after surgery. In Goel et al.\textsuperscript{9} study all patients had clinical neurological improvement following surgery.

Conclusion

Anterior odontoid screw fixation using single hollow titanium screw is a safe and effective method for stabilizing an odontoid fracture while maintaining axial rotation, but its indications are relatively limited. Rod-screw system is a safe and effective method for the treatment of cranio cervical and atlanto-axial instability, provided that good orientation with the complicated anatomy of the cranio cervical junction.

Funding: Self-funding

No Conflict of Interest

Ethical Clearance: Cleared by the ethical committee of Neurosurgery Department Faculty of Medicine Cairo University and Beni-suef University, Egypt
References


Assessment of Bacterial Pigments as Textile Colorants

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Abstract

The textile industry is considered the second most polluting industry in the world. Synthetic non-biodegradable petroleum-based dyes and toxic mordants play a major part in this pollution. Almost 20% of global water pollution has been associated with the textile dyeing practices. These controversies with the current environmental regulations, lead to a great demand for natural colors in food, pharmaceuticals, cosmetics, textiles and in the printing dye industry.

Recently, microbial pigments have been shown to be a promising alternative not only to synthetic dyes, but also to other biopigments derived from vegetables or animals as they are viewed as natural, non-toxic, have no seasonal production issues, offer excellent productivity, economical and most important they are ecofriendly.

An environmental screening of 77 samples was carried out for pigment production. Pigmented bacteria represented 55 (68%) of total samples with the highest percentage of pigmented bacteria found in air samples and the lowest percentage from water samples. Five potential pigmented isolates were chosen for pigment extraction and used for dyeing three types of fabrics - nylon, wool, and polyester. Furthermore, stability of dyes following treatment with acid, alkaline and detergents was studied to investigate the retention of dyes. Bacterial pigments in some unmordanted fabrics were retained 100% in cases of acid treatments while a small amount of discoloration was observed when subjected to alkali, or cold water and detergent. Apart from colorant, *Serratia marcescens* pigments demonstrated antibacterial activity against gram positive bacteria.

The current study demonstrated that coloring ability of the natural dyes can be compared to that of the synthetic dyes. Furthermore, these biochromes are also able to produce various shades similar to those of the synthetic dyes and express variable resistance to treatment with acid, alkaline and detergents.

Keywords: (Environmental, *Serratia*, Dyeing, Textiles).

Introduction

It has been a long time since microorganisms have been utilized to produce several different molecules such as antibiotics, enzymes, vitamins, texturizing agents . . . etc. but bacterial pigments are one of the most amusing and delightful research subjects in life sciences to elucidate their contribution in many industries. In nature, colorful and pigment producing microorganisms (bacteria, yeasts and fungi) are quite common. They create different pigments like carotenoids, prodigiosins, melanins, flavins, quinones, monascins, violacein and indigo [1].

Numerous artificial and synthetic colorants have been extensively utilized in foodstuff, dyestuff, cosmetic and pharmaceutical manufacturing processes. However, they are responsible for a variety of life-threatening effects on biotic and abiotic factors. To resolve the adverse effects there is universal interest in developing pigment production from natural sources. Natural pigments can be derived from two main sources, plants and microorganisms in addition to ores and insects [2, 3] . Microbial pigments have proved to be the most convenient owing to their stability, availability of cultivation techniques, easy and rapid growth in low cost culture media, without being dependent on

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weather, demonstrate different color shades and they are biodegradable in nature [4].

In addition to colorants, bacterial pigments contain numerous biological properties including antioxidant, anticancer activity and antileishmanial and other therapeutic applications [5-7]. Additionally, natural dyes offer properties that greatly interest the textile industry, namely, antibacterial properties. Fabrics can harbor bacteria that reduce unfavorable odors. It has been indicated that many pigment extracts have antimicrobial properties [8] that are non-toxic, which makes them an interesting candidate as natural dyes applicable in the textile industry.

Pigments of different colors help shield the cells of microorganisms from the harmful effect of light rays of visible and near ultraviolet range. These pigments play a significant role as protective agents in preventing oxidative damage. They also prevent different types of cancer and assist in improving the immune response. [9].

As textile colorants are not as restricted by as many safety criteria as food colorants, a larger number of bacterial pigments can be applied in textiles and other non-edible products than in food. As such, biotechnology could play a major role in mass production of dyes. Microbial pigment production is now one of the growing areas of study to show its potential and versatility in a wide range of industrial applications.

The present research was undertaken in an attempt to use simple methodology for both isolation of potential pigmented bacteria as well as their application as natural ecofriendly colorants for dyeing purposes in textiles manufacturing. The intention is to bring microbial pigments beyond the research stage towards commercial production of natural colorants for the dyes market. Research on bacterial pigments should be intensified to find suitable, economical and a cost-effective growth medium to increase its applicability for industrial production. Furthermore, finding new microbial pigments with both mass production and antimicrobial properties is rewarding.

**Materials and Method**

**Pigmented bacterial strains:**

A total of 77 environmental (air, soil, and water) samples were collected in this study and screened for biopigment production.

**Soil samples:**

Soil samples (1 gm) were dissolved in 10 ml of sterile normal saline to make soil suspensions which were left at room temperature for 24 hrs, following which serial dilutions were plated on nutrient agar media, and subjected to incubation at 37° C. Soil samples were collected from various locations in public parks in Turkey, Mosul hotel gardens, etc. Plates were observed after 24-48 hrs. for pigment producing colonies visualized; orange, red, yellow, and pink. Pigments were more profound after 2-3 days at room temperature. These colonies were cultured on the same medium until pure cultures were attained.

**Water samples:** Direct plating of serial dilutions was made on nutrient agar medium, subjected to incubation at 37° C for 24-72 hrs. and observed for pigmented colonies.

**Air samples:** Nutrient agar plates were exposed to air for 15 min. and then incubated at 37° C for 24-72 hrs.

**Pigment extraction:** Nutrient agar was used for screening and storage of pigmented bacteria at 4° C. On the other hand, 10 pigmented isolates were cultivated on duplicate nutrient agar plates to obtain heavy growth. The extraction method of [10] was used with slight modification. Briefly, 5 ml 95% methanol was added to each plate to scrape and harvest the cells. Harvested cells from both petri dishes were centrifuged (3500 rpm, 20 min) The pigment was extracted from cell pellets with 99.5% (v/v) acetone in the ratio of 1: 5 (supernatant) at 60 °C for 20 min or until the pellet was colorless . The supernatant was subjected to filtration with a Millipore Filter (0.45 µm) to be used as a dye.

**Effectiveness as dyeing agent :**

Dyeing with bacterial pigments was done using three types of fabrics (unmordanted). White pieces (1 cm²) of fabrics (wool, nylon, polyester) were placed in sterile petri dishes. Methanol pigment extracts (2 ml) were spotted on the fabrics and subjected to incubation for 48 hrs. at room temperature, each piece of fabric was dried and divided into three smaller sections. These sections were then treated with acid, alkali, cold water plus detergent for 1 hr. [11]. Acid solution (pH 5) was adjusted using 0.1M HCl and an alkaline solution with pH 8 was adjusted with 0.1M NaOH. Soap solution was prepared by adding liquid soap to distilled water (1:1).
Results and Discussion

The textile industry is a fast-growing industry like many others in the world. Textile industries consume massive amounts of synthetic dyes and as a result the difficulty to treat textile seriously threatens the environment. Therefore, natural pigments have been a major focus of the industry which urgently needs a safe replacement. Of the many potential natural sources of colorants, microorganisms appear to hold great promise. Being easy to cultivate and extract, the genetically diverse microbe are a beneficial choice.

Various environmental habitats were screened to obtain new sources, and several pigments that produce bacterial strains were found indicating their massive presence. Results of the current study showed that a wide spectrum of pigments was demonstrated ranging from white, to different shades of yellow, orange, pink to red (Figure 1). Considerable pigment production by the isolates was observed after about 24 hours of incubation. Pigment production increased to a maximum after three days at room temperature, which correlates with the results of [11].

Also, pigmented bacteria represented approximately 68% of total samples, with the highest percentage of pigmented bacteria found in air samples and the lowest percentage from water samples.

These pigments are secondary metabolites synthesized by many bacterial species and have been shown to protect airborne bacteria from the effects of solar/UV radiation [12].

Twelve pigmented isolates were chosen for further extraction and textile dyeing. The predominant colors were shades of yellow to orange, blue, green, creamy, and red. Pigment diversity is caused by variances in their chemical structure compositions as well as the existence of certain chromatophores. Carotenoids have been found to be the most extensively disseminated pigments. This kind of pigment also has a significant role in bacteria, for instance, in photosynthetic processes, by inhibiting photo-damage, and providing resistance to oxidative impairment as a result of the production of activated forms of oxygen.

Effectiveness as dyeing agent:

The dyeing ability of five vibrant bacterial pigments was evaluated on nylon, polyester and woolen fabrics. Crude methanolic extracts demonstrated different shades of colors showing applicability as textile dyes as shown in (Figure 2.).

![Figure (2): Methanolic pigment extracts used for textile dyeing. a) Before millipore filtration, b) After filtration.](image)

Results clearly demonstrate that the pigment produced by five potential isolates named 1a, 1b, Serr, rea and Br, can be effectively used to dye three types of fabrics studied. The three types of fabrics showed equal affinity for bacterial pigments used (Figure 3).

![Figure (3): Bacterial pigments used in textile dyeing.](image)

The isolate serr exhibited a significant amount of red pigment production in the agar medium as well as in the liquid medium following 24 hrs. of incubation compared to other isolates. The selected strain was found to be *Serratia marcescens* based on the morphological and biochemical characteristics using the API 20-E. Thus, the strain serr was considered as one of the promising strains for pigment production in the current, polyester and woolen fibers were vibrantly stained after dyeing.
with red Serratia pigment.

It was noted that when fabrics such as nylon, wool, and polyester were treated with acid, alkali, cold water and detergent for 1 hr. some fabrics retained the dye, while others were destained (Figure 4 and Table 1). It was also found that when fabrics such as nylon, wool and polyester were treated with acid, alkali, and detergent and hot water and detergent for 1 h, the serratia red pigment was totally retained as a result of acid treatment.

These findings correlate with a study by [13], which indicated that red pigments produced by Serratia impart a red color to different types of textiles. The dye was found to be stable following wash performance tests.

![Figure 4: Susceptibility of dyed fabrics following treatment with acids A, alkaline K and detergents D. Right sides were treated with acid (A), left side treated with alkaline (K) and the bottom treated with detergent (D).](image)

**Table (1): Stability of bacterial dyes following treatment with concentrated alkaline, acid, and detergent solution. (+) destained, (-) retained dye.**

<table>
<thead>
<tr>
<th>Textile dyeing Isolates</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Wool</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alkaline</td>
<td>Acid</td>
<td>Detergent</td>
</tr>
<tr>
<td>1b</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>1a</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Serr</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Rea</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brf</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Results of the present study demonstrated that soil, air and water bacterial isolates can lead to the production of pigments with anti-bacterial activity as shown in (Figure 5), which agrees with the findings of many researchers [14, 15].

**Figure (5): Antibacterial activity of Serratia marcescens pigment against a gram-positive bacteria.**

**Conclusion**

The rose red pigment obtained from *Serratia marcescens* can be utilized as a natural colorant to dye nylon, wool and polyester fabrics with a pink color. In addition to dyeing ability, natural bacterial pigments demonstrated an antimicrobial activity which makes them a potential candidate as an alternative to the various chemically synthesized dyes. However, studies to improve the fastness properties performance should be carried out.

**Conflict of Interest:** Nil

**Source of Funding:** Self-funded

**Ethical Clearance:** Research was performed according to the regulations of University of Mosul. No human or animal sources were used in the current research.

**References**

Bedside Evaluation of Fluid Responsiveness in Shock State using Electrical Cardiometry

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Abstract

Background: The initial hemodynamic management for pediatric shocked patients is giving aggressive fluid resuscitation, however fluid overload increases mortality and morbidity, so assessment and monitoring of fluid status have greatest benefit for critical patients to keep hemodynamic stability. Electrical cardiometry is an accurate, easy, and safe method for hemodynamic measurement, and can be used to monitor fluid responsiveness in critically ill patients.

Objectives: To examine stroke volume variation (SVV), evaluated through electrical cardiometry as a predictor of fluid responsiveness in management of shock.

Patients & Method: This was a cohort study done by observation of 60 shocked pediatric patients who received fluid therapy in the Intensive care units at Cairo University Pediatric Hospitals from July till December 2018.

Results: On comparing between patients who were volume non-responders versus volume responders, SVV was highly significant as it was higher in non-responders (P<0.000), also it was higher in patients who died than those who were discharged (p =0.002), it can be used as predictor of mortality with sensitivity of 80%, specificity of 75%, it also can be used as predictor of volume responsiveness with sensitivity of 85%, specificity of 92%.

Conclusion: Monitoring SVV, using electrical cardiometry could guide fluid therapy in critically ill pediatric cases, with beneficial impacts on morbidities and mortalities.

Key words: Fluid Responsiveness-shock-Electrical Cardiometry-stroke volume variation.

Introduction

Volume expansion, first-line treatment of acute circulatory failure, could be a therapeutic dilemma. Rivers et al. noted that, massive fluid management during first 6 h of resuscitation with severe sepsis and septic shock has been associated with improved outcome. Fluid overload has detrimental consequences¹; it prolongs mechanical ventilation and increases mortality of critically ill patients specifically those with sepsis, acute respiratory distress syndrome, intra-abdominal hypertension and acute kidney injury. Potential benefit of volume expansion must be balanced against risk of aggravating lung and tissue oedema².

It is crucial to evaluate whether volume loading will improve a patient’s malperfusion before a fluid bolus. Fluid responsiveness has variable definitions, the common being an increase in stroke volume by 10-15% after 500 mL of crystalloid infusion over 10 to 15 min³.

Electrical cardiometry (EC) is a monitor which measures electrical current produced through electrodes and changes of thoracic electrical bioimpedance, and is related to thoracic aortic flow and red blood cells (RBCs) alignment. When aortic flow stops, RBCs in the aorta are randomly orientated impeding the conduction. Once
the left ventricle contracts, the ejection flow compels the RBCs to parallel with the flow, which results in high conductivity and reduction of bioimpedance. The magnitude and frequency of pulsatile impedance changes are used to calculate hemodynamic parameters.

EC is FDA approved and validated for use in neonates, children and adults. A metaanalysis in 2016, including 20 studies and 624 patients comparing the CO measurement accuracy by using electrical cardiometry with other noninvasive technologies in pediatrics, showed that electrical cardiometry provided the most correct measurements.

Patients and Method

This was a prospective cohort study carried out over a period of six months at PICU of Cairo University pediatric Hospital from July till December 2018.

60 shocked patients fitting criteria according to Goldstein et al., 2005: unexplained metabolic acidosis: base deficit >5.0 mEq/L, prolonged capillary refill: >5 sec, core to peripheral temperature gap >3°C, tachycardia, tachypnea, hypotension, decreased mental status, weak peripheral pulse were included.

Patients were excluded if they had history of heart disease (valvular, myopathy, ischemic), cardiothoracic operation, dysrhythmias, or renal diseases. They were excluded due to underlying confounders such as volume overload, disturbed intracardic anatomy or significant arrhythmia that might interfere with ICON data and interpretation.

Patients’ hospital course was followed to determine the outcome.

Statistical Analysis

Data was subjected to computer assisted statistical analysis using statistical package for social science “SPSS” VERSION 23. Nominal data was expressed as frequency


Pediatric Risk of Mortality score was calculated for patient in his/her first 24 hours of PICU admission.

Electric cardiometry device (ICON):

Stroke volume variation (SVV), cardiac index (CI), stroke volume (SV), Systemic vascular resistance index (SVRI), index of contractility (ICON), thoracic fluid index (TFI) were measured immediately before and after administration of shock therapy (20cc/kg) within 2 mins from administration (up to 60 cc/kg) by electric cardiometry device ICON®. Four sensors were applied-first: approximately 5 cm above the left base of the neck, second on the left base of neck, third on the lower left thorax at the level of the xiphoid and the fourth one on the lower left thorax approximately 5 cm below the 3rd electrode at the level of anterior axillary line in older children, while in infant and young children 4 sensors were applied –first :approximately at forehead ,second on the left base of neck , third on the lower left thorax at the level of the xiphoid, fourth on lateral aspect of thigh 2 cm below symphysis pubis. EC monitor was connected to the sensor cable and the patients’ data were fed (name, age, sex, weight, height, blood pressure, CVP). The ICON monitor incorporates an algorithm which transforms the ohmic equivalent of mean aortic blood flow acceleration into an equivalent of mean aortic blood flow velocity.

We defined fluid reponders by normalization of (MAP, capillary refill time, heart rate, respiratory rate, central venous pressure) and their data was compared with data obtained using electrical cardiometery.

Improvement of the SVV and other data derived from ICON was determined by comparing patient data with normal reference range data already preset in ICON device.

We collected the following data from participants:

Demographic characteristics: Age, Sex, Weight, Height

Clinical findings: Vital signs: heart rate, respiratory rate and blood pressure) using PALS Guidelines, 2015, capillary refill time, central venous pressure, urine output in last 24 hours, if patient was mechanically ventilated or not, If patient received inotropes or not, Vasoactive-Inotropic Score was calculated patients who received inotropes, Peripheral pulsation felt or not, Conscious level (modified pediatric Glasgow Coma Scale)

Laboratory findings: Complete blood count, Kidney function test, Liver function test, CRP, Coagulation profile, Arterial blood gases
and percentage and was compared using Chi square test. Numerical data was expressed as mean +/- standard deviation and was compared using T test. Non parametric data was expressed as median “inter quartile range “and was compared using Mann Whitney u test. Associations between numerical variables was studied using Pearson’s correlation. P-values less than 0.05 was considered significant. Charts and graphs were prepared using Microsoft Excel 2010 TM.

Results

Patients’ median age was 18 (5.5 - 48) months; majority were females (53.3%). The median weight was 10.5 (6 – 16.5) kg. The median height was 72.5 (62.5-97.5).

Different age groups were included; 22 patients (36.6%) were less than 1 year old, 21 patients (35%) from 1-3 years old, and 17 patients (28.4%) were >3 years old.

45 (75 %) patients were invasively ventilated and 40 (66.7%) patients received inotropic support. Mean PRISM score was 10.40 ±4.44 SD (2-18) and median (IQR) VIS was 15 (0-40).

47 patients (78.3%) responded to fluid therapy while 13 patients (21.7%) did not.

Mean SVV significantly decreased while comparing between pre and post shock therapy. CI increased significantly post shock therapy. SV also showed improvement post shock therapy (p = 0.012). TFC, ICON and SVRI were non-significant (p = 0.665, P =0.289 and P =0.391 respectively)

Table 1: ICON parameters before and after shock therapy.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre</th>
<th>Post</th>
<th>Test value</th>
<th>P-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV</td>
<td>Median (IQR)</td>
<td>13.4 (8.8 – 19)</td>
<td>15 (10.3 – 19.85)</td>
<td>-2.499≠</td>
<td>0.012 S</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>2.7 – 90</td>
<td>3.6 – 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>Mean ± SD</td>
<td>4.34 ± 1.77</td>
<td>4.83 ± 1.82</td>
<td>-2.919•</td>
<td>0.004 HS</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>1.5 – 8.4</td>
<td>1.6 – 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFC</td>
<td>Median (IQR)</td>
<td>41 (33 – 56)</td>
<td>41 (30.5 – 61.5)</td>
<td>-0.433≠</td>
<td>0.665 NS</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>25 – 160</td>
<td>12 – 150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Icon</td>
<td>Mean ± SD</td>
<td>96.11 ± 42.21</td>
<td>99.79 ± 42.00</td>
<td>-1.061•</td>
<td>0.289 NS</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>21 – 198</td>
<td>24 – 240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVV</td>
<td>Mean ± SD</td>
<td>20.72 ± 6.83</td>
<td>16.50 ± 7.54</td>
<td>-3.983•</td>
<td>0.000 HS</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>7 – 35</td>
<td>2 – 39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVRI</td>
<td>Median (IQR)</td>
<td>1148 (775 – 2141)</td>
<td>1172.5 (809.5 – 1643)</td>
<td>-0.858≠</td>
<td>0.391 NS</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>453 – 12705</td>
<td>521 – 39344</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On comparing between volume non-responders versus volume responders, SVV and ICON were highly significant (P < 0.000 and p <0.008 respectively), SV and CI were significant (p=0.023, p=0.031 respectively). SVV was higher in non-responders group where SV, ICON, CI were higher in volume responders.
Table 2: Icon parameters in relation to volume response

<table>
<thead>
<tr>
<th></th>
<th>Responder</th>
<th>Test value</th>
<th>P-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non responder</td>
<td>Responder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV</td>
<td>Median (IQR)</td>
<td>11.7 (8 – 15.2)</td>
<td>15 (12.5 – 21)</td>
<td>-2.280</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>4.5 – 20</td>
<td>3.6 – 65</td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>Mean ± SD</td>
<td>3.89 ± 1.46</td>
<td>5.10 ± 1.82</td>
<td>-2.205</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>1.6 – 6.2</td>
<td>2 – 10</td>
<td></td>
</tr>
<tr>
<td>TFC</td>
<td>Median (IQR)</td>
<td>45 (35 – 72)</td>
<td>40 (30 – 52)</td>
<td>-1.204</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>30 – 150</td>
<td>12 – 105</td>
<td></td>
</tr>
<tr>
<td>ICON</td>
<td>Mean ± SD</td>
<td>72.77 ± 31.89</td>
<td>107.26 ± 41.64</td>
<td>-2.764</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>24 – 122</td>
<td>45 – 240</td>
<td></td>
</tr>
<tr>
<td>SVV</td>
<td>Mean ± SD</td>
<td>24.77 ± 6.48</td>
<td>14.21 ± 6.11</td>
<td>5.442</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>18 – 39</td>
<td>2 – 32</td>
<td></td>
</tr>
<tr>
<td>SVRI</td>
<td>Median (IQR)</td>
<td>1630 (781 – 2542)</td>
<td>1082 (815 – 1505)</td>
<td>-1.480</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>521 – 39344</td>
<td>611 – 5713</td>
<td></td>
</tr>
</tbody>
</table>

ICON parameters after shock therapy, and on comparing between patients who were discharged and those who died the mean SVV, SVRI interpretation were highly significant among patients who were discharged and patients who died (p =0.009, P =0.000 receptively). Similarly ICON interpretation was significant (p = 0.041). SVV was higher among patients who died. ICON was higher among patients who were discharge. SVRI interpretation showed that it was higher in patients who improved.

Table 3: ICON parameters post shock therapy in relation to outcome.

<table>
<thead>
<tr>
<th>Icon post</th>
<th>Discharge</th>
<th>Died</th>
<th>Test value</th>
<th>P-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. = 40</td>
<td>No. = 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV</td>
<td>Median (IQR)</td>
<td>15.9 (11.15 – 20.5)</td>
<td>14.5 (9.1 – 16.65)</td>
<td>-1.310≠</td>
<td>0.190</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>3.6 – 65</td>
<td>4.5 – 32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV interpretation</td>
<td>deteriorated</td>
<td>4 (10.0%)</td>
<td>4 (20.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>8 (20.0%)</td>
<td>3 (15.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>28 (70.0%)</td>
<td>13 (65.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>Mean ± SD</td>
<td>5.11 ± 1.91</td>
<td>4.29 ± 1.54</td>
<td>1.670•</td>
<td>0.100</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>2 – 10</td>
<td>1.6 – 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI interpretation</td>
<td>deteriorated</td>
<td>1 (2.5%)</td>
<td>3 (15.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>29 (72.5%)</td>
<td>11 (55.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>9 (22.5%)</td>
<td>4 (20.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>1 (2.5%)</td>
<td>2 (10.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFC</td>
<td>Median (IQR)</td>
<td>39.5 (30 – 64.5)</td>
<td>45 (37 – 52.5)</td>
<td>-1.044≠</td>
<td>0.296</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>12 – 105</td>
<td>20 – 150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFC interpretation</td>
<td>deteriorated</td>
<td>1 (2.5%)</td>
<td>4 (20.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>28 (70.0%)</td>
<td>13 (65.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>11 (27.5%)</td>
<td>3 (15.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICON</td>
<td>Mean ± SD</td>
<td>103.14 ± 39.63</td>
<td>93.09 ± 46.73</td>
<td>0.872•</td>
<td>0.387</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>55 – 240</td>
<td>24 – 177</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: ICON parameters post shock therapy in relation to outcome.

<table>
<thead>
<tr>
<th>Icon interpretation</th>
<th>deteriorated</th>
<th>0 (0.0%)</th>
<th>3 (15.0%)</th>
<th>6.375</th>
<th>0.041</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same</td>
<td>34 (85.0%)</td>
<td>14 (70.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved</td>
<td>6 (15.0%)</td>
<td>3 (15.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVV</td>
<td>Mean ± SD</td>
<td>14.73 ± 6.36</td>
<td>20.05 ± 8.58</td>
<td>2.713*</td>
<td>0.009</td>
<td>HS</td>
</tr>
<tr>
<td>Range</td>
<td>2 – 32</td>
<td>6 – 39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVV interpretation</td>
<td>deteriorated</td>
<td>1 (2.5%)</td>
<td>6 (30.0%)</td>
<td>19.706</td>
<td>0.000</td>
<td>HS</td>
</tr>
<tr>
<td>Same</td>
<td>13 (32.5%)</td>
<td>12 (60.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved</td>
<td>26 (65.0%)</td>
<td>2 (10.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVRI</td>
<td>Median (IQR)</td>
<td>1111 (831.5 – 1510)</td>
<td>1403 (792.5 – 2396)</td>
<td>1.082≠</td>
<td>0.279</td>
<td>NS</td>
</tr>
<tr>
<td>Range</td>
<td>611 – 2824</td>
<td>521 – 39344</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVRI interpretation</td>
<td>deteriorated</td>
<td>0 (0.0%)</td>
<td>7 (35.0%)</td>
<td>22.802</td>
<td>0.000</td>
<td>HS</td>
</tr>
<tr>
<td>Same</td>
<td>10 (25.0%)</td>
<td>9 (45.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved</td>
<td>30 (75.0%)</td>
<td>4 (20.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ROC curve shows that the best cut off point of SVV as predictor of mortality was >15 % with sensitivity of 80%, specificity of 75% and AUC of 70.5%. positive predictive value 61.5, negative predictive value 88.2

The ROC curve shows that the best cut off point of SVV as predictor of volume responsiveness was ≤19 % with sensitivity of 85%, specificity of 92% and AUC of 90%.

The ROC curve shows that the best cut off point of SVV as predictor of volume responsiveness in group age less than 1 year was ≤16 % with sensitivity of 61%, specificity of 100% and AUC of 80% while in group age 1-3 years was ≤19 % with sensitivity of 93%, specificity of 100% and AUC of 94%.
Discussion

Ueyama and Kiyonaka\(^1\), evaluated fluid responsiveness in critically ill patients and found that only 40–50% of the patients responded. That is far away from our study in which 78.3% responded to fluid therapy.

In our study; SVV showed significant improvement after fluid therapy and this is similar to Yi et al., 2017\(^1\) in his meta-analysis which approved diagnostic rate of SVV in expecting fluid responsiveness in children. A meta-analysis Zhang et al., in 2011 found SVV an accurate predictor of fluid responsiveness in adults. However, predictive value in Yi et al., 2017 was not as encouraging as reported in adult patients. It could be clarified through the physiological variations among children and adult cases, such as heart rate, chest wall compliance and vascular elasticity influencing SVV differently.

Thus SVV is a trustworthy predictor of fluid responsiveness in adult cases. However, the meta-analysis aimed to examine the ability of SVV to predict the response to volume expansion in pediatric patients. 6 investigations with a combined total of 224 cases, where data of meta-analysis reported a pooled sensitiveness of 68%, specificity of 65% \(^1\). Our data approved the diagnostic value of SVV in predicting volume responsiveness in children with sensitiveness of 85%, specificity of 92% and AUC of 90%.

The results clarified that CI statistically significantly increased after fluid therapy measured by electrical cardiometry before and after fluid administration within 2 minutes. Observational study done in 2018 in which transthoracic echocardiography was recorded immediately before, 5 minutes after, and 60 minutes after fluid bolus therapy showed that fluid bolus therapy resulted in a transient increase in CI in children with sepsis and acute circulatory failure. Fluid responsiveness was not sustained in the majority of cases \(^1\).

Van de Water et al.\(^1\), found TFC is a reliable measurement of chest fluid status and of changes in that fluid. This is against to our study as we found that there was no significant difference in TFC before and after fluid therapy.

Vergnaud et al.\(^1\), reported SVV dependably predicted fluid responsiveness only in children aged more than 3 years, while area under receiver operator characteristic curve (AUROC) is 50% in younger children.

Our results showed SVV was reliable to predict fluid responsiveness in all age groups included the study; ROC curve showed that the SVV can be used as predictor of volume responsiveness in group age 1-3 years with sensitivity of 61%, specificity of 100% and AUROC was 80% as well as >3 years with sensitivity of 93%, specificity of 100% and AUC of 94%.

Conclusion

SVV can be used as predictor of mortality with sensitivity of 80%, specificity of 75%. SV, CI and ICON can be used to guide fluid therapy in critically ill pediatric patients

Funding: Self-funding

Ethical Clearance: Cleared by the ethics committee Pediatrics department, faculty of medicine, Cairo University

No Conflict of Interest

References


Feasibility of Quantitative Diffusion Weighted MR Imaging with Calculated Apparent Diffusion Coefficients in Characterization of Pediatric Head and Neck Masses

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Abstract

Purpose: Assessing DW MR imaging and ADC value in pediatric head and neck lesions and ability of determination benign from malignant masses.

Methods: Study was undertaken on 56 patients as 39:17, male: female, respectively where they had head or neck mass. Patients exposed to routine MRI to characterize lesions. Diffusion weighted imaging sequence was added to routine MR and evaluation of DWIs.

Results: We found that ± ADC of malignant, benign lesions as $0.64 \times 10^{-3}$, $1.58 \times 10^{-3}$, and $2.10 \times 10^{-3}$ mm$^2$/sec. ADC of $1.25 \times 10^{-3}$ mm$^2$/sec threshold value was used to differentiating among tumors which were represented 100% and 94.1% for sensitivity and specificity, respectively.

Conclusion: Beneficial roles for DW imaging to discriminate between malignant and benign head and neck tumors.

Keywords: Diffusion MR imaging, pediatric head and neck masses.

Introduction

Pediatric head and neck masses are common. Malignant tumors represent approximately 5% of masses. Preoperative diagnosis of malignant tumors is paramount for management which reflect on prognosis. Therefore, preoperative imaging is critical. Imaging also is helpful in guided fine-needle aspiration (FNA) or needle biopsy and to assess treatment response\textsuperscript{1}.

Now DW imaging is helpful to characterize tumors as well as differentiate tumor from non-tumor tissue. DWI is considered as a sensitive biomarker to monitor therapeutic response in neck malignancy\textsuperscript{2}.

Addition of DWI into routine MRI protocol will not add significant extra-time or burden for the patients as it is a completely non-invasive, fast sequence, highly sensitive, well-tolerated technique without contrast material administration\textsuperscript{3}. Aim of present investigation was assess potential roles and feasibility of diffusion-weighted MR imaging with calculated ADC value further get accurately characterize and differentiate benign form malignant pediatric head and neck masses.

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Email: ahmed_elshenawy.nci@yahoo.com
Methods

Study Population:

This study included 56 (39 male and 17 female) patients, between March 2016 and October 2017, presented with head or neck masses. The mean age was 9.02 years (age range, 1–16 years). All patients were subjected to routine contrast-enhanced MRI to characterize these masses with anatomical and morphological details on local extensions and infiltrations. DW MRI was added to evaluate its role in characterization of the masses. Finally, diagnosis was confirmed by biopsy and histopathological assessment.

Technique:

Routine CE-MRI

The routine CEMRI technique was utilized supine position with standard circularly polarized head coil using MRI 1.5 Tesla (Phillips, Achieva XR, Netherlands). The following sequences were used; axial T1WI (450/12ms) TR/TE spin echo; axial T2WI (4540/96ms) TR/TE spin echo; axial STIR (9000/116/2500ms) TR/TE/TI; sagittal T1WI (430/10ms) TR/TE spin echo; coronal T2WI (4520/11ms) TR/TE spin echo, 5mm section thickness and 256x256 matrix size after intravenous administration of Gadolinium-DTPA (0.3 mg/kg), contrast-enhanced T1WI in axial, sagittal and coronal planes were obtained.

MR Diffusion Imaging

Axial DW was done through use single-shot T2-weighted echo planar spin-echo sequence (1600/107) diffusion gradient encoding in x, y, z orthogonal directions; b (0, 500 and 1000 sec/); view(24 - 24 cm); matrix (128-128); thickness, (7.5 mm); gap(0 mm); and final (1) signal acquired. At b, x, y, and z single-direction DW images and a baseline image (b _ zero sec/mm2) acquired 10 sections give 50 images at b in thirteen sec. (ten images of combined [{x _ y _ z}]/3) DW imaging, ten baseline image, and ten of x-, y-, and z-direction DW. DW get two hundred photo. DW data transferred to workstation for determined signal of each tumor.

ADC recorded at least 1cm regions of interest (ROI) of tumor on ADC. The ROI is placed on enhancing solid components as much as possible. We excluded cystic, necrotic, and hemorrhagic tumor areas.

Statistical Analysis

Results and entered were using SPSS program (24). Comparisons among quantitative variables done using non-parametric Kruskal-Wallis and Mann-Whitney 4.

ROC constructed with area under curve analysis to determined better cutoff of ADC to defined the malignancy.

Results

The masses were classified into benign solid (13 cases, 23.2%), cystic lesions (4 cases, 7.1%) and malignant tumors (39 cases, 69.6%) based on histopathological results. Table. 1 demonstrates the pathological entities detected by pathology analysis.

After accurate interpretation of the conventional MRI studies of these 56 cases, the primary diagnosis was, 17 cases were diagnosed as benign lesions (solid and cystic, Fig. 1), while 39 cases were diagnosed as malignant lesions (Fig. 2 and 3), relying on their morphological criteria, anatomical location and enhancement pattern. The analysis of diffusion weighted imaging based on signal intensity on b1000 images revealed 39 masses (69.6%) with high signal intensity and dark signal on ADC maps, reflective of restricted diffusivity. These cases were matching with the pathological diagnosed malignant tumors with sensitivity 100%. The remaining 17 cases (30.4%) were found to have facilitated diffusion.

Our results showed that, ±ADC of benign solid masses were 1.58±0.37 x 10^-3 mm²/sec while 2.1±0.18 x 10^-3 mm²/sec was found to present the cystic lesions. The mean ADC value of malignant masses was found to be 0.64±0.21 x 10^-3 mm²/sec. Statistical difference was noted among solid benign and malignant tumors (p<.0001). Fig. 4 shows Malignant tumors have lower ADC (mm²/sec) than benign solid masses or cystic lesions.
Table 1: Illustrates number and percentage of different pathologies in our study.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoma</td>
<td>4</td>
<td>7.1%</td>
</tr>
<tr>
<td>Fat containing lesion</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Fibrous Dysplasia</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Hemangioma</td>
<td>3</td>
<td>5.4%</td>
</tr>
<tr>
<td>LCH</td>
<td>3</td>
<td>5.4%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Lipoblastoma</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Lipofibromatosis</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Lymphangioma</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>7</td>
<td>12.5%</td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td>11</td>
<td>19.6%</td>
</tr>
<tr>
<td>Neurofibroma</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Ranula</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Reactive nodes</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Retinoblastoma</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>RMS</td>
<td>11</td>
<td>19.6%</td>
</tr>
<tr>
<td>Thornwaldt cyst</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Vascular malformation</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>1</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Table 2: Illustrates the results of previous studies of DWI in head and neck region.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang et al. 2001</td>
<td>The mean ADC value of benign solid tumors was higher than malignant tumors.</td>
</tr>
<tr>
<td>Sumi et al. 2003</td>
<td>Value of DWI in metastatic cervical lymph nodes</td>
</tr>
<tr>
<td>Abdel Razek et al. 2006</td>
<td>Differentiation of non-necrotic malignant from benign lymph node</td>
</tr>
<tr>
<td>Eida s et al. 2007</td>
<td>ADC can provide preoperative tissue characterization of salivary gland tumors.</td>
</tr>
<tr>
<td>Abdel Razek et al. 2008</td>
<td>Malignant thyroid nodules show a significantly lower ADC value than that of benign solitary thyroid nodules.</td>
</tr>
</tbody>
</table>
Fig. 1: 12-year-old male with facial masses/deformity. Coronal T2 weighted image and coronal CT bone window “a and b” images show extensive expansion of facial bones with heterogeneous predominately high T2 signal and ground glass appearance on CT images. Diffusion-weighted imaging “c and d” show intermediate signal in DWI and ADC map with ADC value of $1.55 \times 10^{-3}$ mm$^2$/s. The pathology revealed Fibrous dysplasia.

Fig. 2:11-year-old male with mass at the right masticator space. Axial T2 weighted and coronal T1 after IV gadolinium administration images show a heterogeneously enhancing infiltrating soft tissue mass (arrows) within the right masticator space. The mass is associated with perineural invasion along V2 course (circle). The diffusion weighted images demonstrate restricted diffusivity of the mass with ADC value $0.82 \times 10^{-3}$ mm$^2$/s. Pathology revealed Rhabdomyosarcoma.

Fig. 3: 2-year-old male with multiple lesions at the right sphenoid & left retro-maxillary/nasopharyngeal and left mandibular regions. Coronal T2 and T1 after IV gadolinium administration with fat saturation images at variable levels show multiple heterogeneously enhancing soft tissue masses (arrows) at the right sphenoid bone, left para-pharyngeal and left mandibular regions. These masses have restricted diffusivity on diffusion weighted imaging with ADC value $0.69 \times 10^{-3}$ mm$^2$/s. Pathology shows Langerhans cell Histiocytosis (LCH).

Fig. 4: Box and whisker plot of pediatric neck masses.

Discussion

Pediatric head and neck masses represent a challenge as they compass a wide spectrum of differential diagnoses. The optimal treatment depend on pathologic nature of these masses. Surgical approaches for malignant tumors certainly differ from those assigned for benign masses. Preoperative imaging with predicting benign from malignant tumors is paramount.
in management planning.\(^1\)

DWI could detect early pathological changes within tissues on the cellular level based on the random motion of water molecules. Increase in water content, change in composition or increase cellularity and decrease extra-cellular spaces significantly reflect on diffusivity of water molecules within different tissue.\(^5\)-\(^6\).

ADC of malignant pediatric neck tumors had lower value than of benign solid and cystic lesions. Which could assumed to histopathological variability between benign and malignant tumors. The malignant tumors have histopathologic characteristics such as hypercellularity with enlarged nuclei, hyperchromatism and loss of polarity. Consequently, the extracellular matrix and space diminish resulting in lower ADC values. Table. 2 demonstrates prior studies of DWI in the head and neck region.\(^7\)-\(^11\).

On our study the ADC (malignant cases) was 0.64 x 10\(^{-3}\), solid tumors 1.58 x 10\(^{-3}\), benign cystic lesions, 2.10 x 10\(^{-3}\) mm\(^2\)/s. ADC of 1.25 x 10\(^{-3}\) mm\(^2\)/s as threshold and benign lesions 100% and 94.1%, sensitivity and specificity, respectively.

These results are in the same track with Sakamoto et al.\(^12\) that found ADC of malignant cases is 1.13 ± 0.43 x 10\(^{-3}\) mm\(^2\)/sec, mean ADC of benign solid tumors, (1.56 ± 0.51) x 10\(^{-3}\) mm\(^2\)/s, which for benign cystic lesions, (2.05 ± 0.62) x 10\(^{-3}\) mm\(^2\)/s. ADC for 1.2 x 10\(^{-3}\) mm\(^2\)/s as threshold for distinguish among malignant and benign lesions.

The malignant cases were found that they have ADC value lower for the benign lesions, the mean ADC 0.64 x 10\(^{-3}\) mm\(^2\)/s.

On our study we found that, there is significant among the malignant lesions (\(P<0.001\)).

ADC difference in malignant tumors which could related to its cellularity, which agree of Abdel Razek et al.\(^11\) and Humphries et al.\(^13\).

There is significant P value of the ADC between the benign solid lesions and malignant lesions as well as between the benign cystic lesions and malignant lesions (\(P<0.001\)), while there is no significant P value between the benign cystic and solid lesions.

Future requirements to improve applications of diffusion MR imaging:

More standardization of DWI such motion-probing gradient directions, b values, and TR/TEs is very important. Updating current software tools to perform more complex quantitative is also needed.

Other limitations in this study included heterogeneity of the study cohort with widely variable pathological diagnoses. Additionally, the number of benign tumors was very small compared to malignant tumors.

**Conclusion**

Pediatric head and neck masses are one of the most important medical issues. Early detection help better therapeutic planning.

This study concluded that DW MRI is accurate, non-invasive and non-enhanced technique that could help proper characterization of masses with potential differentiation malignant from benign masses.

**Funding:** Self-funding

**Ethical Clearance:** Ethics approval and consent to participate: This study was approved by the research committee of Faculty of Medicine, Cairo University. IRB number: I161015

**No Conflict of Interest**

**Abbreviations:**

ADC: Apparent diffusion coefficient.

CEMRI: Contrast-enhanced MRI.

CT: Computed tomography.

DWI: Diffusion weighted imaging.

EPI: Echo planar imaging.

FDG: Fluorodeoxyglucose.

FNA: Fine-needle aspiration.

MRI: Magnetic resonance imaging.

PET: Positron emission tomography.

STIR: Short tau inversion recovery.

TE: Echo time.

TR: Repetition time.
References


Prevalence of Obesity among Primary School Children Living in Egypt

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Abstract

Obesity is a disease that dangerously affects health. BMI is the most preferable method to define. Childhood obesity is one of the major public health problems not only in low and middle income countries but also in high income. Obesity problem was in a rising curve in the last decade. School age is important period to early discover and effective intervention. Participants and methods: A cross sectional survey managed in 2018 including 31270 children in school age period in Egypt. Data was collected through a simple questionnaire and Measure weight, height and BMI. Assessment was in relation to BMI for age Z score. 200 obese children were selected randomly from the obese on basis of parental consent for investigations.

Results: 31270 students (6-11years) were studied. 15.02% overweight and 10.55% obese. Prevalence among boys (14.2%) more than girls 6.7%. higher in urban (15.5%) compared to rural (6.8%).higher among high socioeconomic standard (14.1%). Higher between (8-9 years) (15.9%) than other age groups. Cholesterol level was high in 20% of the selected cases while LDL was high in10% while Triglyceride was high in 25% of cases unlike HDL was low in only 15%. Conclusion: Overweight and obesity was 15.02% and 10.55% respectively. Higher among boys, urban and high socioeconomic. Cholesterol, LDL and TG were lower in 20%, 10% and 20% respectively and in HDL was lower in 15%.

Key words: Obesity, Prevalence, School Children.

Introduction

It is well recognized that childhood obesity is a significant public health issue, with adverse physical and psychological effects that persist beyond childhood into the adult years. After decades of rapid increase, it appears that childhood obesity prevalence in developed countries is starting to plateau. Reviews of international evidence have shown that the prevalence of obesity in children and adolescents is stabilizing in countries including Australia, Japan, France and US. However, evidence also suggests that such progress may not have been shared among children across all socioeconomic groups ¹.

Obesity is a multifactorial condition characterized by abnormal or excessive body fat accumulation. The etiology of obesity includes genetic, metabolic and environmental factors. Obesity appears mainly when the intake of calories is higher than the calories consumed. During last two decades, obesity has emerged as a leading public health problem; it is more prevalent in developed countries, affecting adult and children alike ².

Obesity is associated with physical problems, such as hypertension, coronary arteriosclerosis, elevated cholesterol, type 2 diabetes, joint problems and certain types of cancers. Psychologically, it is associated with decreasing self-image, anxiety and depression ³.

The age at which excess weight gain occurs has important implications for child health and development. The range of normal BMI changes during childhood growth, with values generally lowest during age 4-6 years followed by an increase and subsequent steady rise into the adolescence. Early adiposity rebound is
associated with greater adiposity in mid-childhood, which, in turn, has been associated with accelerated growth, advanced bone age, earlier pubertal transition and adult obesity. In older children, both overweight and obesity contribute to an increased risk of metabolic syndrome, type 2 diabetes, hypertension, dyslipidemia and obstructive sleep apnea. Thus, early recognition of obesity is an important step towards preventing long term adverse health consequences.

The global burden of disease studies in 1990, 2000, and 2013 showed that metabolic risk factors are the most important determinants of emerging non-communicable diseases all over the world. Obesity has now become a common health problem and its prevalence continues to increase in both developed and developing countries. The increasing incidence of childhood obesity and its attributed socioeconomic and public health burden is a real threat for developing countries. Recent studies reveal the increasing rates of obesity and their attributed ranges of adverse health outcomes in children and adolescents. Most obese children and adolescents already are at high risk for metabolic complications, and for a wide range of morbidities and mortality so lipid profile to these children help in decreasing this risk.

Metabolic syndrome is considered not only an adult condition but a pediatric as well. The main components of MS are: central obesity, hypertension and abnormal carbohydrate and lipid metabolism. When we identify the factors that constitute MS in the early stages of growth, there is an advantage of early initiation of treatment, reducing the risk of developing a classic MS.

The 2015 Egypt Health Issues Survey confirms that non-communicable diseases are on the rise and remain among the leading causes of death in Egypt. School age is a very special period where children develop and acquire knowledge and behavior in relation to health protection and promotion, so early determine obesity problem in this period will provide the easily bypass it.

In Egypt most of related articles that focused on overweight and obesity are focused mainly on children below 5 years but typically developed children at primary school age have not investigated the overweight and obesity and their relation to lipid profile. Therefore, due to the insufficient data and given the lack of studies in this field in Egypt due to un awareness of the Egyptian families about the problems of obesity and even some of the families didn’t know that obesity is a disease.

So the goal of this study was to determine prevalence of obesity in primary school age children in Egypt.

**Method**

Among all primary schools from seven Egyptian governorates were selected by randomly, 4 governorates from delta region and 3 of them from Upper Egypt. A cross sectional study was conducted between Aprils till November 2018 in children among age groups (6 to 11) years.

An approval from Menoufia Faculty of Medicine ethical committee was taken before beginning of the study.

A written consent form was signed by the manager of each school and authorities in the education ministry.

A written consent was signed by parents of the students after describing to them about the important of the study and that there was no any invasive maneuver to their children.

Selection of cases: the study was included 31270 students will be diagnosed according to Z score charts. The survey was conduct a questionnaire to the student includes the identification: (name, age, sex, and residence). Assessment of socioeconomic standard of family with questions about the father’s and mother’s education and occupation and family income according to modified.

Only 200 children were investigated to lipid profile after a written consent from their parents and briefly counseling them about obesity and high lipid profile relation also the diseases that precipitated secondary to this problem.

Anthropometric measurements were taken in situ. (Height, weight and BMI) we determined obesity according to Z- score for BMI.

The chosen child with criteria of both sex, age between 6 to 11 years, live in Egypt and apparently healthy. And the excluded child: age above 11 years or below 6 years, with skeletal deformity or long term steroid therapy.

The data were analyzed by SPSS (statistical package for social science) version 17.0 on IBM computer. We used two types of statistical analysis: Descriptive statistics e.g. percentage, mean and standard deviation.
and analytic statistics e.g. Chi-square test. P-value of < 0.05 was considered statistically significant.

**Results**

This table shows that the percentage of the age groups and sex, 6-7 y (30.28%) was higher and 10 y < (10.08%) , according to sex there were 51.62% male, female 48.38%, according to age the mean was 7.95 ± 1.52. (Table 1)

**Table (1): age groups and sex, mean, standard deviation (SD) and range for age. (N=31270)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups (y):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-7</td>
<td>9467</td>
<td>30.28</td>
</tr>
<tr>
<td>7-8</td>
<td>6780</td>
<td>21.68</td>
</tr>
<tr>
<td>8-9</td>
<td>5631</td>
<td>18.01</td>
</tr>
<tr>
<td>9-10</td>
<td>6239</td>
<td>19.95</td>
</tr>
<tr>
<td>10 -11</td>
<td>3153</td>
<td>10.08</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16143</td>
<td>51.62</td>
</tr>
<tr>
<td>Female</td>
<td>15127</td>
<td>48.38</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100</td>
</tr>
<tr>
<td>Area:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>17757</td>
<td>56.79</td>
</tr>
<tr>
<td>Urban</td>
<td>13513</td>
<td>43.21</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
<tr>
<td>Socioeconomic:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>2754</td>
<td>8.81</td>
</tr>
<tr>
<td>Average</td>
<td>21860</td>
<td>69.91</td>
</tr>
<tr>
<td>High</td>
<td>6657</td>
<td>21.29</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.00</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>7.95 ± 1.52</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>6.00 – 10.9</td>
<td></td>
</tr>
</tbody>
</table>

This table shows frequency and percentage for area and socioeconomic. According to area, rural and urban (56.79% and 43.21 %) respectively, according to socioeconomic, low, average and high (8.81 %, 69.91% and 21.29 %) respectively. (Table 1) obesity 3300(10.55), overweight 4697 (15.02%), Normal 20886(66.79%) thinness 1903(6.09%) and very thinness 484 (1.55%). (Table 1)

This table shows that that prevalence of obesity among high socioeconomic standard (14.1%) was higher than low and average (7.7% and 9.9%) respectively. (Table 1)

**Table (2): frequency for BMI.**

<table>
<thead>
<tr>
<th>BMI</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>very thinness</td>
<td>484</td>
<td>1.55</td>
</tr>
<tr>
<td>Thinness</td>
<td>1903</td>
<td>6.09</td>
</tr>
<tr>
<td>Normal</td>
<td>20886</td>
<td>66.79</td>
</tr>
<tr>
<td>over weight</td>
<td>4697</td>
<td>15.02</td>
</tr>
<tr>
<td>Obese</td>
<td>3300</td>
<td>10.55</td>
</tr>
<tr>
<td>Total</td>
<td>31270</td>
<td>100.0</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>18.55 ±4.3</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>6.1–47</td>
<td></td>
</tr>
</tbody>
</table>

This table shows that that prevalence of obesity among male individual (14.2%) was higher than in female individual (6.7%) (Table 6)

This table shows that prevalence of obesity among urban individual (15.5%) was higher than in rural individual (6.8%). (Table 4)

This table shows that prevalence of obesity among 8- 9 y (15.90%) was higher than 6-7 y was9.4%. (Table 6)
Table (3): Distribution of the studied groups by socioeconomic and Z-score for BMI (N=31270)

<table>
<thead>
<tr>
<th>Socioeconomic</th>
<th>.</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>very thinness</td>
</tr>
<tr>
<td>Low</td>
<td>No.</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Average</td>
<td>No.</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.5%</td>
</tr>
<tr>
<td>High</td>
<td>No.</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>484</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

Chi-Square $\chi^2$ 448.42
P-value 0.00 **

** indicate P < 0.01. Chi square is significant at the 0.01 level.

This table show that the mean value of all laboratory investigation within normal range and 10% of the selected 200 cases was with higher level of LDL, 20% with higher cholesterol level, 25% with higher triglyceride level and only 15% were with low HDL. (Table 5)

Table (4): Distribution of the groups by Areas and Z-Score BMI

<table>
<thead>
<tr>
<th>Area</th>
<th>No.</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>very thinness</td>
</tr>
<tr>
<td>Rural</td>
<td>No.</td>
<td>429</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Urban</td>
<td>No.</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>484</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

Chi-Square $\chi^2$ 2014.12
P-value 0.00**
Table (5): Mean values of lipid profile among studied groups (n=200).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low</th>
<th>Normal</th>
<th>Border line</th>
<th>High</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>NO.</td>
<td>-</td>
<td>120</td>
<td>40</td>
<td>40</td>
<td>123</td>
<td>265</td>
</tr>
<tr>
<td>%</td>
<td>-</td>
<td>60</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TG</td>
<td>NO.</td>
<td>-</td>
<td>150</td>
<td>-</td>
<td>50</td>
<td>35</td>
<td>165</td>
</tr>
<tr>
<td>%</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDL</td>
<td>NO.</td>
<td>30</td>
<td>170</td>
<td>-</td>
<td>-</td>
<td>31</td>
<td>79</td>
</tr>
<tr>
<td>%</td>
<td>15</td>
<td>85</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>NO.</td>
<td>-</td>
<td>160</td>
<td>20</td>
<td>20</td>
<td>34</td>
<td>156</td>
</tr>
<tr>
<td>%</td>
<td>-</td>
<td>80</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (6): Distribution by age groups for BMI.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Z-score BMI</th>
<th>very thinness</th>
<th>thinness</th>
<th>Normal</th>
<th>over weight</th>
<th>Obese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-7 y</td>
<td>No.</td>
<td>150</td>
<td>180</td>
<td>6947</td>
<td>1300</td>
<td>890</td>
<td>9467</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.6%</td>
<td>1.9%</td>
<td>73.4%</td>
<td>13.7%</td>
<td>9.4%</td>
<td>100%</td>
</tr>
<tr>
<td>7-8 y</td>
<td>No.</td>
<td>80</td>
<td>530</td>
<td>4519</td>
<td>1001</td>
<td>650</td>
<td>6780</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.2%</td>
<td>7.8%</td>
<td>66.7%</td>
<td>14.8%</td>
<td>9.6%</td>
<td>100%</td>
</tr>
<tr>
<td>8-9 y</td>
<td>No.</td>
<td>110</td>
<td>460</td>
<td>3346</td>
<td>820</td>
<td>895</td>
<td>5631</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>2.0%</td>
<td>8.2%</td>
<td>59.4%</td>
<td>14.6%</td>
<td>15.9%</td>
<td>100%</td>
</tr>
<tr>
<td>9-10 y</td>
<td>No.</td>
<td>100</td>
<td>610</td>
<td>4064</td>
<td>920</td>
<td>545</td>
<td>6239</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.6%</td>
<td>9.8%</td>
<td>65.1%</td>
<td>14.7%</td>
<td>8.7%</td>
<td>100%</td>
</tr>
<tr>
<td>10 &lt;</td>
<td>No.</td>
<td>44</td>
<td>123</td>
<td>2010</td>
<td>656</td>
<td>320</td>
<td>3153</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.4%</td>
<td>3.9%</td>
<td>63.7%</td>
<td>20.8%</td>
<td>10.1%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>484</td>
<td>1903</td>
<td>20886</td>
<td>4697</td>
<td>3300</td>
<td>31270</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>66.8%</td>
<td>15.0%</td>
<td>10.6%</td>
<td>100%</td>
</tr>
<tr>
<td>Male</td>
<td>No.</td>
<td>371</td>
<td>1095</td>
<td>9777</td>
<td>2610</td>
<td>2290</td>
<td>16143</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>2.3%</td>
<td>6.8%</td>
<td>60.6%</td>
<td>16.2%</td>
<td>14.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Female</td>
<td>No.</td>
<td>113</td>
<td>808</td>
<td>11009</td>
<td>2187</td>
<td>1010</td>
<td>15127</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0.7%</td>
<td>5.3%</td>
<td>72.8%</td>
<td>14.5%</td>
<td>6.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>No.</td>
<td>484</td>
<td>1903</td>
<td>20786</td>
<td>4797</td>
<td>3300</td>
<td>31270</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>66.5%</td>
<td>15.3%</td>
<td>10.6%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Chi-Square $\chi^2$ 755.40

P-value 0.00**
**Discussion**

Obesity has become a global problem that is not only limited to adults but also unfortunately, child and adolescent obesity has become a major public health problem.

The screening determined that 10.55% were obese according to WHO Z-Score for BMI curves for both sex.

Our study was similar to the prevalence of obesity among primary school children aged 8-10 years in Dar es Salam city, Tanzania was 9.5%.

The prevalence of obesity and over weight in our study were lower than Hispanics (18.2% boys, 15.2% girls).

Also it is lower than El shafie et al. Childhood obesity has more than tripled in the past 30 years. The prevalence of obesity among children aged 6-11 years increased from 6.5% in 1980 to 19.6% in 2008.

Our study revealed that prevalence of obesity among male children (14.2%) was higher than in female children (6.7%).

Unlike M. Alqarni shows existing trends of gender-specific and overall obesity prevalence in KSA. According to the statistics, rate of obesity is continuously increasing, Saudi women have a higher obesity rate than men; and the overall rate is projected to reach 59.5% by 2022.

We found prevalence of overweight and obesity in urban areas (21.5% and 15.5%) respectively higher than living in rural areas (10.1% and 6.8%).

This is in similarity with El- Shafie et al. this could be the dietary variation between rural and urban areas.

There was statistically significant difference obesity is higher in high socioeconomic than low and average.

An international systematic review published in 2010 examined obesity prevalence trends and reported leveling off of the obesity epidemic in recent years. leveling of obesity prevalence less apparent for more disadvantaged socioeconomic groups. However, impact of socioeconomic on obesity prevalence provided mixed results.

Our study is in agreement with the results of Janevic et al., who reported low socioeconomic status had a more detrimental effect on linear growth than on body weight.

**Conclusion and Recommendation**

The main purpose is to evaluate the prevalence of obesity among primary school age between 6 to 11 years and it was 10.55% and we determined the relation of obesity with socioeconomic standard than increase with high socioeconomic, also it more in boys and more common in urban. Finally we need more care from media and ministry of health to encourage the harm of obesity and the diseases occur secondary to Uncontrolled obesity and need special programs for obese child and a fitness programs aiming to reduce not only their weight but also decrease MS risk.

**Authors contributions**

AE devised the idea for the beginning of the research program. All authors helped in collecting the data of the manuscript and the result analysis. AE and ZO supervised the research. AE, ZO and WB greatly contributed to the manuscript revision. ZO and ESE wrote the article. All authors read and approved the final manuscript.

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**Ethical Clearance:** Cleared by the ethical committee of Pediatric Department, Faculty of Medicine, Meniuofia University, Meniuofia, Egypt

**No Conflict of Interest**

**References**


Effectiveness of acupressure Technique on Chemotherapy Induced Nausea and Vomiting among Breast Cancer Women: An Intervention Study

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Abstract

Background: Nausea and vomiting are the most common side effects associated with the usage of chemotherapy among breast cancer women. Aim of this study was to investigate the effectiveness of acupressure on chemotherapy-induced nausea and vomiting among breast cancer women. Research design: Quasi-experimental design was used to achieve the aim of the current study. Setting: The current study was conducted in outpatient oncology clinics at Zagazig University Hospitals. Subjects: Breast cancer women were divided into two groups (acupressure and control). They are on routine care and regular treatment. Tools: Interview questionnaire consists of four parts were used for data collection: Demographic characteristics and medical history, risk factors for nausea and vomiting, awareness regarding complementary therapy and the Index of Nausea, Vomiting and Retching (INVR). Results: The results showed that the mean scores of total occurrence, experience, distress for nausea, vomiting, retching in acupressure group were statistically significant decreased compared to control group throughout follow up days (p<0.05). Conclusion: Acupressure technique is positively affect nausea, vomiting and retching among breast cancer patients. Recommendation: Acupressure as technique should be carried out as supportive nursing intervention to relieve chemotherapy induced nausea and vomiting in breast cancer patients.

Keywords: Acupressure, chemotherapy-nausea-vomiting breast cancer, pharmacological techniques

Introduction

Breast cancer is the deadliest cancer amongst females in developing countries, causing about half a million total deaths each year¹. In Egypt, according to Egyptian National sponsored programs for cancer registry; breast cancer incidence increased from 18.9% to reach 38.8% in 2014².

Chemotherapy is a significant constituent of therapy for many cancers, and new anti-cancer medicines appear one of the greatest areas of pharmaceutical development³. Nausea and vomiting are the greatest be afraid side effects of cytotoxic chemotherapy and it can have a causing harm influence on the health-concerning quality of life, compromise treatment outcomes and increase healthcare resource utilization⁴.

There has been growing interest in the use of complementary and alternative medicine alongside curative and palliative treatments, use have been associated with reduced therapy related toxicity, improvement in disease related symptoms and in quality of life⁵. Acupressure is the usage of pressure or localized massage to particular sites on the body, the Nei-Guan point (P6) is known for relieving nausea and vomiting⁶.

Furthermore, research results revealed that the mean nausea, vomiting, and retching scores for patients was utilized at the P6 acupressure point were statistically considerably lower than the patients in the control

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group in breast cancer. Nurses should play key roles in helping patients to assess and manage chemotherapy-induced nausea and vomiting.

**Materials and Method**

**Design**

Quasi-experimental design was used to achieve the aim of this study.

**Setting**

The study was conducted in outpatient oncology clinics at Zagazig University Hospitals.

**Sample**

A purposive sample consisted of 56 breast cancer women undergoing chemotherapy on routine care. They were divided into two groups (study and control) using random allocation.

**Inclusion criteria**

1. Women aged 30-60 years
2. Stage of breast cancer I-III
3. Female who were starting their second or third cycle of chemotherapy
4. Receiving chemotherapeutic protocols such as Adramycin-Cyclophosphamid (AC), 5-fluouracil-Adramycin-cyclophosphamid (FAC) and 5-fluouracil-Epirubcin-cyclophosphamid (FEC)
5. Had nausea/vomiting with their previous cycle
6. Controlled diabetes and hypertension
7. Free from lymph edema in arms and bowel obstruction

**Tools for data collection**

An interview questionnaire sheet composed of four parts:

- **Part I**: Demographic characteristics and medical history
- **Part II**: Risk factors for nausea and vomiting
- **Part III**: Awareness regarding complementary therapy
- **Part IV**: Index of Nausea, Vomiting, and Retching

This index was developed by Rhodes and McDaniel [9]. Depending on a 5-point Likert-type questionnaire that consisted of eight questions. These were scored from 0 to 4 respectively, with inverse scoring for negative notifications therefore that a higher score indicates more severity of symptoms. This index assesses experience, occurrence, distress of nausea, vomiting, and retching. The scores of occurrence, distress, and experience as well as the total Rhodes score were added and expressed in means and standard deviations. The day “1” are considered as the acute symptoms while the days 2 to 7 are considered delayed symptoms.

**Pilot Study**

A pilot study was achieved on a sample of 6 women with breast cancer under treatment of chemotherapy. The person who takes part in the pilot study were excluded from the sample.

**Ethical Consideration:**

Official letters were issued from the Faculty of Nursing, Zagazig University to the Directors of the outpatient clinics. Moreover, confirmed for participation was taken verbally from each woman.

**Field work:**

The researcher started the collection of data (assessment phase) through interview with each woman individually. The researcher explained simple information regarding acupressure (definition, benefits, frequency, duration) and how to locate the P6 (Neiguan), i.e., place three middle fingers proximal to the upper wrist crease, the most distal finger will still just on the wrist crease. The p6 is located between the two central tendons by the index finger.

Patients were required to wear a wristband on both wrists continuously for seven days. The average time to complete the interview questionnaire ranged from 40-60 minutes. The effectiveness of the intervention was done through phone call using the same tool (post
intervention. They were asked to fill out the index at the same time each night through seven days. Data were collected through 11 months, starting from the beginning of September 2017 to the end of July 2018.

**Results**

Study results showed that studied groups (acupressure and control) their mean age was 46.5±9.5 and 46.6±8.5 respectively. Regarding marriage, 85.7% of acupressure group and 92.9% of control group were married.

Table (1) points to regarding occurrence of vomiting and retching were statistical significant decreased in acupressure group compared to control group post intervention through out follow up days (p<0.05). As regards the occurrence of nausea was statistical significant decreased in acupressure group compared to control group post intervention on first five days. Regarding total occurrence of nausea, vomiting and retching were statistically significant decreased in acupressure group compared to control group through out follow up days.

Table 1: Scores of occurrence of symptoms in the acupressure and control groups throughout FU days

<table>
<thead>
<tr>
<th>Days of follow-up</th>
<th>Pre test (baseline)</th>
<th>Acute NVR</th>
<th>Delayed nausea, vomiting and retching (NVR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Occurrence of nausea:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>6.5±2.3</td>
<td>2.4±2.4</td>
<td>2.8±2.5</td>
</tr>
<tr>
<td>Control</td>
<td>7.0±1.6</td>
<td>5.9±2.7</td>
<td>6.0±2.6</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.19</td>
<td>17.99</td>
<td>16.75</td>
</tr>
<tr>
<td>p-value</td>
<td>0.66</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Occurrence of vomiting:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>1.4±2.2</td>
<td>1.4±2.2</td>
<td>3.7±1.3</td>
</tr>
<tr>
<td>Control</td>
<td>4.3±3.0</td>
<td>4.1±3.0</td>
<td>4.0±1.6</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>14.10</td>
<td>12.96</td>
<td>0.42</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
<td>0.52</td>
</tr>
<tr>
<td>Occurrence of retching:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>1.4±1.1</td>
<td>0.6±1.0</td>
<td>0.6±0.9</td>
</tr>
<tr>
<td>Control</td>
<td>1.5±1.5</td>
<td>1.5±1.4</td>
<td>1.8±1.6</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.01</td>
<td>7.51</td>
<td>9.52</td>
</tr>
<tr>
<td>p-value</td>
<td>0.95</td>
<td>0.006*</td>
<td>0.002*</td>
</tr>
<tr>
<td>Total occurrence:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>11.5±3.4</td>
<td>3.7±4.0</td>
<td>4.0±3.8</td>
</tr>
<tr>
<td>Control</td>
<td>12.4±3.2</td>
<td>10.5±4.9</td>
<td>10.8±4.9</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.46</td>
<td>20.95</td>
<td>21.63</td>
</tr>
<tr>
<td>p-value</td>
<td>0.50</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

(*) Statistically significant at p<0.05
Table (2) reveals that nausea and retching distress were statistically significant decreased in acupressure group compared to control group post intervention throughout follow up days (p < 0.05). Concerning vomiting distress was statistical significant decreased in acupressure group compared to control group post intervention throughout follow up days except for sixth and seven days. Regarding total distress of nausea, vomiting and retching were statistically significant decreased in acupressure group compared to control group throughout follow up days.

Table (3) demonstrates that nausea and retching experiences were statistical significant decreased in acupressure group compared to control group post intervention throughout follow up days (p <0.05). In relation to vomiting experience was statistical significant decreased in acupressure group compared to control group post intervention on first five days. Regarding total Rhodes scores of nausea, vomiting and retching were statistically significant decreased in acupressure group compared to control group throughout follow up days

### Discussion

The current study results revealed that vomiting and retching occurrence were significantly decreased in the acupressure group compared to the control group throughout follow up days. These results might be due to compliance of breast cancer patients with wearing of the wrist bands. Similarly, in Egypt, \(^{10}\), found that there were low mean score for acupressure group rather than control group in acute and delayed vomiting, retching occurrence.

Furthermore, the current study results found that nausea occurrence was significantly decreased in acupressure group compared to control group throughout first five days. The rational of this phenomenon might be due to pressure on p6 relax stomach muscle and relieve stomach disturbance including nausea. In UK, this result was in agreement with [11], done a randomized controlled trial. They found that nausea occurred significantly less frequently in the acupressure group compared to the control across the five assessment days.

### Table 2: Scores of symptoms distress in the Acupressure and control groups throughout FU days

<table>
<thead>
<tr>
<th>Days of follow-up</th>
<th>Pre test (baseline)</th>
<th>Acute NVR</th>
<th>Delayed NVR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Nausea distress:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>3.4±1.0</td>
<td>0.9±1.2</td>
<td>1.4±1.3</td>
</tr>
<tr>
<td>Control</td>
<td>3.4±1.0</td>
<td>2.8±1.4</td>
<td>2.8±1.4</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.04</td>
<td>20.72</td>
<td>12.28</td>
</tr>
<tr>
<td>p-value</td>
<td>0.84</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Vomiting distress:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>2.8±1.1</td>
<td>0.3±0.8</td>
<td>0.5±1.1</td>
</tr>
<tr>
<td>Control</td>
<td>2.9±1.2</td>
<td>2.2±1.8</td>
<td>2.3±1.7</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.11</td>
<td>18.22</td>
<td>14.96</td>
</tr>
<tr>
<td>p-value</td>
<td>0.74</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Retching distress:</td>
<td></td>
<td></td>
<td></td>
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</table>

---
Cont.... Table 2: Scores of symptoms distress in the Acupressure and control groups throughout FU days

<table>
<thead>
<tr>
<th></th>
<th>Pre test (baseline)</th>
<th>Acute NVR</th>
<th>Delayed NVR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Experience of vomiting:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>6.5±2.1</td>
<td>1.0±2.5</td>
<td>1.2±2.3</td>
</tr>
<tr>
<td>Control</td>
<td>6.9±2.5</td>
<td>5.2±4.2</td>
<td>5.3±4.2</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.33</td>
<td>15.15</td>
<td>15.47</td>
</tr>
<tr>
<td>p-value</td>
<td>0.57</td>
<td>&lt;0.001*</td>
<td>0.005*</td>
</tr>
<tr>
<td>Experience of nausea:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>9.9±3.2</td>
<td>3.3±3.3</td>
<td>4.2±3.8</td>
</tr>
<tr>
<td>Control</td>
<td>10.3±2.3</td>
<td>8.7±4.0</td>
<td>8.8±3.9</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.06</td>
<td>20.43</td>
<td>16.08</td>
</tr>
<tr>
<td>p-value</td>
<td>0.80</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Experience of retching:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>3.6±2.7</td>
<td>1.2±1.9</td>
<td>1.1±1.9</td>
</tr>
<tr>
<td>Control</td>
<td>3.4±2.2</td>
<td>3.5±2.7</td>
<td>4.0±3.0</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.04</td>
<td>10.70</td>
<td>12.46</td>
</tr>
<tr>
<td>p-value</td>
<td>0.83</td>
<td>0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Total Rhodes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>20.0±6.1</td>
<td>5.5±6.2</td>
<td>6.5±6.4</td>
</tr>
<tr>
<td>Control</td>
<td>20.6±5.9</td>
<td>17.4±8.5</td>
<td>18.1±8.3</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.05</td>
<td>21.60</td>
<td>21.44</td>
</tr>
<tr>
<td>p-value</td>
<td>0.82</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

Table 3: Scores of symptoms experience in the Acupressure and control groups throughout FU days

<table>
<thead>
<tr>
<th></th>
<th>Experience of vomiting:</th>
<th>Experience of nausea:</th>
<th>Experience of retching:</th>
<th>Total Rhodes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
</tr>
<tr>
<td>Experience of vomiting:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>6.5±2.1</td>
<td>1.0±2.5</td>
<td>1.2±2.3</td>
<td>1.1±1.9</td>
</tr>
<tr>
<td>Control</td>
<td>6.9±2.5</td>
<td>5.2±4.2</td>
<td>5.3±4.2</td>
<td>4.1±4.2</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.33</td>
<td>15.15</td>
<td>15.47</td>
<td>8.06</td>
</tr>
<tr>
<td>p-value</td>
<td>0.57</td>
<td>&lt;0.001*</td>
<td>0.005*</td>
<td>0.006*</td>
</tr>
<tr>
<td>Experience of nausea:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>9.9±3.2</td>
<td>3.3±3.3</td>
<td>4.2±3.8</td>
<td>4.0±3.7</td>
</tr>
<tr>
<td>Control</td>
<td>10.3±2.3</td>
<td>8.7±4.0</td>
<td>8.8±3.9</td>
<td>9.3±3.2</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.06</td>
<td>20.43</td>
<td>16.08</td>
<td>22.94</td>
</tr>
<tr>
<td>p-value</td>
<td>0.80</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Experience of retching:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>3.6±2.7</td>
<td>1.2±1.9</td>
<td>1.1±1.9</td>
<td>1.3±1.9</td>
</tr>
<tr>
<td>Control</td>
<td>3.4±2.2</td>
<td>3.5±2.7</td>
<td>4.0±3.0</td>
<td>4.3±2.5</td>
</tr>
<tr>
<td>Mann-Whitney test</td>
<td>0.04</td>
<td>10.70</td>
<td>12.46</td>
<td>16.39</td>
</tr>
<tr>
<td>p-value</td>
<td>0.83</td>
<td>0.001*</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Total Rhodes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td>20.0±6.1</td>
<td>5.5±6.2</td>
<td>6.5±6.4</td>
<td>6.4±5.5</td>
</tr>
<tr>
<td>Control</td>
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<td>18.1±8.3</td>
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<tr>
<td>Mann-Whitney test</td>
<td>0.05</td>
<td>21.60</td>
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</tr>
<tr>
<td>p-value</td>
<td>0.82</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>
Regarding symptoms distress, the current study results showed that nausea and retching distress were significantly decreased in acupressure group compared to control group throughout follow up days. This reflected feelings of breast cancer women with support and interest which lead to improving psychological status. In turkey, this finding is on the same line with 7. Who found that the average scores for patients in the experimental group in terms of the distress may be caused by nausea and retching were decreased than with patients in the control group.

In addition to study results found that vomiting distress was significantly decreased in acupressure group compared to control group throughout follow up days. This finding was supported by12 who carried out a study in Egypt and found that the mean score of vomiting distress in study group using acupressure were decreased compared to control group.

Considering symptoms experience, the current study results revealed that nausea and retching experiences were significantly decreased in acupressure group compared to control group throughout follow up days. The explanation of these results might be reflect the feasibility of acupressure technique. Similarly, [13] in Mani pal found that nausea experience was significantly lower in the acupressure group than the control group.

On the same way, in UK,14 found that nausea levels in the proportion of patients using wristbands were lower than those in the proportion of patients using antiemetics-only group.

Moreover, study results revealed that vomiting experience was significantly decreased in acupressure group compared to control group throughout first five days. The rational of this result might be due to non pharmacological with pharmacological treatment double positive effect on decreasing chemotherapy induced nausea and vomiting. The previous finding was supported by study carried out by 15 in Coimbatore, found that significant values between acupressure and control group regarding level of vomiting using standardized rhodes index of nausea and vomiting across the five assessment days.

Regarding total occurrence, experience and distress of nausea, vomiting and retching. The current study revealed that the mean scores of total rhodes for nausea, vomiting, and retching experiences were significantly decreased compared to control group. These findings might be attributed to the acupressure P6 wrist band when applied to point P6 is effective, safe, convenient, cost effective, and provides an easy, self-administrated, that can be used to reduce chemotherapy induced nausea and vomiting. in congruent, researches conducted in Turkey by 7, in Egypt by 10, and in Uk by 11 where it was determined that the mean scores of total rhodes for nausea, vomiting, and retching for patients to whom acupressure was applied at the P6 was statistically significantly decreased than the scores of patients in the control group.

On the contrary, study carried out by 16 at Istanbul University Institute of oncology found that nausea, vomiting and retching experiences of the patients before utilizing a placebo and a real acupressure were identical and similar alterations had been showed 5 days after the therapy. It has been determined that there was no variation among the groups statistically. This might be attributed to different sample size, diagnosis and type of protocol of treatment.

Conclusion

The mean scores of total occurrence, experience, distress for nausea, vomiting, retching in acupressure group were statistically significant decreased compared to control group.

Recommendations

1- Acupressure as non-pharmacological method should be achieved as supportive nursing intervention to alleviate chemotherapy-induced nausea and vomiting in breast cancer patients.

2- Further studies should be achieved on a large scale with a randomized control design.

Funding: Self-funding

Ethical Clearance: Cleared by the ethical committee of Community Health Nursing Department, Faculty of Nursing, Zagazig University, Egypt

No Conflict of Interest

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Correlation Between Trapezius Trigger Points and Head/Neck Posture In Subjects With Frozen Shoulder

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Abstract

Objective: To find out correlation between head/neck posture and trigger points in upper trapezius muscle in frozen shoulder subjects.

Method: A total of 48 subjects (28 females and 20 males) between the age group 40-60 years with stage 2 of frozen shoulder were selected for the assessment of head/neck posture and trigger points in upper trapezius. Outcome assessment for head/neck posture included cranial vertical angle (CVA), cranial rotation angle (CRA); upper trapezius trigger points were explored through palpation. Both the readings were compared and analysed by Pearson correlation test using SPSS (version 20).

Result: Poor correlation between CVA and upper trapezius trigger points-(r=0.1647) whereas correlation between CRA and trigger points in upper trapezius-(r=-0.0972) in subjects with frozen shoulder which was statistically insignificant.

Conclusion: There is weak influence of head/neck posture and trigger points in upper trapezius. i.e. there is no greater/smaller deviational change in the forward head posture (FHP) in association with trigger points in upper trapezius in frozen shoulder subjects.

Keywords: Cranial vertical angle, cranial rotation angle, head/neck posture, trigger points.

Introduction

Frozen shoulder is a common shoulder joint condition characterized as painful, limited active as well as passive joint range of motion (ROM) of the shoulder. It is found in 2-5% of the general population and 10-15% of the diabetic population. Occurrence of Frozen shoulder is most commonly seen in females than in males, affecting the age group between 40-60 years.

The exact aetiology of Frozen Shoulder is unknown. However, it is an inflammatory contracture of the glenohumeral joint capsule resulting in pain, stiffness at shoulder joint. Capsular adhesions limit glenohumeral movements, dominating compensatory abnormal scapular movements like excess elevation, increased upward rotation of scapula during arm elevation. Weakness of glenohumeral external rotator muscles concerning with upper trapezius (UT) muscle overload result in pain, forming Myofascial trigger points (MTrPs) in UT. According to the line of muscle action and axis of scapular motion, the UT elevates and rotates scapulae and lower trapezius maintains horizontal and vertical equilibrium of scapulae. Thus, scapular motion is altered by imbalanced force production of upper and lower trapeziusthereby activating UT with increased superior translation of scapulae.

Abnormal motions of the scapula are in line with muscle imbalances inducing weakness of one muscle group and tightness of other leading to musculotendinous, ligamentous changes gradually resulting in symptomatic
pain, stiffness. Thus, altered muscle tension in and around the neck and shoulder muscles changes the neck posture. Forward head posture (FHP) results in postural abnormalities of the neck wherein the head/neck rest anteriorly to vertical line of body’s centre of gravity (COG). In FHP, weight of the head supported by neck is increased, flexion/extension of which exerts pressure on the surrounding muscles, joints of cervical vertebra.

Correct alignment of the vertebra of the cervical spine is related to muscle contraction. UT can alter the motion of cervical spine. FHP alters the scapular kinematics, kinetics by increasing the load on posterior cervical structures. Corresponding to UT overload, imbalanced scapular upward rotators have an impact on UT pain, MTrPs. FHP can induce problems related to muscle proprioception, like mechanoreceptors, spindle sensitivity alteration of neck muscles, loss of kinaesthetic acuity of neck movements. UT, serratus anterior being the primary stabilizers of scapula regulate force to control scapular motions. Activation of stabilizing muscles is altered due to abnormal orientation of the scapula. Increased activity of upper and lower trapezius is seen in FHP. Altered scapular alignment and FHP may contribute to shoulder pain, affecting UT with MTrPs and pain. MTrPs limit ROM exhibiting specific referred pain patterns on palpation also are associated with pain production, altered motor function. Among the postural muscles, UT is mostly affected with MTrPs.

Various method, tools are available to assess MTrPs including Pressure Pain threshold (PPT) with Algometer, instrument assisted soft tissue techniques, soft tissue Palpation. Looking at cost effectiveness and clinical feasibility; identification of MTrPs on palpation is a reliable method. With flat palpation, taut band is located, on compression of hyperirritable spot for a few seconds MTrPs are explored.

Assessment of FHP can be done with: Cervical Range of Motion Instrument (CROM), Photogrammetric method, Radiographs. One of the easily accessible method is Photogrammetric method: CVA [ICC-(intrarater)0.984, (interrater)0.983] measured on photographs captured in lateral view. The lesservalue of CVA,CRA greater is FHP. Availability of easily accessible method, tools is necessary for evaluation of FHP which can be done using various system softwares like Body style Analyzer, MB Ruler [intrarater (ICC>0.972); Test-retest(ICC=0.774)], Kinovea [ICC-(intrarater) 0.95 to 0.98;(interrater) 0.98 to 0.99] etc.

Previous studies show higher UT electromyographic activity during six different testing positions in Frozen shoulder contributing altered scapular movement, muscle imbalances limiting glenohumeral movements. This study aims at determining head/neck posture, presence/absence of trigger points in UT among frozen shoulder subjects, so as to aid them in attaining proper cervical spine posture, inactivating trigger points thereby achieving correct muscle balance.

Materials and Method

Study design-cross-sectional study, sample size-48 subjects, Study Place-KIMS Hospital Karad, Study duration-3months, Sampling method-consecutive sampling.

Inclusion Criteria: 1) Unilateral Frozen Shoulder, 2) stage 2 Frozen shoulder, 3) Male, female subjects, 4) Age group between 40-60 years of age

Exclusion Criteria: 1) Patients injected with corticosteroids, 2) fractures, dislocations of the shoulder, 3) undergone surgery of shoulder in past 3 years, 4) blockade/infiltration for last six months, 5) cervical pathologies like spondylolisthesis, facet osteoarthritis, disc herniation, stenosis.

Outcome measures: The outcomes were assessed by measuring CVA, CRA using photographic method. Adhesive markers were placed at Tragus of the ear, Canthus of eye, C7 spinous process. Self-balance posture was achieved by having the subject perform maximum cervical flexion/extension and gradually reducing it to place the head in comfortable position. The subjects were photographed in lateral view using SONY GX30 (digital camera). The distance between the camera and measurer was set 1.5m. CVA was measured by drawing a horizontal line passing through C7 parallel to the ground and a line passing through C7 and tragus of the ear. CRA was measured by line connecting C7 with tragus of the ear and line connecting tragus of the ear with lateral canthus of eye. Angles were measured on the digital photographs using Kinovea computer program.
UT Trigger points were explored through palpation. Having the subject in supine lying on the couch, examiner standing superiorly to the subject taut band was located with flat palpation using thumb. Palpation was perpendicular to muscle fibre orientation from medial third of superior nuchal lines, external occipital protuberance to lateral border of clavicle. Also, trigger points were palpated at spinous process C5-C6 approximately halfway between spinous process and acromion, hyperirritable spot was located using pincer grasp. The entire free margin of UT was lifted off underlying supraspinatus and apex of the lung after which muscle was rolled between the thumb and fingers to locate hyperirritable spot along length of the muscle. On compression of hyperirritable spot for 10 seconds presence/absence of trigger points was noted.7

Materials used—Camera (Sony Lens G30X), Laptop, Inch Tape, Adhesive Markers, Watch.

Ethical clearance was obtained from Institutional Ethical Committee KIMSDU. Demographic data was collected, explaining procedure to subjects. Each one was assessed for trigger points through palpation in supine lying and head/neck posture-CVA, CRA were assessed. Data was recorded, analysed in accordance to distribution of age, gender, diabetes, affected side, pain during assessment, association between CVA-trigger points and CRA-trigger points.

Results

1. Affected Side Distribution

Table No. 1: Affected side distribution.

<table>
<thead>
<tr>
<th>Side</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>22</td>
<td>45.8</td>
</tr>
<tr>
<td>Right</td>
<td>26</td>
<td>54.2</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

2. Diabetes Distribution

Table No. 2: Diabetes distribution.

<table>
<thead>
<tr>
<th>Diabetes</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>31</td>
<td>64.6</td>
</tr>
<tr>
<td>Present</td>
<td>17</td>
<td>35.4</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

3. Trigger Points Distribution

Table No. 3: Trigger points distribution.

<table>
<thead>
<tr>
<th>Trigger Points</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>42</td>
<td>87.5%</td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
<td>12.5%</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

4. Pain During Assessment

Table No. 4: Pain distribution during assessment.

<table>
<thead>
<tr>
<th>Pain during assessment</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>36</td>
<td>75.0</td>
</tr>
<tr>
<td>Present</td>
<td>12</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>
5. Mean and Standard Deviation of CVA, CRA.

Table No. 5: Mean and standard deviation of CVA, CRA.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Angles in degrees</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CVA</td>
<td>45±6.067</td>
</tr>
<tr>
<td>2.</td>
<td>CRA</td>
<td>158.41±7.296</td>
</tr>
</tbody>
</table>

6. Pearson Correlation Coefficient (R)

Table No. 6: Pearson correlation coefficient.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>r</th>
<th>r² square</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0.1647</td>
<td>0.0271</td>
<td>0.232</td>
<td>NS (Not significant)</td>
</tr>
<tr>
<td>2.</td>
<td>-0.0972</td>
<td>0.0094</td>
<td>0.5108</td>
<td>NS</td>
</tr>
</tbody>
</table>

Association was determined using Pearson correlation coefficient (r). Correlations were considered weak when r<0.3, moderate 0.3<r<0.7 and strong when r>0.7. The statistical analysis was conducted at 95% confidence level wherein, p<0.05 was considered statistically insignificant.

Discussion

Among the 48 subjects, UT trigger points were present in 6 subjects and absent in 42 subjects. The mean degrees of CVA was (mean±SD) 45°±6.067 and CRA was 158°±7.296.

Antony Paul suggests that frozen shoulder commonly affects females, accordingly your sample includes 28 females and 20 males. Frozen shoulder commonly affects individuals in fourth to sixth decade of life, as in, our sample includes 10 frozen shoulder subjects between the age group 41-50 years and 38 frozen shoulder subjects between the age group 51-60 years (55.75±5.302).

Study includes 17 individuals with diabetes and 31 individuals without diabetes. Conversely, literature suggests that individuals with diabetes are more commonly affected with frozen shoulder. As this study was conducted in a limited geographical area, results could not be generalized with a smaller sample size.

This study shows 36 subjects had no pain during assessment and 12 subjects experienced pain during the assessment. Our study shows 42 subjects with no trigger points and 6 subjects with presence of trigger points. Whereas, Ferracini GN suggests presence of active and latent trigger points in various neck and shoulder muscles like Suboccipital, sternocleidomastoid, temporal, UT in subjects with migraine. In our study we found less number of subjects with UT trigger points as they were undergoing treatment limiting the generalizability of findings.

Altered patterns of muscle action, muscle imbalances leads to altered movement patterns of the head and shoulder muscles in individuals who use computers, smartphones for a prolonged duration. A study conducted on Predictors of UT pain and MTrPs in food service workers reviewed that, various factors like strength, posture, mobility and psychological factors are linked with UT pain and MTrPs in food service workers. In our study only 6 subjects were found to have trigger points in UT, as subjects were not differentiated according to the occupation, strength, mobility were not considered.

This study showed mean CVA as (45±6.067). A Study conducted on FHP angle in healthier older females suggested no significant correlation between FHP angle in relation to old age. The study showed mean CVA as (46.41±5.32). The mean value of CVA in our study is smaller as we had included both male, female samples in the study with varying duration of stage 2 frozen shoulder.

In this study CRA mean was 158.41±7.296, whereas a study conducted on three-dimensional analysis of motion reported average ROM in cervical spine across all age groups-total rotation (Mean 144°SD-23°) with wide variation in all age groups. However, discrepancies between studies suggest that above study was conducted among all age groups whereas, in current study we included frozen shoulder pathology between the age group 40-60 years and subjects were not having a specific angle range that can be identified as FHP.

In our study, mean CVA, CRA values are 45±6.067 and 158±7.296 respectively. Astudy conducted on the Effects of cervical Mobilization Combined with Thoracic Mobilization on FHP of neck pain patients suggested improvements in CVA, CRA on giving combination of cervical mobilization and thoracic mobilization. The mean values of CVA were 46.6±3.3 and 48.9±3.1 before and after respectively whereas, the mean values of CRA were 155.3±3.1 and 152.6±3.1 before and after respectively. In our study, mean values
of CVA, CRA are found to have wide range of difference as the study was cross-sectional, postural changes were considered secondary to frozen shoulder and subjects were undergoing treatment i.e. not freshly diagnosed with frozen shoulder.

Present study shows weak correlation between head/neck posture and UT trigger points. Correlation between CVA and trigger points was \( r = 0.1647 \); CRA and trigger points was \( r = -0.097 \) which was statistically insignificant. We found certain restraints in determining the association between UT trigger points with CVA and CRA as the subjects were not found to have a certain range of angle of FHP and due to lack of clinically accessible tools for exploring trigger points.

The limitation of this study was that other factors like psychological status, lumbar spine curvature, alignment of lower limb and postural measures like head tilt angle, head position angle, forward shoulder angle were not considered. Lack of gold standard assessment tool for identification of trigger points was another limitation of the study. Furthermore research is required to identify the correlation between head/neck posture and trapezius trigger points considering other variables like strength, mobility, neck pain, lower limb alignment, psychological status, occupation of subjects in order to prevent postural abnormalities, functional disabilities, improve cervical spine alignment and stability.

**Conclusion**

On the basis of results of our study, we conclude that correlation between CVA and UT trigger points was weak \((0.1647)\) whereas no correlation was found between CRA and UT trigger points \((-0.0072)\).

**Conflict of Interest:** The authors declare that there are no conflicts of interest concerning the content of present study.

**Source of Funding:** This study is self-funded study.

**References**


Dominant Factors of Central Obesity in Hypertensive Patients

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Abstract

Background: Central obesity, which has increased in hypertensive patients over the past ten years, is a risk factor for long term complications such as type 2 diabetes, cancer and cardiovascular diseases. These diseases have health consequences ranging from increasing risk of early death to severe chronic conditions reducing the quality of life. When a person becomes overweight or obese at a young age, the incidence and severity of long-term complications due to obesity also increases significantly.

Objectives: This cross-sectional research study identifies the difference between sleep quality and other factors of central obesity in hypertensive patients. The study sample included hypertensive patients studied at the Puskesmas Tegal Gundil.

Material and Method: We recruited 92 hypertensive patients from Puskesmas Tegal Gundil, North Bogor District. Data were collected in 2017. The Global Physical Activity Questionnaire was used to assess physical and sedentary activity. Sleep quality and duration were assessed using Pittsburgh Sleep Quality Index. Energy, carbohydrate, protein, fat and dietary fiber intake are analyzed with the semi-quantitative food frequency questionnaire and Nutrisurvey software.

Result: The frequency of central obesity in our sample was 82.6\%, and there were significant relationships between central obesity and sleep quality, energy and carbohydrate intake.

Conclusion: A dietary approach to stop hypertension for Indonesians (DASHI) should be socialized for hypertensive patients.

Keywords: Central obesity, dietary intake, hypertensive patients, sleep quality.

Introduction

Obesity cases around the world have nearly tripled since 1975.\textsuperscript{1} When a person becomes overweight or obese at a young age, the incidence and severity of long-term complications due to obesity also increases significantly. The most common complications of obesity include type 2 diabetes mellitus, cancer, and cardiovascular diseases, including hypertension and stroke.\textsuperscript{2} Obesity is also closely related to metabolic syndrome, a collection of risk factors for dangerous heart attacks. According to the International Diabetes Federation (IDF) these risk factors include diabetes, increased fasting glucose, central obesity, high cholesterol and high blood pressure.\textsuperscript{3} These diseases have health consequences ranging from increasing risk of early death to severe chronic conditions reducing the quality of life.\textsuperscript{4}

Lack of physical activity is associated with obesity because imbalanced food intake and energy expenditure will result in accumulation of body fat.\textsuperscript{5} The main causes of being overweight and obesity is an energy imbalance between calories consumed and calories expended.\textsuperscript{1} Sedentary activities, such as watching television, contribute to an increased prevalence of obesity. Research in the UK with adult respondents demonstrated that longer durations of watching television are related to increased incidences of central obesity. Respondents who watch television \textgreater;6 h per day had a significant relationship tended to
be more obese compared to respondents who watched television for <2 h per day.  

The quality and duration of sleep are also associated with the incidence of obesity. Poor sleep patterns, including sleep deprivation and poor sleep quality, have an impact on hormone regulation processes, which can increase the risk of obesity. Theorell-Haglow’s study of Swedish women aged 20 years or more found that women with a sleep duration >10 h per day had a greater waist circumference than women who slept <8. The study also found that sleep-deprived respondents had greater waist circumferences than those who had enough sleep. Respondents with long or short sleep duration generally lacked physical activity, were smokers, were sick or were undergoing treatment and experienced psychological stress.

Central obesity is also associated with hypertension. Owalabi et al. found that central obesity was significantly related to the incidence of hypertension. In this study, 490 of 998 respondents (49%) were hypertensive patients. Of these, 74.1% of the hypertensive patients had central obesity. Our study aims to determine differences in sleep quality, sleep duration, physical activity, sedentary activity, energy intake, carbohydrate, protein, fat and central obesity fibre in hypertensive patients at the Tegal Gundil Public Health Center (Puskesmas) North Bogor District in 2017.

Method

This is cross-sectional, quantitative research. Physical activity assessed is at work, travel to and from places and sedentary activities. Sedentary activities in this study include sitting or reclining at work, at home, getting to and from places, time spent sitting at a desk, sitting with friends, travelling in a car, bus, or train, reading, playing cards, or watching television. Study of dietary intake included the intake of energy, carbohydrates, protein, fat and dietary fiber.

The study was conducted in the working area of Puskesmas Tegal Gundil, North Bogor District, Bogor City in May, July and September 2017. The study sample included hypertensive patients studied at the Puskesmas Tegal Gundil. The inclusion criteria of this study were: hypertensive patients aged 30–65 years registered as participants in the Program Penanggulangan Penyakit Kronis (Prolanis) or Chronic Disease Program and Pos Pelayanan Terpadu (Posbindu) or an integrated health service programme.

The instruments used in this study include the following. A plastic measuring tape with 0.1 cm accuracy, used to measure waist circumference (categorized as central obesity is ≥ 90 cm in men and ≥ 80 cm in women). A physical activity questionnaire taken from the Global Physical Activity Questionnaire, version 2, which assessed overall physical activity and sedentary activity or leisure activities. The sleep quality questionnaire was taken from the Pittsburgh Sleep Quality Index (PSQI) and was used to assess sleep quality with seven components; subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping pills and daytime dysfunction. A semi-quantitative food frequency questionnaire was used to determine the dietary intake of respondents during the prior month and calculated using Nutrisurvey 2007 software. Data analysis included univariate and bivariate analyses performed using statistical analysis applications. Bivariate analysis was performed using independent samples T-test and Mann–Whitney U.

Results

We studied 92 total hypertensive patients. Most hypertensive patients were classified as centrally obese (Table 1).

Hypertensive patient characteristics, including age, waist circumference, physical activity and sedentary activity, as well as sleep quality and duration and dietary intake (energy, carbohydrates, protein, fat and fibre intake), are presented in Table 2. The univariate analysis results indicate that the average age of respondents was 51.6 ± 8.4 years. The mean waist circumference was 91.23 ± 12.68 cm. Based on waist circumference measurements, 82.6% of respondents had central obesity (Table 2). Physical activity is calculated in MET-mins/week with a mean of 2583.7 ± 3325.12 MET-min/week. Meanwhile, mean sedentary activity was 350.92 ± 219.84 min/day. Sleep quality score has a mean of 5.86 ± 2.58.

The average sleep duration of the respondents was 6.48 ± 1.32 h. The average energy intake was 1573 ± 596 kcal. The average carbohydrate intake was 210.5 ± 77.8 grams. The mean protein and fat intake were 56.8 ± 29.8 grams and 57.0 ± 32.4 grams, respectively. The respondents’ fibre intake was 10.7 ± 5.5 grams.

The carbohydrate intake, energy intake and sleep quality have significant differences with central obesity.
The mean physical activity score in the group with central obesity was smaller compared to the non-central obesity group. The mean sleep quality score was greater in the central obesity group. Energy and carbohydrate intake is found to be greater in non-central obesity groups.

**Discussion**

The results showed that 82.6% of our hypertensive patients had central obesity, which is is alarmingly higher than the national obesity rate of 26.6%. Also, more women had central obesity (82.7%) than men (81.8%). This study is in line with a central obesity study in diabetics conducted in the Jatinegara Health Center, East Jakarta, which found a greater proportion of central obesity in diabetic women (82.7%) than men (72.7%).

In the current study, the group with central obesity had a lower physical activity score than the other group. There is a stigma of obese individuals who tend to be lazy, but excessive adiposity can limit joint and muscle movement and cause pain. This condition makes it more difficult for obese individuals to move. In addition, a disruption of dopamine signalling that controls body movement contributes to physical inactivity in obese individuals. The disruption of dopamine signalling can be caused by continuous exposure to an obesogenic diet (high-fat food) which interferes with dopamine synthesis.

The sedentary activity of the central obesity group was lower than the non-central obesity group. This finding is in contrast with previous research which has found a significant relationship between central obesity and sedentary activity since a higher waist circumference was associated with greater sedentary activity.

The PSQI questionnaire assesses sleep quality based on several components, such as sleep efficiency, sleep latency and sleep disturbances. In the sleep disturbance component, there are questions about possible sleep problems, such as not being able to fall asleep in 30 min, feeling too hot, feeling too cold, having a bad dream and unable to breathe comfortably. Respondents who experienced this sleep disorder had higher PSQI scores. In our study, 57.6% of respondents awoke at midnight ≥ 3 times/week. In addition, 9.8% of respondents had difficulty breathing comfortably 1–2 times/week and 4.3% experienced breathing difficulty ≥ 3 times/week. Sleep disorders such as obstructive sleep apnoea (which is the narrowing of the upper airway due to obstruction by the throat muscles that relax) are associated with hypertension and obesity.

The mean sleep duration in the central obesity group was not significantly lower than the non-central obesity group. In another study, sleep duration was not different in central obesity because short sleep duration decreased with age.

Various other studies propose that the main cause of central obesity is an energy imbalance. If the energy intake is more than the energy expenditure, energy will be stored in the form of triglycerides, which are mainly found in adipose tissue. In our study, energy and carbohydrate intake were significantly different between obese and non-obese groups, but the results were contradictory; the non-obese group had higher energy carbohydrate intake. The higher average energy and carbohydrate intake found in the non-central obesity group is consistent with Nuraini’s study. All respondents were Prolanis participants, so it was likely that they had been exposed to the dietary approach to stop hypertension for Indonesians (DASH); thus it is likely that the diet caused the central obesity group to have lower energy and carbohydrate intake.

Protein quality has an inverse relationship with abdominal fat. The quality of protein is defined as the ratio of essential amino acids to the protein consumed in grams. Approximately 10 grams of essential amino acids in one meal can stimulate maximum protein synthesis. If consumption of essential amino acids is below that level, there are no other anabolic responses. Protein consumed by respondents in this study most likely did not reach the recommended protein quality (essential amino acids in protein consumed <10 grams for each meal), so protein intake did not contribute to the occurrence of central obesity. A higher protein intake was found in the non-central obesity group. A study of fat intake and obesity shows that fat intake in the range of 18–40% of total energy has a small impact on body fat. In our study, protein and fat intake was found to be higher in the non-central obesity group, in line with energy and carbohydrate intake.

The mean fiber intake was not significantly different between groups; this finding is consistent with previous research which found that fiber intake was not related to obesity. This is because the average fiber intake is relatively low (14.7 grams/day) and contributes a small amount to daily calorie intake. In our study, greater fiber intake is in line with high energy and carbohydrate intake, and not from consumption of high-fiber foods.
Table 1: Distribution of frequency of respondents based on the central obesity category

<table>
<thead>
<tr>
<th>Central Obesity Categories</th>
<th>Total (n=92)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Obesity</td>
<td>76</td>
<td>82.6%</td>
</tr>
<tr>
<td>Non-central obesity</td>
<td>16</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

Table 2: Distribution of respondents with hypertension according to individual and dietary intake characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unit</th>
<th>Mean ± SD</th>
<th>Median</th>
<th>Min-Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>year</td>
<td>51.63 ± 8.36</td>
<td>52.5</td>
<td>32–64</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>cm</td>
<td>91.23 ± 12.68</td>
<td>91.57</td>
<td>62.45–127</td>
</tr>
<tr>
<td>Physical activity</td>
<td>MET-min/week</td>
<td>2583.7 ± 3325.12</td>
<td>1680</td>
<td>40–18480</td>
</tr>
<tr>
<td>Sedentary activity</td>
<td>Min/day</td>
<td>350.92 ± 219.84</td>
<td>292.5</td>
<td>30–1080</td>
</tr>
<tr>
<td>Sleep quality score</td>
<td></td>
<td>5.86 ± 2.58</td>
<td>5.00</td>
<td>0–13</td>
</tr>
<tr>
<td>Sleep duration</td>
<td>hour</td>
<td>6.48 ± 1.32</td>
<td>6.58</td>
<td>3–9.3</td>
</tr>
<tr>
<td><strong>Dietary intake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>Cal</td>
<td>1573.26 ± 595.5</td>
<td>1532.39</td>
<td>608.3–3537</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>gram</td>
<td>210.5 ± 77.81</td>
<td>206</td>
<td>56.3–390.1</td>
</tr>
<tr>
<td>Protein</td>
<td>gram</td>
<td>56.84 ± 29.78</td>
<td>48.81</td>
<td>12–177</td>
</tr>
<tr>
<td>Fat</td>
<td>gram</td>
<td>56.99 ± 32.38</td>
<td>47.8</td>
<td>16.4–203.8</td>
</tr>
<tr>
<td>Fibre</td>
<td>gram</td>
<td>10.73 ± 5.53</td>
<td>9.90</td>
<td>1.7–29.8</td>
</tr>
</tbody>
</table>

Table 3: Differences in characteristics of respondents and intake of nutritional substances with central obesity in hypertension patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Central Obesity</th>
<th>Non-central obesity</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Physical activity (MET-min/week)</td>
<td>2154.74</td>
<td>2496.53</td>
<td>4621.25</td>
</tr>
<tr>
<td>Sedentary activity (min/day)</td>
<td>344.47</td>
<td>206.1</td>
<td>381.56</td>
</tr>
<tr>
<td>Sleep quality</td>
<td>6.09</td>
<td>2.60</td>
<td>4.88</td>
</tr>
<tr>
<td>Sleep duration (h)</td>
<td>6.487</td>
<td>1.22</td>
<td>6.495</td>
</tr>
<tr>
<td>Energy intake (kcal)</td>
<td>1531.54</td>
<td>601.6</td>
<td>1771.44</td>
</tr>
<tr>
<td>Carbohydrate intake (gram)</td>
<td>202.61</td>
<td>76.01</td>
<td>248.07</td>
</tr>
<tr>
<td>Protein intake (gram)</td>
<td>55.76</td>
<td>30.03</td>
<td>61.97</td>
</tr>
<tr>
<td>Fat intake (gram)</td>
<td>56.26</td>
<td>33.11</td>
<td>60.47</td>
</tr>
<tr>
<td>Fiber intake (gram)</td>
<td>10.42</td>
<td>5.48</td>
<td>12.21</td>
</tr>
</tbody>
</table>

*significant if P-value <0.01

**Conclusion**

The proportion of central obesity in our hypertensive patients was 82.6%. We found significant relationships between sleep quality, energy intake and carbohydrate intake with incidence of central obesity in hypertensive patients. Puskesmas can market and socialise the DASHI diet to hypertensive patients during consultation at the Puskesmas nutrition corner or during Prolanis activities. Also, Puskesmas can advocate for a healthy lifestyle for patients, such as engaging in routine physical activity 2–3 times a week and monitoring body weight and waist circumference. If the patients are able to live a healthy lifestyle, their health status will increase so that they will have good sleep quality.

**Acknowledgements:** The authors would like to thank our patients in Puskesmas Tegal Gundil North Bogor District for participation in this study.

**Conflict of Interest:** The authors have no conflict of interest to disclose in this work.

**Ethical Clearance:** Taken from Komisi Riset dan Pengabdian Kesehatan Masyarakat Fakultas Kesehatan
Masyarakat Universitas Indonesia (Ethical Committee of Research and Public Health Services Faculty of Public Health Universitas Indonesia) No. 213/UN2.F10/PPM.00.02/2017.

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References
Risk Factors for the First Dose Measles Immunization Drop Out in Mempawah District, West Kalimantan Province

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Abstract

One factor in the occurrence of measles in children was measles immunization drop out during infancy. The purpose of this study was to determine the risk factors for measles immunization drop out in children aged 9-17 months. This study uses a cross-sectional design. Sample in this study was 126 mothers who had children aged 9-17 months. Study variables were measured using a questionnaire with the interview method. Logistic regression was used to look at the risk factors for measles immunization drop out and the odds ratio of these risk factors. Factors that influence the incidence of measles immunization drop out were the poor family economic status of AOR 7.0 (95% CI 2.55-18.65, p = 0.0001), lack of maternal knowledge AOR 3.61 (95% CI 1, 43-9.08, p = 0.006) and lack of family support AOR 6.54 (95% CI; 2.39-17.89, p = 0.006). Factors that did not influence the incidence of measles immunization drop out were the age of mothers <30 years old, mothers with elementary education, status of working mothers, perceptions of the role of health officers, perceptions of services at posyandu and distance to health facilities. Health officer is expected to provide information on the importance of measles immunization to mothers of children <5 years and include families at the time of counseling so that families know and support measles immunization, and provide information to the public through the media.

Keywords: Drop out, Immunization, Measles, First Dose.

Introduction

Measles is one of the infectious diseases that can cause an outbreak and increase every year. The measles rate incidence in 2015 was 3.2/100,000 people with the death of 1 case. In 2016 there was an increase of 5/100,000 population with 5 cases of death and 2017 increased by 5.6/100,000 population with death increasing to 14 cases.¹,²

Measles immunization drop out is calculated based on DPTHB1 immunization coverage with criteria set by the Indonesian government nationally not to exceed 5%.¹,³ Data on measles immunization drop out in Indonesia still experience fluctuations every year. In 2014 there was a drop out rate of 2.9%, in 2015 at 2.9%, in 2016 at 2.4% and in 2017 it increased by 2.6%.¹,² Measles immunizations drop out can cause the risk of unusual event. Unusual events that occurred in West Kalimantan Province in the last 3 years were 24 times with a 1.3% Case Fatality Rate.⁴ Unusual events that took place in Mempawah District accounted for 40% of all unusual events that occurred in West Kalimantan Province.⁵ The measles immunization drop out rate in Mempawah District still has not reached the nationally set target of <5%. In 2017 amounted to 5.46% and in 2016 amounted to 5.94%.⁶

The occurrence of measles immunization drop out is influenced by 2 main factors, namely behavioral factors, and factors beyond behavior. Behavior is the biggest factor in the measles immunization drop out. Behavior is influenced by 3 factors, namely predisposing factors including maternal characteristics (age, education level, employment status, economic status), maternal
perceptions of the role of immunization officers and the level of knowledge of mothers, enabling factors, namely the quality of services at the posyandu, access to health services and transportation towards health care, reinforcing factor is family support. Based on the background, it is necessary to analyze the risk factors for the first dose measles immunization drop out in Mempawah District.

Method

This study uses a cross-sectional design. The study data is sourced from a preliminary survey conducted in the Sungai Pinyuh Public Health Center (PHC) in Mempawah District, July-August 2018. Respondents in this study were mothers who had children aged 9-17 months.

The sample was 126 mothers obtained in the Sungai Pinyuh PHC in Mempawah District area. Sampling uses simple random sampling method with inclusion criteria for mothers who have children aged 9-17 months who were registered at the Puskesmas and reside in the Sungai Pinyuh PHC area in Mempawah District, have immunization records (KMS/village immunization books/other notes) and mothers are willing to be respondents and exclusion criteria for mothers who have children not immunized with medical indications or mothers refuse to participate.

Dependent variable in this study is measles immunization drop out. While the independent variables are maternal age, maternal education, family economic status, maternal employment status, maternal perceptions of the role of immunization officers, maternal knowledge, maternal perceptions of family support, maternal perceptions of services at posyandu, and distance to health facilities.

Data was collected using a questionnaire that had been tested for validity. Data processing and analysis was done by chi square and logistic regression. The analysis was conducted to see the frequency distribution of each variable, identify the factors associated with first dose measles immunization drop out and investigate the main independent predictors. The significance of all tests is set at p-value 0.05.

Result

The results showed that the average age of respondents was 29.16 ± 6.12. Based on the age variable category most of the respondents were <30 years old (54%). Most respondents have elementary education (55%), most respondents do not work (housewives) (82.3%).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n = 126</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>29.16</td>
</tr>
<tr>
<td>Median</td>
<td>29.00</td>
</tr>
<tr>
<td>SD</td>
<td>6.12</td>
</tr>
<tr>
<td>Minimum</td>
<td>16</td>
</tr>
<tr>
<td>Maximum</td>
<td>45</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>NO school</td>
<td>3</td>
</tr>
<tr>
<td>Elementary</td>
<td>70</td>
</tr>
<tr>
<td>Middle</td>
<td>24</td>
</tr>
<tr>
<td>High</td>
<td>25</td>
</tr>
<tr>
<td>Collage</td>
<td>4</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Housewives</td>
<td>97</td>
</tr>
<tr>
<td>Merchant</td>
<td>14</td>
</tr>
<tr>
<td>Government employee</td>
<td>3</td>
</tr>
<tr>
<td>Farmer</td>
<td>7</td>
</tr>
<tr>
<td>Labor</td>
<td>5</td>
</tr>
</tbody>
</table>

Based on the statistical results obtained p value 0.032 with OR of 1.71 (95% CI; 0.97-3.02), so that it can be said that maternal education is a risk factor for the incidence of first dose measles immunization drop out. Based on the statistical results obtained p= <0.0001 with an OR of 2.03 (95% CI; 1.47-2.80), so that it can be said that the economic status of poor families is a risk factor for first dose measles immunization drop out. Based on the statistical results obtained p= <0.0001 with an OR of 2.53 (95% CI; 1.54-4.15), so that it can be said that the level of less maternal knowledge is a risk factor for first dose measles immunization drop out. Based on the statistical results obtained p= <0.0001 with OR of 2.28 (95% CI; 1.65-3.16), so that it can be said that family support is less a risk factor for first dose measles immunization drop out. Based on the statistical results obtained p=0.0229 with OR of 1.53 (95% CI; 1.10-2.13), so that it can be said that the perception of the role of immunization officers who are not good is a risk factor for first dose measles immunization drop out.
Table 2. Analysis of Risk Factors First Dose Measles Immunization Drop Out in Children 9-17 Months in Mempawah District, West Kalimantan Province

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Drop Out</th>
<th>No Drop Out</th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30 years</td>
<td>32 (50.8)</td>
<td>36 (57.1)</td>
<td>0.88</td>
<td>0.62-1.24</td>
<td>0.470</td>
</tr>
<tr>
<td>≥ 30 years</td>
<td>31 (49.2)</td>
<td>27 (42.9)</td>
<td>ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>54 (85.7)</td>
<td>44 (69.8)</td>
<td>1.71</td>
<td>0.97-3.02</td>
<td>0.032*</td>
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<td>High</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>9 (14.3)</td>
<td>19 (30.2)</td>
<td>ref</td>
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</tr>
<tr>
<td>Mother occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>12 (19.0)</td>
<td>17 (27.0)</td>
<td>0.79</td>
<td>0.50-1.26</td>
<td>0.290</td>
</tr>
<tr>
<td>Not working</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>51 (81.0)</td>
<td>46 (73.0)</td>
<td>ref</td>
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</tr>
<tr>
<td>Economic status</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 (47.6)</td>
<td>9 (14.3)</td>
<td>2.03</td>
<td>1.47-2.80</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Not poor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33 (52.4)</td>
<td>54 (85.7)</td>
<td>ref</td>
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<td></td>
</tr>
<tr>
<td>Maternal knowledge</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 (79.4)</td>
<td>26 (41.3)</td>
<td>2.53</td>
<td>1.54-4.15</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 (20.6)</td>
<td>37 (58.7)</td>
<td>ref</td>
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</tr>
<tr>
<td>Family support</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33 (52.4)</td>
<td>8 (12.7)</td>
<td>2.28</td>
<td>1.65-3.16</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 (47.6)</td>
<td>55 (87.3)</td>
<td>ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of the role of immunization officers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 (33.3)</td>
<td>10 (15.9)</td>
<td>1.53</td>
<td>1.10-2.13</td>
<td>0.0229*</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42 (66.7)</td>
<td>53 (84.1)</td>
<td>ref</td>
<td></td>
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</tr>
<tr>
<td>Perception of Services at Posyandu</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 (47.6)</td>
<td>24 (38.1)</td>
<td>1.21</td>
<td>0.86-1.17</td>
<td>0.280</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33 (52.4)</td>
<td>39 (61.9)</td>
<td>ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mileage to Health Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reachable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (11.1)</td>
<td>5 (7.9)</td>
<td>1.19</td>
<td>0.71-1.98</td>
<td>0.5439</td>
</tr>
<tr>
<td>Reachable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 (88.9)</td>
<td>58 (92.1)</td>
<td>ref</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of logistic regression analysis showed that there were 3 factors that influenced the first dose measles immunization drop out, namely the economic status of the family with AOR 7.0 (95% CI 2.55-18.65, p=<0.0001) so that mothers with poor family economic status have a risk of measles immunization drop out 7 times greater than non-poor family economic status. Mother with less knowledge had an effect on measles immunization drop out with AOR 3.61 (95% CI 1.43-9.08, p=0.0060) so that mothers with less knowledge of the risk of measles immunization drop out by 3.61 times more large compared to well-knowledge mothers. Lack of Family support had an effect on measles immunization drop out with AOR of 6.54 (95% CI 2.39-17.89, p=<0.0001) so that mothers with less family support have risk of measles immunization drop out 6.54 times greater compared with good family support.

Table 3. Logistic Regression of Risk Factors First Dose Measles Immunization Drop Out in Children 9-17 Months in Mempawah District, West Kalimantan Province

<table>
<thead>
<tr>
<th>No</th>
<th>Characteristics</th>
<th>B</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td></td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Poor family economic status</td>
<td>1.931</td>
<td>0.0001</td>
<td>7.0</td>
<td>2.55</td>
</tr>
<tr>
<td>2</td>
<td>Lack of maternal knowledge</td>
<td>1.283</td>
<td>0.006</td>
<td>3.61</td>
<td>1.43</td>
</tr>
<tr>
<td>3</td>
<td>Lack of family support</td>
<td>1.878</td>
<td>0.0001</td>
<td>6.54</td>
<td>2.39</td>
</tr>
</tbody>
</table>
Discussion

Poor family economic status in this study obtained an OR of 2.03 (95% CI: 1.47-2.80, p=<0.0001), so it can be said that poor family economic status is a risk factor for first dose measles immunization drop out. Family economic status influences the completeness of measles immunization\textsuperscript{14}. Income has a large effect on immunization\textsuperscript{10}. Socio-economic conditions are the cause of the high drop out of immunization in children aged 11-23 months\textsuperscript{15,16}.

Mothers with less knowledge in this study were more at risk for measles immunization drop out with OR 2.53 (95% CI: 1.54-4.15, p = <0.0001), so that it can be said that mothers with less knowledge were a risk factor of first dose measles immunization drop out. Knowledge is the dominant factor in shaping one’s actions\textsuperscript{8,17}. Mothers who have high knowledge have more opportunities to give immunizations compared to mothers who have low knowledge\textsuperscript{12,18}. Mothers who have good knowledge about immunization have the opportunity to complete their child’s immunization (AOR = 2.4, 95% CI: 1.6-3.8)\textsuperscript{11,19}.

Less family support is a risk factor for first dose measles immunization drop out with OR 2.28 (95% CI: 1.65-3.16, p = 0.0001), it can be said that less family support able to cause first dose measure immunization drop out. Family support is one of the factors needed by a mother to provide immunizations, family support in question comes from a husband, father, mother, brother who is in one house.

Perceptions of the role of immunization officers who were not good in this study were obtained with OR 1.53 (95% CI: 1.10-2.13, p = 0.0229), it can be said that the not good perception of the role of immunization officers causing the first dose measles immunization drop out. The role of immunization officers influences the increase in measles immunization\textsuperscript{15,19,20}.

The mother’s age <30 years in this study obtained OR of 0.88 (95% CI: 0.62-1.24, p = 0.470) which was protective. Unlike the previous research, the age of the mother is a risk factor for measles immunization drop out\textsuperscript{21,22}. Age of a mother> 30 years is more likely to immunize her child\textsuperscript{11,13,14,23}.

Mothers who have elementary education were more at risk of having a first dose measles immunization drop out with a value and OR 1.71 (95% CI; 0.97-3.02, p = 0.032). In line with several studies which stated that there was an educational effect on measles of 1.25 times (95% CI: 0.511-3.22)\textsuperscript{16,22}. Children who have highly educated mothers were 2,306 times more likely to get measles immunization compared to uneducated mothers\textsuperscript{13,21,23}. Mothers who can read and write have the opportunity to complete their child’s immunization\textsuperscript{18}.

In this study the maternal employment status was not significantly associated with a first dose measles immunization drop out with p = 0.290. In contrast to several studies which state that the work of mothers influences the status of completeness of child immunization\textsuperscript{22}.

Conclusions

The risk factors that affect the first dose measles immunization drop out were the poor family economic status, lack of mother’s knowledge and lack of family support. Risk factors that do not affect first dose measles immunization drop out were maternal age, maternal occupation, maternal education level, perception of the role of immunization officers, services at posyandu and distance of health facilities.

PHC officers are expected to provide information about the importance of measles immunization to mothers of children <5 years and include families during counseling so that families know and support measles immunization, utilize posyandu cadres in counseling families, provide information to the public through the media.

Acknowledgement: We thank the Health Office of Population and Family Planning Control of Mempawah District, Sungai Pinyuh Public Health Center, Immunization Program Manager and all related parties in writing this manuscript.

Ethical Clearance: Not required

Source of Funding: Self funding

Conflict of Interest: Nil.

References
3. Ministry of Health RI. Regulation of the Minister of


Factors of Need for Antenatal Care and its relation to Mother’s Participation in Antenatal Education; Study in Semarang City, Indonesia

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¹Department of Health Policy and Administration, Faculty of Public Health, ²Department of Public Administration, Faculty of Social and Political Science, ³Department of Health Policy and Administration, Faculty of Public Health, ⁴Department of Health Policy and Administration, Faculty of Public Health, Diponegoro University, Semarang, Indonesia

Abstract

The low utilization of antenatal care routinely has an impact on the increasing difficulty of detecting potential risk of pregnancy complications resulting in maternal deaths. Knowledge constraints are the cause of the low utilization of antenatal services. Through the Antenatal Education (AE) class, it is hoped that mother’s knowledge and attitudes can be improved. AE class is not effective because of low participation of mothers. The purpose of study was to analyze the relationship need factors for ANC and their participation in AE class. It was a quantitative survey with cross-sectional design. Sample was 140 pregnant women that selected using purposive sampling based on characteristics of PHC.

The study showed no relationship between history of illness and pregnancy, perception of pregnancy, level of pregnancy complaints and perceived level of danger pregnancy for maternal participation in AE class. In a composite analysis it is proven that the need factors of pregnant women for antenatal care is related to the mothers participation in AE class. Mother’s perception of pregnancy is a key factor to increasing the taste and value of her needs. Increasing the sense of need can be done through improvement of women’s access and roles in the family and community about maternal health services. Continuous efforts need to be made as encouragement as well as support for AE class through structured and integrated socialization to every pregnant woman.

Keywords: Need factors, Antenatal Education, Antenatal Care, PHC, Semarang.

Introduction

Routine antenatal care is an effective strategy to detecting high risk of pregnancy.¹ If the risk factors are known early, the prevention and management efforts could more adequate. As in other developing countries, the continuity of antenatal care by mothers cannot be guaranteed. The use of ANC is also not optimal. Some influencing factors include limited access to health facilities, resources, demographic factors, socio-economic conditions, and health related factors, especially aspects of availability, accessibility and quality of service.² The level of knowledge and attitudes of mothers to care for her pregnancy affects the low utilization of ANC.³–⁵ Supply side factors have an important influence on ANC attendance, the design of ANC and particularly how to deal with the needs and concerns of mothers.¹ Non-compliance with standard ANC examinations has an impact on the higher risk factors for failure to detect complications which ultimately lead to the increased risk of maternal death.

The lower knowledge and attitudes of mothers have an impact on lower understanding and awareness of utilizing antenatal care according to WHO standards.⁶–⁸
Knowledge is a predictor of both attendance at ANC, in addition to socio-economic, parity and age. Education and antenatal care (ANC) is significantly related. It was suggesting that the higher level of education, the likelihood of receiving ANC during pregnancy is higher too, because educated women tend more aware about the importance of ANC during pregnancy. Limited knowledge is an obstacle in increasing utilization of health services, especially in developing countries, including Indonesia.

Antenatal education (AE) class is solution to overcome the constraints of knowledge related to pregnancy and complications risks. The impact orientation to increase maternal compliance in routine antenatal care visits, at least 4 times during the pregnancy period. AE class also has a community empowerment principles because it involves the role and participation of mothers. The success of AE class is determined by how much mothers as participants attend regularly and involved actively in various activities.

Organizing a antenatal education in several countries has proven success meeting the expectations of participants. Most participants in Sweden considered the AE class increase feelings of safety as parents and labor preparation. Antenatal education in Laos improve an average of 10% of knowledge and understanding of basic care for newborns. Study of Nolan et al shows that the existence of antenatal classes is very helpful in increasing self-confidence to become parents, establishing friendships and creating new social networks. Women in Iran have a higher level of happiness and satisfaction in their overall quality of life and health, especially in the postpartum period.

Adopting Andersen’s health service utilization model in behavioral changes, the need factor is one of the important factors that influence service utilization, including antenatal care. In some cases, women do not feel the need to seek professional care while pregnant. Mothers are reluctant to check their pregnancies because of perception that pregnant is a natural process. Mother often feels her pregnancy status is healthy, does not feel painful complaints and feels unsure about the competence and abilities of midwives.

**Method**

This is a quantitative survey with cross-sectional design. Research location in Semarang City, Indonesia, the city of second largest maternal mortality in Central Java Province, with 28,758 pregnant women in 2017. The number of AE class held was 271 classes. The proportion of mothers participating in AE Class is very small compared to its population which less of 10%.

Population is all pregnant women in Semarang City. Sample was selected using purposive sampling based on characteristics of PHC, which represented the area, distance variations to the city center and had the most, the least and without cases of maternal deaths in the last three years. PHC of Gayamsari, Purwoyoso and Rowosari were chosen. Total sample 140 mothers with determined accidentally and proportional.

Primary data was collected through interviews with structured questionnaires that have been tested for validity and reliability. Descriptive analysis and statistics using Chi-Square to test the relationship of needs factors and participation of AE class.

**Findings:** Based on study, the average age of mothers was 28 years old (SD 4.7), and 67.1% were in the best age range for pregnancy, ie 21-30 years old and parity ≤ 2 children are 93.6%. Most mothers have secondary education level (77.9%) and are housewives (73.6%). There are 93.4% of mothers having health insurance, especially government health insurance or BPJS (92.4%). Regarding monthly income, most of them have met the Semarang minimum wage standard of Rp. 2,300,000 per month. If differentiated between groups of AE class and Non AE class, the characteristics relatively similar.

Mothers with high socioeconomic status tend to not following AE class because easily access to health facilities. Another reason be caused of limited time and busy work. Similar to study of Liu et al (2014) that mothers with low socio-economic status are likely take less advantage of antenatal care and better wealth status was associated with increased maternal health services utilization. Study of Kisuule et al (2013) shows that busy working mothers make them late in the first antenatal care visit. Job busyness has an impact on the low attention and intensity of utilization of health services needed, including in AE class.

The results showed only 54.3% of mothers participated in AE class. Generally the participation in AE class is not routine because most of them only take 1-2 activities (standard 4 times per period). The most fun activity is pregnancy exercise. The majority reasoned because they did not know, were busy with domestic
work, the schedule did not fit the working hours, the perception that the pregnancy status was healthy and safe, and no one was delivering them. Socio economic and demographic factors increase maternal participation in utilizing various maternal care programs.1–5

All respondents have a history of illness and pregnancy which can affect their pregnancy status. The most cases suffered history of infectious diseases at about 40.7%, followed by hypertension and a history of congenital defects. As many as 26.4% of mothers had a history of anemia and 15% of mothers had a previous history of labor. Based on its category, there were 52.5% of mothers had a history of disease and history of pregnancy with a heavy category.

In its perception of pregnancy, 62.1% admitted that her current pregnancy status was not good. Mothers with severe complaints about pregnancy also had a greater percentage (61.4%). Although have many complaints, 59.3% of mothers considered their pregnancy be harmless. This is very interesting and becomes a contradiction because even though diagnosed it appears that most mothers have problematic pregnancies, but they tend to perceive the pregnancy to be harmless and safe. The perception aspect is the key to maternal management practices by mothers. Furthermore, based on the composite of need factors variable, it is known that 61.4% of mothers have a high level of need, especially in advanced pregnancy examinations, because statistically mothers have a high risk factor for the occurrence of the danger of pregnancy or complications. Descriptively, about 60% of mothers feel that their pregnancy is dangerous. Mothers who consider their pregnancies harmless and safe tend to not following AE class even though they have severe history of illness and pregnancy. The perception of dangerous level of pregnancy is related to maternal participation in AE class. Similar to Al-Ateeq et al.’s study that maternal perceptions and beliefs influence antenatal visits in Saudi Arabia.14

Most pregnant women, especially in Semarang and generally in Indonesia have values and beliefs that pregnancy is natural event because it is a God blessings. Therefore mothers do not be afraid of facing pregnancy or childbirth. Some people have values that routine ANC is not be needed, because as long as the mother is healthy, her pregnancy is also healthy and safe. However, it is also acknowledged that the fear of childbirth is still felt by some pregnant women so they try seeking antenatal care in hoping that their pregnancy is detected and monitored routinely. According to them, a healthy and safe pregnancy must also be pursued entirely by every pregnant woman.

Compliance with ANC and advice from health professionals can provide security and protection during labor. As many as 50% mothers stated that participation in AE class does not guarantee the safety of their pregnancies. When pregnant women assume there are no definite guarantees regarding the health status and safety of the pregnancy process, they tend to ignore it. It is recognized that women are more likely to use feelings in dealing with every problem. It could be caused by culture, values, habits or parenting patterns that affect a person’s personality.

Table 1: Relationship analysis of needs variables and mothers participation in AE class at Semarang City

<table>
<thead>
<tr>
<th>No.</th>
<th>Variables</th>
<th>Categories</th>
<th>Participation in AE class</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No (%)</td>
<td>Yes (%)</td>
</tr>
<tr>
<td>1</td>
<td>History of illness and pregnancy</td>
<td>Dangerous</td>
<td>53.4</td>
<td>46.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secure</td>
<td>37.3</td>
<td>62.7</td>
</tr>
<tr>
<td>2</td>
<td>Perception of pregnancy</td>
<td>Poor</td>
<td>50.6</td>
<td>49.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good</td>
<td>37.7</td>
<td>62.3</td>
</tr>
<tr>
<td>3</td>
<td>Pregnancy complaints</td>
<td>Many complaints</td>
<td>48.8</td>
<td>51.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Few complaints</td>
<td>40.7</td>
<td>59.3</td>
</tr>
<tr>
<td>4</td>
<td>Perceived level of danger pregnancy</td>
<td>Less</td>
<td>50.6</td>
<td>49.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>38.6</td>
<td>61.4</td>
</tr>
<tr>
<td>5</td>
<td>Level of need</td>
<td>Less</td>
<td>33.3</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>53.5</td>
<td>46.5</td>
</tr>
</tbody>
</table>

* Significancy at p-value ≤ 0.05
Table 1 showed that more pregnant women of AE class who had a history of dangerous diseases and pregnancies (53.4%), whereas mothers who participated in AE class have a secure history of illness and pregnancy (62.7%). The p value=0.056 which only slightly exceeded of the threshold value for the hypothesis was rejected or accepted. There is no relationship between history of illness and pregnancy with the participation of AE class. Participants of AE class who perceive their pregnancies in good condition have a higher percentage (62.3%), while those who do not participate in AE class perceive pregnancy to be less good (50.6%). There is no correlation between perceptions of pregnancy and AE class participation (p=0.192). Mothers who experienced many complaints turned out to be mothers of AE class. No correlation between pregnancy complaints and participation of AE class with p value=0.446. Through composite analysis for looking at the factor level of maternal needs for antenatal care, it appears that more mothers from the Non AE class group have high level of need for antenatal care. In contrast, in class AE group, mothers actually had a low level of need (66.7% compared to 46.5%). Statistical tests prove significant relationship between the level of antenatal care needs and participation in AE class with p value = 0.031.

Maternal perception has a major contribution to participation of AE class. Perception directs the practice of pregnant women, where women who consider their pregnancy be safe and harmless tend to attend AE class despite having complaints during pregnancy. Conversely, mothers who consider their pregnancies are not good choose not to joint the AE class. This result is contrary to the previous descriptive analysis which illustrates the tendency of mothers who attend AE class have history of illness and pregnancy in bad status. Even though they know and have a history of illness and pregnancy, but when mother considers her pregnancy to be “no problem”, she tends to participate the AE class. Even though the mother does not have a history of severe illness and pregnancy, but when considering her condition as “problematic”, the mother will not participate in the AE class activities.

The context of understanding social cultural values contributes to practices and activities related to maternal health services. Culture and value are still upheld, which gives rise to unethical, disrespectful feelings and reluctance of mothers to honestly and openly share all her pregnancy problems with others, even though the person is a health worker or even a fellow pregnant woman herself. There is a perception and belief that pregnancy is a natural process. It is natural if mothers have experience and feel certain complaints. They tend to stay at home without seeking treatment because of the assumption that complaints will disappear when gestational age increases.

**Conclusion**

Needs are psychological aspects that move individuals in various activities. Perception of the level of need is influenced by the power of supporting and motivation. Mother’s perception of pregnancy is a key factor to increasing the taste and value of her needs. Although by diagnostic, pregnant women have a history of severe illness and high complaints of pregnancy, but when mothers perceive as “not a problem”, they tend to ignore routine ANC examinations. Increasing the sense of need can be done through improvement of women’s access and roles in the family and community about maternal health services. How the strategy to encourage mothers raise awareness about the importance of ANC services are essential. Continuous efforts need to be made as encouragement as well as support for AE class through structured and integrated socialization to every pregnant woman.

**Conflict of Interest:** The author does not have a conflict of interest related to all aspects of research.

**Source of Funding:** Research funding is borne entirely by researcher.

**Ethical Clearance:** This research has received ethical approval from the Health Research Ethics Commission of the Faculty of Public Health Diponegoro University, Semarang, Indonesia Number 259/EK/KEPK-FKM/2018 approved in 26th December 2018.

**References**


Factors Affecting Nurse Performance in Medical Ward

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Abstract
Nurses are the world’s fastest-growing professions. The number of registered nurses increases every year. Nurse performance becomes the determinant of a hospital’s accountability. Factors affecting performance were divided based on their perspectives: individual differences, situational, and regulation. This research was analytic descriptive study with cross-sectional approach. The study was conducted in dr. H. Andi Abdurrahman Noor General Hospital, Indonesia from September to October 2017. The sample consisted of 24 nurses in the medical ward. An open-ended structured questionnaire was used as an instrument of data collection. Design the questionnaire based on observations of the literature that has been presented. Data were analyzed using a cumulative percentage system and presented in tables. Some respondents were dissatisfied with his personal appearance. This was influenced by eleven factors, with the most important factors were overwork, lack of facilities, and inability to control stress. From a situational perspective, some factors affecting nurse performance were workload (83.3%), facilities (66.7%), cooperation (29.1%), and work environment (12.5%). Supervision (45.8), salaries (37.5%), service fee (45.8%), and rewards (12.5%) were grouped according to the regulation perspective. While the ability (54.1%), skills (12.5%), and motivation (8.3%) had an individual impact.

Keywords: Factor, hospital management, nurse, performance.

Introduction
Nurses are the world’s fastest-growing professions. The number of registered nurses increases every year. In 2003, there were 2,449,000s and became 2,888,000s in 2014 (18 percent increase).1 In Indonesia, nurses are the largest health professions (compared to general practitioners, specialists, midwives, pharmacists and dentists) with 296,876 members (49%) in 2016. The national nurses ratio is 113.40 per 100,000 population in the same year, which is far from the target of 180 per 100,000 population in 2009.2 In these circumstances, the nurses-who is the first line in health care-is required to always do the best. So the assumption that the nurses are an important factor in determining the accountability of the hospital is not wrong.

Nurse performance in patient care is influenced by various factors. Study by Adatara et al (2016) found that optimal nursing performance was influenced by ability, mutualism, motivation, professionalism, clear assignment and target, availability of equipment, and functional feedback systems.3 While based on Yaghoubi et al study (2013) was found that the nurse performance correlated significantly with work environment, legality of work, continuous work evaluation, incentives, assistance from management to achieve work goals, clarity of main tasks and functions, and individual capability.4

Previous study was conducted by Kamati et al (2014) at a national referral hospital in Namibia. The study was conducted on 48 nurses from a 284 total population, using a questionnaire. The results showed that there was negative correlation between the nurses performance with short working mad, bad feedback,
low remuneration, poor work environment, and poor training. Limitations in this study were the absence of control that elements and the results were done in one hospital due to lack of resources.5

The large number of factors that affect nursing performance as employees makes Sonnentag and Frese divide them into three parts according to their perspectives: individual differences, situational, and regulation.6

### Individual Differences Perspective:
Many studies illustrate how individual differences perspectives affect their performance. To get a well-performing nurse, the hospital must select individuals based on their abilities, work experience, and motivation and personality.3,5,6

### Situational Perspective:
This perspective refers to environmental factors that could support the improvement of nurse performance. The most basic question in this perspective: “In what situations could the individual perform the best performance?” Some factors in this perspective are job characteristics, capabilities/circumstances that allow for stress control, and forced situations.4,5,6

### Regulation Perspective:
This perspective focuses on performance processes and concepts as a result of work. The most important question in this perspective: “How is performance generated?” And “What happens when a person works?” This regulation could be either financial or non-financial (feedback, social reward) interventions.3,4,5,6

Despite the numerous studies conducted, in its development, nurse performance remains an important point in hospital marketing. Therefore, strengthening the theory about the factors that affect nurse performance should continue to be done, as an effort to improve service to patients and build a good hospital image.

### Materials and Method
This research was analytical descriptive study with cross-sectional approach. The place this study was dr. H. Andi Abdurrahman Noor General Hospital, located in Tanah Bumbu District, South Borneo Province, Indonesia. Data is collected between September and October 2017. The population of this study was all nurses who numbered 165 people. Form total population, there were 24 samples of nurses who served in medical ward.

An open-ended structured questionnaire was used as an instrument of data collection. Design the questionnaire based on observations of the literature that has been presented. Open-ended questions allow respondents to be spontaneous in conveying and focusing opinions in their own words. Respondents were asked questions about the factors that according to their perspectives had the highest effect on nurse performance in the first order, to the last sequence they thought had the least influence.

Data were analyzed using a cumulative percentage system. Demographic characteristics, performance satisfaction levels, and factors that impact the nurses performance were analyzed with descriptive statistics and presented in tables.

### Results
Respondents consisted of 54.2% of female, with 16 respondents aged between 21-30 years, one respondent aged between 41-50 years, and the rest in middle age. More than half of the respondents had a diploma in nursing. More than 70% of respondents are non-permanent employees/contracts with varying work experiences, dominantly respondents worked less than four years as a nurse in this hospital.

Based on personal assessment of respondents, 66.7% were satisfied with his personal appearance. Most respondents felt that they had made the best effort to serve patients even though the equipment available at the hospital was not yet complete. While the rest felt not able to perform maximum service to patients (see Table 1).

### Table 1: Level of satisfaction with personal performance

<table>
<thead>
<tr>
<th>Level of Satisfaction</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Satisfied</td>
<td>8</td>
<td>33.3</td>
</tr>
<tr>
<td>Satisfied</td>
<td>16</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Factors affecting nurse performance were ranked from the most-mentioned to the least. The most frequently mentioned factor in this case was the excessive workload (83.3% of the total respondents). This was influenced by the ratio between the nurses and the bed in medical ward (only about 1:12) and the documentation on the medical record which time-consuming for the nurses. Lack of facilities became the second largest factor (66.7%). The facilities include medical and non-medical equipment, such as diagnostic equipment, emergency equipment
and personal protective equipment. The inability to control stress in the workplace is the third largest factor (54.2%). This stress was mainly due to pressure from supervisors and leaders (see Table 2).

### Table 2: Factors that result in poor of nurse performance

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frequency</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive workload</td>
<td>20</td>
<td>1st</td>
</tr>
<tr>
<td>Lack of facilities</td>
<td>16</td>
<td>2nd</td>
</tr>
<tr>
<td>Inability to control stress</td>
<td>13</td>
<td>3rd</td>
</tr>
<tr>
<td>Lack of supervision</td>
<td>11</td>
<td>4th</td>
</tr>
<tr>
<td>Non-compliance of service fee with workload</td>
<td>11</td>
<td>5th</td>
</tr>
<tr>
<td>Salary incompatibility with minimum wage</td>
<td>9</td>
<td>6th</td>
</tr>
<tr>
<td>Poor cooperation between different profession of employees</td>
<td>7</td>
<td>7th</td>
</tr>
<tr>
<td>Lack of non-financial rewards</td>
<td>3</td>
<td>8th</td>
</tr>
<tr>
<td>Inconvenience work environment</td>
<td>3</td>
<td>9th</td>
</tr>
<tr>
<td>Unavailability of continuing education</td>
<td>3</td>
<td>10th</td>
</tr>
<tr>
<td>Status as a non-permanent employee/contract</td>
<td>2</td>
<td>11th</td>
</tr>
</tbody>
</table>

### Discussions

One that affects the workload of the nurses was the ratio between the patient and the nurses. According to the California Nurse Association (CNA), the number of patients supervised by the nurses varies according to the work unit, but does not exceed six patients. While, at the hospital where the research was conducted, the fact was still far from the ideal situation, where the average ratio was only 1:12. Document overload also results in excessive workload of nurses. When viewed from the Hospital Accreditation Standard of Indonesia 2012, there were still many overlapping forms on the medical record so that the time to complete the document becomes longer. This will impact on shorter nursing services and lead to limited nurse-patient interactions. In 2015, Muhammadi et al studied the factors that affectingnurse performance who work in intensive care unit (ICU). There were many things that cause poor of the nurse performance, including difficulty sitting down to work on documentation, unfriendly workplaces, poor workplace settings and inventory space, poor equipment conditions, drug delays, unpredictable situations, and poor cooperation.

Inadequate facilities were the second most mentioned factor. This was in accordance with study conducted by Adatara et al (2016) who found that the availability of equipment affects the poor performance of 28% of respondents. While stress and ability to control it is the third largest factor affecting the nurses performance. Simanjorang et al (2015) found a significant relationship between job stress and the nurses performance. It was also found in this study, in which the ability to control stress has been mentioned by more than half the number of respondents.

Other studies had also shown that organizational factors, interpersonal cooperation, nurses cooperation with other professions, and relationships with leaders or supervision had an impact on the nurses performance. Good relationships and regular supervisory supervision with various parties in the workplace will improve nurses ability and motivation to perform their duties better. Despite other influencing factors such as motivation, salary in accordance with regional minimum wages, and non-financial rewards. This was in accordance with James et al (2015) study, in which financial and non-financial rewards had a positive impact on the performance of health workers. Non-financial rewards can be promoted or candidates for specialized training.

The work environment was also an important factor, although it was ranked ninth from eleven factors that affectingnurse performance. While, the least-mentioned factor was the employment status. There was no evidence-base showing the relationship between employment status and nurse performance, but it was assumed that the status of government employees has higher income than contract workers, with the same workload. This clearly impacts financially for the nurses.

### Conclusion

From this research, there were eleven factors that influence nurse performance. If grouped according to Sonnentag and Frese theories, then the situational perspective had a great impact on nurse performance, followed by individual differences and regulation perspectives. Factors of the situational perspective in this study were the workload (83.3%), facilities (66.7%), cooperation (29.1%), and work environment (12.5%). Supervision (45.8), salaries (37.5%), service fee (45.8%), and rewards (12.5%) were grouped according to the regulation perspective. While the ability (54.1%), skills (12.5%), and motivation (8.3%) have an individual
impact. It was important to know by the hospital management, because if they improve the nurses’ performance means simultaneously they also improve the image of the hospital in a community perspective.

Conflict of Interest: The authors declare that they have no conflict interest.

Source Funding: This study done by self funding from the authors.

Ethical Clearance: In this study we followed the guidelines from the Committee of Ethics, Indonesian School of Economics, Banjarmasin. The informed consent included the research title, purpose, participants’ right, confidentiality and signature.

Acknowledgement: Alhamdulillah. All praise is only to Allah azza wa jalla, who has given His guidance. Shalawat to Rasullullah shalallahu’alaïhi wasallam, the best example of human life. Thanks to Arman Jaya Rikki as Director of dr. H. Andi Abdurrahman Noor General Hospital, for his suggestion in this study.

Reference


Improved WOMAC Score Following Treatment with Nanoparticle Phyllanthus Amarus Phonophoresis Gel for Knee Osteoarthritis

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Abstract

Objective: The aim of this study is to compare the effects of phonophoresis of nanoparticle Phyllanthus amarus phonophoresis gel (PP) and ultrasound therapy (US) in patients with osteoarthritis of knee (OA).

Method: OA knee patients (n=40) who had symptomatic knee pain were randomly allocated into 2 groups. There are US group (ultrasound group) and PP group (Phyllanthus amarus gel phonopheresis group)(20 in each group) were treated with an ultrasound program by using continuous mode, 1.0 W/cm², 10 minutes per session, once daily and 10 sessions. The nanoparticle Phyllanthus amarus gel was used in the PP group, while the US group was use the nondrug coupling gel. Pain and function assessment were measured by the visual analog scale (VAS) and the Western Ontario and McMaster Universities O-osteoarthritis Index (WOMAC), respectively. Moreover, the range of motion was used to measure by goniometers. Three primary outcomes were investigated before and after treatment 10 sessions.

Results: The VAS and total WOMAC scores were significantly increased post-treatment in both groups (P < 0.001). The PP group showed more significant improve VAS and total WOMAC scores than the US group (P<.001). However, ROM was not significant in both groups to compare to baseline.

Conclusion: The nanoparticle Phyllanthus amarus phonophoresis gel was significantly reduced pain and improve knee functioning. It is suggested as a new, effective method for treatment OA knee for relieving pain and improving function.

Keywords: Knee osteoarthritis; Phyllanthus amarus; phonophoresis; ultrasound therapy; visual analog scale.

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Introduction

Osteoarthritis knee (OA knee) is a degenerative joint disease with the pathological bone characteristics changing that decrease hyaline articular joint and increase synovial inflammation. The chronic joint pain condition of the musculoskeletal system and a highly prevalent chronic condition among most common elderly more than 50 years and older and prevalence increases with age in women more than men. The main symptom of OA is the pain that lead to the quadriceps muscle weakness and limited joint movement and weight-bearing activities including standing, walking, up and down stair and muscle atrophy, causing decreased physical function in older adults with knee OA. The OA knee patient with symptomatic pain is treated in primary care including the several modalities approach, exercise therapy, pharmacological and surgical interventions for severe of OA knee. It is treated analgesic and non-steroidal anti-inflammatory drugs.
Phyllanthus amarus is Thai herbs which have pharmacological effects for anti-inflammation and antioxidant could be reduced pain\textsuperscript{4,5} by transforming electric to be acoustic wavelength. It is mostly used in musculoskeletal disease including OA knee for increasing nerve conduction velocity and firing rate, decreasing soft tissue inflammation, enhancing scar tissue remodeling, increasing soft tissue healing and increasing tissue extensibility (Baker and et al., 2001)\textsuperscript{6}. The aim of treatments was decrease pain symptoms and increase function. Application of US with the drug for permeating skin is called “Phonophoresis”.\textsuperscript{7} NSAIDs cream such as ibuprofen with US at 1 MHz frequency and 1 Watt/cm\textsuperscript{2} of power for 5-10 minutes per session at 10 times\textsuperscript{8}, is most common use in this technique to reduce significantly pain in OA knee and many pathologies such as shoulder pain, myofascial pain and OA knee\textsuperscript{9}. The Phyllanthus amarus is Thai herbs which have pharmacological effects for anti-inflammation and antioxidant could be reduced pain\textsuperscript{10}. Thus, the aim of our study was to evaluate the effectiveness of the nanoparticle Phyllanthus amarus phonophoresis gel treatment was developed and conducted for study to compare effects of the nanoparticle Phyllanthus amarus phonophoresis gel for changing pain and functional assessments including WOMAC score and range of motion (ROM) in OA knee patients with conventional US gel.

**Method**

**Participants:** The study’s protocol was approved by the institutional review board of the Faculty of Associated Medical Sciences, Chiang Mai University. All participants were written informed consent. Forty patients were diagnosed OA knee follow as the American College of Rheumatology (ACR) Classification Criteria.\textsuperscript{11} The sample size required for each group was 15 [and add 15% for drop out] (power =0.9 and significant level =0.05) which is calculated from a previous study\textsuperscript{12}. The inclusion criteria were the subjects had chronic knee pain, age ≥ 50 years, morning stiffness <30 min, and crepitus on the motion. The exclusion criteria were the history of taken anti-inflammatory or analgesic drugs and injection of steroid within 3 months.

**Treatment procedures**

**Phonophoresis of Phyllanthus amarus:** The Phyllanthus amarus gel was mixed with a standard coupling agent which was prepared by pharmacologist. Patients were received US with continuous mode, 1.0 W/cm\textsuperscript{2} power at once daily for 10 sessions. The participants were random the group using a computer program and examined by the physician with double-blind to group assignment.

**Outcome measures:** The clinical outcomes were monitored at baseline, 10 sessions after treatment.

1. **Visual Analogue Scale (VAS):** The severity of knee pain was assessed using the Visual Analog Scale (VAS) before and after treatment US at 10 sessions. The scale of VAS is the numeric scale at 0 to 100. 0 show no pain/limitation and 100 show very severe pain/limitation\textsuperscript{13}.

2. **WOMAC score:** The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score was widely used assessed symptoms and disability questionnaire in patient with osteoarthritis\textsuperscript{14,15}. It consisted with knee pain, stiffness, and functional limitation. Subjects were assessed before treatment (pretreatment) and 10 sessions after the start (post-treatment)\textsuperscript{13}.

3. **Measurement of Knee ROM\textsuperscript{16}:** The range of motion was evaluated by plastic goniometer\textsuperscript{17}. The lying supine is the starting position for measuring the range of motion at both active and passive knee flexion and extension. Initial fully extended knee was considered zero position and maximal flexion of knee was recorded. The axis was at lateral epicondyle and the movable arm was at lateral face of the fibula.

**Statistical analysis:** The values are expressed as mean ± SD. The pre-treatment and the post-treatment data were compared within the groups using the nonparametric (Wilcoxon) tests. Statistical analysis was carried out by repeated measure ANOVA and was followed by Turkey’s post hoc test. The level of
Results

Sample Description: Total, 40 patients (70% female, n=14) with knee osteoarthritis were included in this study. The mean of age in US and PP were 64.30 ± 9.71 and 65.20 ± 8.34 years, respectively. There was no significant difference in sex, BMI and duration of knee pain in both groups. Descriptive analyses are presented in Table 1.

Table 1: Baseline characteristic of enrolled participants in both groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>US (n=20) Mean ± SD</th>
<th>PP (n=20) Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>64.30 ± 9.71</td>
<td>65.20 ± 8.34</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Female (n)</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22.63 ± 8.61</td>
<td>23.62 ± 5.21</td>
</tr>
<tr>
<td>Duration of symptoms (Years)</td>
<td>2.00 ± 1.30</td>
<td>2.20 ± 1.48</td>
</tr>
</tbody>
</table>

Note: BMI = body mass index; SD = standard deviation.

The effect of Phyllanthus amarus phonophoresis on the visual analog scale (VAS): Visual Analog Scoring of knee pain during the pre and post-treatment sessions is depicted in Fig. 1. Data indicate that the knee pain levels for after treatment in both groups (mean ± SD) significantly decreased (p < 0.001) compared to pre-treatment. Moreover, PP reduced significantly VAS score from 71 ± 8.74 to 15 ± 7.53 compare to US group (p < 0.001). These data suggest that PP group significantly reduced knee pain.

![Figure 1](image)

Figure 1 The mean values of VAS in pre-to post treatment of US and PP group. a showed significant compare pretreatment in each group, b showed significant compared post treatment of US group, p < 0.001.

The effect of Phyllanthus amarus phonophoresis on Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

There was a significant decrease in total WOMAC in both groups (P < 0.001) (Table 2). The PP group showed significantly more total WOMAC than the US group (see Fig. 2).
Figure 2: The values of total WOMAC score in pre-to post treatment of US and PP group. a showed significant compare pretreatment in each group, b showed significant compared post treatment of US group, p < 0.001.

The effect of Phyllanthus amarus phonophoresis on the range of motion (ROM) of the knee: ROM was measured by the goniometer. The result showed that both active and passive ROM pre and post-treatment were not changed in both groups as shown in Table 2. These data suggested that PP group was not significantly increased ROM.

Table 2: Pre-treatment and post-treatment of ROM in both groups

<table>
<thead>
<tr>
<th>ROM</th>
<th>US (n=20) Mean ± SD</th>
<th>PP (n=20) Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM active flexion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>129.5 ± 10.91</td>
<td>128.0 ± 11.11</td>
</tr>
<tr>
<td>Post</td>
<td>131.5 ± 10.81</td>
<td>129.0 ± 10.22</td>
</tr>
<tr>
<td>ROM passive flexion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>132.0 ± 10.05</td>
<td>133.5 ± 9.78</td>
</tr>
<tr>
<td>Post</td>
<td>133.5 ± 10.56</td>
<td>133.5 ± 9.78</td>
</tr>
<tr>
<td>ROM active extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.0 ± 2.58</td>
<td>1.5 ± 4.24</td>
</tr>
<tr>
<td>Post</td>
<td>3.0 ± 2.58</td>
<td>1.5 ± 4.24</td>
</tr>
<tr>
<td>ROM passive extension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.0 ± 2.58</td>
<td>2.5 ± 2.64</td>
</tr>
<tr>
<td>Post</td>
<td>2.5 ± 2.64</td>
<td>0.5 ± 1.58</td>
</tr>
</tbody>
</table>

Note: ROM = Range of motion

Discussion

This study assessed the effectiveness of Phyllanthus amarus phonophoresis for patients with knee OA. Pre and post-treatment, patients were assessed pain of knee by using VAS (numeric rate scale at 0-100-mm) and functional performance by using WOMAC questionnaire index. Studies have shown that treating the US and Phyllanthus amarus were the effective treatment for knee OA for reducing significantly VAS compared to baseline. In our study was assessed how Phyllanthus amarus phonophoresis of non-pharmacological treatments affect pain and WOMAC index scores\(^{(12)(18)(19)}\). Luksurapan et al.\(^{(20)}\) found that phonophoresis of piroxicam was using the stroking technique, continuous mode, 1.0 W/cm\(^2\), 10 minutes per session, and 5 times per week for 2 weeks. The VAS and total WOMAC scores were significantly increased in post-treatment in phonophoresis of piroxicam groups (P<0.001) according to the study of Boonhong et al.\(^{(21)}\) showed phonophoresis of piroxicam improvement in both VAS and total WOMAC scores post-treatment. Other research reported that therapeutic of phonophoresis using dexamethasone sodium phosphate in ultrasound waves of 1 MHz frequency, for 5 minutes, 10 sessions treatment period for patients with knee osteoarthritis could increase the total WOMAC scores and knee range of motion also improved significantly\(^{(22)(23)}\). Our results had shown that using ultrasound gel also could be improved pain and total WOMAC scores. However, our study showed that there has been no improved both flexion and extension
ROM of the knee. In this study, we proposed that the nanoparticle phonophoresis is enhanced by ultrasound and the benefits to treat with Phyllanthus amarus phonophoresis gel. Ultrasound is one of the deep heating modality which is used in physical therapy. The ultrasound has the property for healing procession, increase blood flow and connective tissue extensibility. Moreover, this study showed that US group had effective significantly in decreasing pain and increasing WOMAC compared to baseline according to Yeğin et al., 2017\(^{12}\). Phyllanthus amarus has a known antioxidant and anti-inflammation effect in vivo and in vitro study.\(^{10,24,25}\) The antioxidant effect of the phenolic compound has chondroprotective activities with anti-collagenase activity\(^{26}\). Phyllanthus amarus phonophoresis could be decreased pain and improve function. However, it could not increase ROM of the knee. Thus future research should study with other treatment for improving ROM of the knee including manual physical therapy approaches\(^{27}\), theraband exercise program\(^{28}\) and manipulation on range of motion\(^{29}\).

Conclusion

Phyllanthus amarus gel was used for relieving pain and improving function OA knee. The results of our study may ongoing research for the treatment knee OApaitents, and further Phyllanthus amarus phonophoresis is suggested as a new, effective method for treatment symptomatic knee OA.

Conflict of Interest: The authors declare no conflicts of interest.

Acknowledgments: This work was supported by the grants funded by the Faculty of Associated Medical Sciences and CMU Junior Research Fellowship Program of Chiang Mai University, Thailand. The authors also thank Mr. Komsan Tejah, Miss Chanyaphak Munyuen, and Miss Chanunya Wongkiti for collecting part of the data and all patients.

Ethical Clearance: Approved number AMSEC-60EX-019

References


Do Social Determinants Influence Parents Health Behaviour and Oral Health Status in Children: A Descriptive Study

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Abstract

Context: Addressing the rising oral disease burden globally necessitates the need for oral health promotion with consideration of factors at grass root level.

Aims: The present study was undertaken to assess the influence of social determinants on the oral health of children aged 12 and 15 years in Bangalore.

Settings and Design: A cross-sectional study was conducted among 432 School children aged 12 and 15 years.

Method and Materials: Children were administered the questionnaire on social determinants of health and were instructed to get it filled by their parents. Oral health examination was conducted using DMFT index.

Statistical Analysis: Descriptive and Inferential statistics like Bivariate analysis determined the association of social determinants and health Outcomes.

Results: The bivariate analysis revealed that Family Strength, Mother’s education and Father’s occupation was significantly associated with the Oral Disease prevalence among children as perceived by parents. On clinical examination the mean DMFT score of children was 1.17±1.689 and was significantly associated with the monthly family income (p=0.031).

Conclusions: Social determinants influence the various aspects of oral health care in children. This necessitates the need for inter-sectoral measures to be implemented taking into account the social determinants at upstream and downstream levels initiating effective oral health promotion.

Keywords: “Oral health”, “Social determinants of Health”, “Bangalore”, “School Children”.

Introduction

Health is central to human life and well-being. A healthy individual enjoys a better quality of life, reflecting in their functional efficiency. However, from primeval times, the component of health refers to just general well-being. The compartmentalization of general and oral health has led to negligence of oral health on a hefty scale, especially in children.

General health and oral health are interlinked. The risk factors and causative agents of oral diseases are
often proved to be involved in general health disorders too. However, the slender acquaintance of these oral and general health disorders among health professionals has resulted in health promotion measures being narrow and secluded, separating the mouth from the rest of the body\(^\text{[1]}\). Thus health promotion approaches are often duplicated costing additional resources and burden to the health care delivery system\(^\text{[2]}\).

Amongst the various risk factors of general and oral health diseases in children, social determinants of health play an imperative role. Sustainable improvements in the overall health of children with equal reduction in health and oral health inequalities can be achieved by addressing these factors of social determinants which lie at the core of disease causation\(^\text{[3]}\).

Various review studies globally have addressed the issue of social determinants of health and oral health individually\(^\text{[3–6]}\). However, meagre studies have highlighted the effect of social determinants on general and oral health of children. Thus the present study aims at describing the effect of social determinants of health on various oral and general health factors in children.

**Materials and Method**

A cross-sectional study was conducted in 2015-16 in Bangalore on a sample of 432, 12 and 15 year old school children. Ethical clearance was obtained from the Institutional Review Board.

**Selection and Description of Participants:** Children studying in government schools aged 12 and 15 years and their parents were the target population. A multi-stage simple random sampling was followed. Utilising lottery method, Bangalore Urban South was selected from Bangalore District. Further among the 5 Zones in Bangalore Urban South, South zone 1 was selected. 6 schools in this zone were selected using table of random numbers.

Children present on the day of data collection and providing informed consent of the parents were included in the study. The sample size was estimated using the formula \( N = \frac{Z^2 \times PQ XD}{\Delta^2} \) where \( Z = 1.96 \) for 95% confidence level, \( P = \) Proportion of social determinants determining children’s health (0.4)\(^\text{[7]}\), \( Q = 1-P, \Delta = 0.05 \) (5% margin of error).

**Data Collection Process:** The study was conducted by abiding to ICMRs ethical guidelines for Biomedical Research on human participants. On obtaining permission from the school authorities, the children were administered the consent forms and the Questionnaire on Social Determinants of health. The Children were instructed to get it filled by their parents. The following day questionnaires were collected and oral health examination of the children was conducted by 3 calibrated examiners to assess for dental cariesDecayed Missing Filled Teeth (DMFT) Index wherein DMFT score of 0 was considered as absence of caries and DMFT score >1 was considered as presence of caries.

**Data Collection tool:** A self-administered questionnaire was developed in Kannada language which was validated for face and content validity. It was tested on a group of 30, 12-15 year old school children. The questionnaire consisted of 24 questions distributed over 3 domains namely: Personal/Biological Determinants (2), Social Determinants (10), Oral Health and Access to Health Services (12).

**Statistical Analysis:** Data was entered in Microsoft Excel and analysed using SPSS Version 16. The frequency of various determinants were expressed in terms of number and percentage. Bivariate analysis was performed to determine the association of various social determinants on the health and oral health related aspects of the participants.

**Findings:** The response rate was 92.13% (398/432). Non response was addressed using per-protocol analysis by including responses of participants completing the entire study process.

**Social Determinants of Oral Health:** The study consisted of children aged 12 years [155 (38.9%)] and 15 years [243 (61.1%)]. Majority of them were females [232 (58.3%)], Hindus [326 (81.9%)] and belonged to family size of 1-5 [281 (70.6)]. Majority of their parents were unskilled workers with lesser than middle school education and income of less than Rs. 12,000 and 227 (57%) participants owned a Below Poverty Line (BPL) card.

Among the participants 291 (73.1%) had not enrolled for any form of health insurance. Bivariate analysis revealed that mother’s education and BPL card holders were significantly associated with the acquisition of health insurance \((p<0.05)\) [Table 1].

201 (50.5%) participants revealed that in the past one year their child faced oral problems amongst which
dental caries [164 (41.2%)] was the most common oral disease [Table 2]. Bivariate analysis revealed that Family size, mother’s education and Father’s occupation were significantly associated with the occurrence of oral problems [Table 3].

Around 147 (36.9%) participants had taken their child to a dentist in the past one year, majorly for the treatment of dental caries [115 (28.9%)]. However, 251 (63.1%) parents had not taken their child to a dentist in the last 1 year. The cost associated with the dental treatment [157 (39.4%)] was the most common reason for not visiting the dentist [Table 2]. Bivariate analysis revealed that strength of the family was significantly associated with the dental visit behavior (p<0.05). 106 (72.1%) participants commonly sought dental care from a Government hospital with a dental Unit.

78 (80.4%) participants had spent less than Rs.5000 for dental treatment in the past 1 year. The facility of reimbursement for the dental treatment availed was utilized by 22 (5.5%) participants which was mostly from the place of work [11 (50.0%)]. 24.9% and 23.4% parents felt that oral problems influenced the academic performance of children and caused lose of time respectively.

**Oral Health Status of Children:** 208 (52.3%) children had a DMFT score = 0 and 190 (47.2%) had a DMFT score > 1. The mean DMFT score among children was 1.17+1.689. Bivariate Analysis revealed that family income was significantly associated with the caries status of children (p=0.031) [Table 4].

### Table 1: Bivariate analysis of Health Insurance availing behaviour and social determinants

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Independent Variable</th>
<th>Health Insurance</th>
<th>No Health Insurance</th>
<th>Odds Ratio</th>
<th>Bivariate analysis 95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Mother’s education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;Middle school</td>
<td>40 (33.1)</td>
<td>81 (66.9)</td>
<td>1.548</td>
<td>0.969-2.472</td>
<td>0.046*</td>
</tr>
<tr>
<td></td>
<td>&lt;Middle school</td>
<td>67 (24.2)</td>
<td>210 (75.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>BPL Card Holders</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Yes</td>
<td>79 (34.8)</td>
<td>148 (65.2)</td>
<td>2.726</td>
<td>1.673-4.443</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>28 (16.4)</td>
<td>143 (83.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Characteristics of Oral Problems and Dentist Visit among participants

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Variables</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Type of oral problems faced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dental caries</td>
<td>164 (41.2)</td>
</tr>
<tr>
<td></td>
<td>Gum Problems</td>
<td>65 (16.3)</td>
</tr>
<tr>
<td></td>
<td>Swelling in the face</td>
<td>29 (7.3)</td>
</tr>
<tr>
<td></td>
<td>Halitosis</td>
<td>36 (9.0)</td>
</tr>
<tr>
<td></td>
<td>Malocclusion</td>
<td>32 (8.0)</td>
</tr>
<tr>
<td>2.</td>
<td>Reason for dental visit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dental check up</td>
<td>5 (1.3)</td>
</tr>
<tr>
<td></td>
<td>Dental caries</td>
<td>115 (28.9)</td>
</tr>
<tr>
<td></td>
<td>Gum problems</td>
<td>33 (8.3)</td>
</tr>
<tr>
<td></td>
<td>Malocclusion</td>
<td>16 (4.0)</td>
</tr>
<tr>
<td>3.</td>
<td>Reasons for non visit of dentist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fear of dental treatment</td>
<td>43 (10.8)</td>
</tr>
<tr>
<td></td>
<td>Expensive Cost of treatment</td>
<td>157 (39.4)</td>
</tr>
<tr>
<td></td>
<td>Opposition from the family</td>
<td>96 (24.1)</td>
</tr>
<tr>
<td></td>
<td>Lack of time</td>
<td>88 (22.1)</td>
</tr>
<tr>
<td></td>
<td>Previous uneventful dental experience</td>
<td>33 (8.3)</td>
</tr>
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</table>
Table 3: Bivariate analysis of Oral Problems Prevalence and social determinants

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Independent Variable</th>
<th>Oral problems-Yes</th>
<th>No Oral problems</th>
<th>Odds Ratio</th>
<th>Bivariate analysis 95% CI</th>
<th>P value</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Family Size</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 5 members</td>
<td>131</td>
<td>46.6</td>
<td>150</td>
<td>53.4</td>
<td>0.586</td>
</tr>
<tr>
<td></td>
<td>&gt; 5 members</td>
<td>70</td>
<td>59.8</td>
<td>47</td>
<td>40.2</td>
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<td>Mothers education</td>
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<td></td>
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<td></td>
</tr>
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<td>&gt;Middle school</td>
<td>72</td>
<td>59.5</td>
<td>49</td>
<td>40.5</td>
<td>1.686</td>
</tr>
<tr>
<td></td>
<td>&lt;middle school</td>
<td>129</td>
<td>46.6</td>
<td>148</td>
<td>53.4</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Father's Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Skilled workers</td>
<td>39</td>
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<td>60</td>
<td>60.6</td>
<td>0.550</td>
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<tr>
<td></td>
<td>Unskilled worker</td>
<td>162</td>
<td>54.2</td>
<td>137</td>
<td>45.8</td>
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Table 4: Bivariate analysis of Caries Prevalence and Social Determinants

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<th>Sl.</th>
<th>Independent Variable</th>
<th>Caries =0</th>
<th>Caries &gt;1</th>
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<th>Bivariate analysis 95% CI</th>
<th>P value</th>
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<tbody>
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<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
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</tr>
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<td>Gender</td>
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<td>Male</td>
<td>89</td>
<td>53.6</td>
<td>77</td>
<td>46.4</td>
<td>1.098</td>
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<tr>
<td></td>
<td>Female</td>
<td>119</td>
<td>51.3</td>
<td>113</td>
<td>48.7</td>
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<td>Family Size</td>
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</tr>
<tr>
<td></td>
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<td>150</td>
<td>53.4</td>
<td>131</td>
<td>46.6</td>
<td>1.165</td>
</tr>
<tr>
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<td>58</td>
<td>49.6</td>
<td>59</td>
<td>50.4</td>
<td></td>
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<tr>
<td>3.</td>
<td>Father’s education</td>
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<tr>
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<td></td>
<td>&lt;middle school</td>
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<td>54.2</td>
<td>131</td>
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<td>4.</td>
<td>Mothers education</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>&gt;Middle school</td>
<td>66</td>
<td>54.5</td>
<td>55</td>
<td>45.5</td>
<td>1.141</td>
</tr>
<tr>
<td></td>
<td>&lt;middle school</td>
<td>142</td>
<td>51.3</td>
<td>135</td>
<td>48.7</td>
<td></td>
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<tr>
<td>5.</td>
<td>Father’s Occupation</td>
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<td>Skilled workers</td>
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<td>56.6</td>
<td>43</td>
<td>43.4</td>
<td>1.259</td>
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<tr>
<td></td>
<td>Unskilled workers</td>
<td>152</td>
<td>50.8</td>
<td>147</td>
<td>49.2</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Mother’s Occupation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Skilled workers</td>
<td>33</td>
<td>51.6</td>
<td>31</td>
<td>48.4</td>
<td>0.967</td>
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<tr>
<td></td>
<td>Unskilled workers</td>
<td>175</td>
<td>52.4</td>
<td>159</td>
<td>47.6</td>
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<td>7.</td>
<td>Family Income</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
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<td>14</td>
<td>35.9</td>
<td>25</td>
<td>64.1</td>
<td>0.476</td>
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<tr>
<td></td>
<td>&lt; Rs 10000</td>
<td>194</td>
<td>54.0</td>
<td>165</td>
<td>46.0</td>
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</tr>
</tbody>
</table>

Discussion and Conclusion

The unicentric approach of the existing Oral Health promotion strategies fails to address the root cause of the problems treating only the disease at sight, thus bearing minimum effect on the incidence rates.

Oral diseases affect around 90% of children, hampering their quality of life\textsuperscript{[8]}. The present study was conducted on 12 and 15 year old government schoolchildren since it is the age recommended by the World Health Organization for Global monitoring of caries\textsuperscript{[9]}. Parents’ perceptions of their child’s oral health revealed that 50.5% children faced oral problems in the past, with dental caries being the most common problem (41.2%) which was significantly associated with family size, mothers’ education and father’s occupation. A similar study by Amin M S et al found that 44% of the parents rated their child’s oral health as good but 56% had dental decay\textsuperscript{[10]}. An unskilled laborer works on daily wages and hence may not be able to afford quality and appropriate dental care causing poor oral health status among children.

In the present study, a poor dental attendance (36.9%) was reported by the parents owing to the high cost of Dental treatment. 28.9% attendance was for treatment of dental caries. Contrary to our study a study by Lourenco et al showed that 53.3% of the parents reported to have taken their child to a dentist, majorly for routine dental check up\textsuperscript{[11]}. In addition a review by Gambhir et al reported that dental ignorance, lack of time and self-medication were the reasons for poor dental attendance\textsuperscript{[12]}.
The Mean DMFT Score was 1.12+1.689 which was significantly associated with the family income. A similar study by Paula JS et al found that the mean DMFT score among children aged 12 years was 1.09+1.70\cite{13}. A study by Martins MT found family income to be strongly associated with caries\cite{15}. Individuals with lower family income deter oral care needs due to the high cost of treatment and fear of post treatment complications.

The study has a good internal validity and the findings can be extrapolated to children aged 12 and 15 years old. In addition, the study has been conducted in accordance with the Strobes checklist guidelines.

This is a cross-sectional study, hence the influence of social desirability bias, recall bias cannot be ruled out. Social determinants of health have several distal and proximal factors amongst which only a few were considered in the present study. Inculcation of more factors like environmental influence, community factors and health behaviors with comparison between rural and urban child population should be taken up to get a more comprehensive evidence.

The present study proves as an evidence base for policy makers, stakeholders and community members to realize the importance of social determinants in oral health promotion, thus helpful in the successful planning and implementation of programs. The correlation of social determinants of health and oral health established in the present study necessitates a multi-factorial approach of disease treatment incorporating the social determinants of health which will provide an insight into the proximal and distal variables of risk factors leading to successful oral health promotion.

Conflict of Interest: None

Source of Funding: Nil

Ethical Clearance: Obtained

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Perinatal and Background Risk Factors for Children with Autism Spectrum Disorder in Indonesia

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Abstract

Background: Indonesia has experienced an increased number of children with autism spectrum disorder (ASD). One of the challenges that Indonesia currently faces is how to reduce the perinatal and risk factors related with the incidence of autism. This study aimed to identify the perinatal and risk factors contributing to ASD.

Method: This research was a case control study involving 52 children with ASD in the case group and 201 normal children in the control group in Banyumas district, Province of Central Java, Indonesia. Data collection used independently completed questionnaires, concerning perinatal factors such as maternal age at birthing, gestational age, labor method, fetus presentation in labor, and history of complications during labor.

Results: Stepwise logistic regression analysis indicated a higher risk of preterm gestational age among children in the ASD group with $p=0.019$ and OR:5.883. Abnormal delivery method such as caesarean delivery or vacuum extraction also had association with the ASD group ($p=0.001$; OR=0.303). Abnormal fetus presentation during labor increased the risk of ASD ($p=0.004$; OR:6.908). Mother with complication during labor such as difficult labor, preeclampsia, and fetal distress correlated with ASD ($p=0.021$; OR:2.101). Multivariate analysis also showed complications during labor became a risk factor for ASD (OR: 2.142 (1.904-4.196). There was no correlation between maternal age below 20 years ($p=0.332$; OR=1.871) or 31-40 years ($p=0.115$; OR=2.868) with ASD.

Conclusion: Labor method, fetus presentation, and complication during labor were significantly related with ASD.

Keywords: Perinatal, labor, fetus, ASD, risk factors.

Introduction

Autism Spectrum Disorder (ASD) is a type of neurodevelopmental disorder. ASD presents with a range of severity and impairments in social, communication skill, and behaviors. Based on epidemiological data, it is estimated that the global prevalence of ASD is more than 7.6 million persons with various disabilities and has become 0.3% of the global burden of disease. In many developing countries such as Indonesia, ASD receives little attention and this lack results in fewer available studies about ASD. Consequently, Indonesia also has no current data about the exact national or provincial prevalence of ASD.

The cause of ASD is still unknown. A recent study showed that genetics account for only 35-40% of the contributing factors. The remaining 60-65% are likely...
due to a multi-factorial combination, involving prenatal, perinatal, and postnatal environmental factors. In a previous study, perinatal factors such as acute fetal distress, prematurity, exceeding the term, and difficult labor were found to be the most affecting factors in ASD. Considering the potential risk about perinatal factors, we used a case control study to investigate the association between perinatal factors and ASD.

Method

Research design: This case control study was conducted in a community in Banyumas District, Province Central Java, Indonesia. It was conducted over a period of four months from October 2017 to January 2018.

Population and samples: The sample included 253 children in Banyumas District, Province of Central Java, Indonesia. The sample population was divided into case group and control group. The case group was composed of 52 autistic children previously identified by psychologists in the Banyumas Autism Care Project (BACP) event. The control group was composed of 201 normal children. Inclusion criteria were children with age between 3-18 years old and willing to be a respondent with parental approval. Whereas, exclusion criteria were children with known neurogenetic conditions such as Down Syndrome, Mental Retardation, and Neurofibromatosis.

Sample size: Using sex differences between ASD within boys and girls as a risk factor and aiming to detect an odds ratio (OR) of at least 2 with a power of 80% using a 5% level of significance, the recommended sample size was calculated to be 58 cases and 58 controls.

Sample type and selection: Consecutive cases were selected over 4 months, during which time every weekend was allocated to visit the school of special needs children. We invited parents who have children with ASD and independently confirmed their approval by completing the informed consent form to permit their children to become participants for this study. The location for sampling was in the Research Center of the Faculty of Medicine, Universitas Jenderal Soedirman, Banyumas District, Central Java Province, Indonesia. Controls were selected from normal children who came with their parents and also were visited by the research team at local schools, until the required sample size was reached.

Instruments: This study used a demographic tool with questions about perinatal history. It consisted of five questions about Maternal Age at Birthing, Gestational Age, Labor Method, Fetus Presentation in Labor, and Complications during labor.

Data collection: Data were collected from parents of children ages 2-18 years old who were currently diagnosed using DSM 4 and DSM 5 by professional practitioners and then grouped in the case group (children with ASD) and the control group (children in normal state) during a four month study period using an independently completed questionnaire consisting of demographic factors and risk factors for ASD.

Statistical Analysis: Analysis were first done to describe the data and then to describe the trends resulting from each item. Bivariate analysis used Chi-square to explore relationships between variables. This study also used logistic regression for multivariate analysis to determine the most affecting factors in ASD.

Results

Two hundred and three respondents participated in this study. Maternal Age at Birthing, Gestational Age, Labor Method, Fetus Presentation in Labor, and Complications during labor together with the frequencies and presentation, P values and OR are shown in Table 1.

Table 1: Result of Risk Factors of ASD

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case Group (n = 52)</th>
<th>Control Group (n = 201)</th>
<th>P</th>
<th>OR</th>
<th>CI 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age at Birthing (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>3</td>
<td>24</td>
<td>0.332</td>
<td>1.871</td>
<td>0.527-6.639</td>
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<tr>
<td>20-30</td>
<td>29</td>
<td>124</td>
<td>ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>19</td>
<td>53</td>
<td>0.115</td>
<td>2.868</td>
<td>0.774-10.625</td>
</tr>
<tr>
<td>&gt;40</td>
<td>1</td>
<td>0</td>
<td></td>
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</tbody>
</table>
Table 1 shows the distribution of perinatal factors and relationship with ASD. Gestational age, labor method, fetus presentation in labor, and complications during labor were significantly correlated with ASD ($p<0.05$). Mother with preterm gestational age <37 weeks (OR: 5.883), fetus presentation (OR: 6.098), and complications during labor (OR: 2.101) had significantly increased risk for children with ASD. Meanwhile, abnormal labor method had a significant association with ASD, but it had a low relative risk (OR: 0.303). On the other hand, maternal age at birthing was not related significantly with ASD ($p>0.05$).

Table 2 shows the final result of multivariate analysis with logistic regression. Gestational age was excluded from the multivariate final result because it had a $p$-value more than 0.05. These result show fetus presentation in labor and complication during labor were the most affecting perinatal factors of ASD with OR: 4.487 and OR: 2.142.

### Discussion

For the Indonesian population sample, the most common perinatal risk factors related with incidence of ASD were preterm gestational age, abnormal labor method, abnormal fetus presentation in labor, and complications during labor with ASD. There were no significant relationship between maternal age at birthing and ASD. This result was the same with a recent study that showed an association between prematurity with ASD in Denmark\(^5\). Another study found there was a strong relationship between delivery circumstances such as labor method and fetus presentation with ASD in China\(^6\). A meta-analysis study also showed that history of complications such as difficult labor, preeclampsia, fetal distress, and other delivery problems significantly related with ASD\(^7\). Similar to this study, recent research found there was no relationship between maternal age at birthing with ASD\(^8\).

Infants with premature gestation get a high exposure to stressors during a critical period and it may affect the brain development. One study reported there were cerebellar lesions in preterm infants at risk of developing...

Preterm infants also had the largest gray matter cluster that included the left angular gyri and the heteromodal association region involved in complex language functions. This brain structure is known to be affected in ASD.

Abnormal labor method also had a relationship with ASD. Studies have shown a strong relationship between abnormal delivery method with ASD. Labor method such as vacuum extraction pose a potential harm such as brain injury. This brain injury could be a predisposing factor in ASD. Abnormal delivery method is also known have a potential risk as a brain injury agent and could contribute to abnormality in neurodevelopment in ASD. Infants with caesarian birthing history have been shown to have a lower APGAR’s score, which shows fetal distress syndrome could affect the infant’s neurodevelopment.

The next finding also showed that abnormal fetus presentation during labor increased the risk of ASD. Fetus presentation such as breech presentation is also known to be one of the risk factors for ASD. A fetus with breech presentation will experience a difficult labor and may need an abnormal delivery method such as caesarian that are risk factors of ASD. Previous study also had found that abnormal fetus presentation was related with ASD. One meta-analysis study had a similar result showing a strong relationship between fetus presentation with ASD. Breech presentation is also known as one of the risk factor in ASD. Breech presentation will conduct a difficult labor and need an abnormal labor method like caesarian. Other presentations such as placenta previa position also are known to cause delayed brain development and are potential risks for ASD.

History of complications during labor also could become a potential risk factor for ASD. Complications such as difficult labor, preeclampsia, and fetal distress can make infants susceptible to experience stress. Research in Australia found that complications during labor increased the risk of ASD. Another retrospective-cohort study in USA also found a potential risk of ASD related to the history of complications of intrapartum conditions. Circumstances during complications made infant more susceptible to get stress. These stressful complications potentially can cause infants to aspirate fluids into the respiratory system. Then, this impaired respiratory status of the neonate infant could be altered causing the brain to only get a little oxygen. In a lower oxygen conditions, the brain could be damaged causing a neurodevelopment disorder such as ASD.

Study Limitations: Perinatal factors could be significant risk predictors of ASD. However, this study had some limitation because further detailed explanation could not be given about the factors which potentially became a risk for ASD. Some factors need to be explained and examined more completely such as labor method, fetus presentation during labor, and history of complications during labor. It is considered important for further study to provide more detailed data to clearly determine the mechanisms and the effect of perinatal factors on ASD.

Conclusion

The perinatal risk factors for ASD included gestational age, labor method, fetus presentation in labor, and complications during labor.

This study highlights the importance of improving access to quality health services, with special care given to young mothers. Efforts in the future need to additionally focus on implementing preconception education and counseling programs to ensure more widespread pregnancy and delivery planning, which will help in improving maternal health and reducing the potential risks for autism spectrum disorder.

Conflict of Interest: The authors declare that they have no conflicts of interest.

Source of Funding: Thanks to Ministry of Research and Higher Education of Indonesia and Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada; Universitas Jenderal Soedirman for funding this research.

Ethical Clearance: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References


Compare Transferrin Binding Protein (Tbp A) Gene Virulence of Pasteurella Multocida Type B of Buffalo and Vaccine Septicemiaepizootica

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Abstract

Septicemia Epizootica (SE), is a fatal acute septicemia disease by Pasteurella multocida. B:2,5 and E:2,5 in cattle and buffalo. TbpA has a number of important role for bacterial cells, such as nutrient uptake, transport of molecules in and out of cells and interactions with the environment and host. P. multocida iron acquisition related gene, tbpA, has been considered as an important epidemiological marker. The purpose of this study was to compare the Transferrin Binding Protein A (TbpA) gene from P. multocida type B of buffalo and it with vaccine strain. Characterization of TbpA of P. multocida and vaccine strain was done using PCR then sequencing. Sample used in this study were P. multocida local isolate from NTT and vaccine strain (Katha). Isolation and identification were performed using bacteriological culture and biochemically characterization. Results from PCR showed positive a tbpA gene on P. multocida local isolate and vaccine strainis. The comparison of the results of sequencing between the tbpa gene isolates P.multocida and vaccines showed deletion.

Keywords: SeptisemiaEpizootica; Pasteurellamultocida type B; Transferrin Binding Protein A (TbpA) gene; PCR, buffalo.

Introduction

Septicaemia Epizootica (SE), is a fatal acute septicemia disease by Pasteurellamultocida serotype B:2,5and E:2,5 in cattle and buffalo. In Southeast Asian countries including Indonesia, Philippines, Thailand, Malaysia, Middle East and South Africa disease Septicemia Epizootica is an important bacterial disease. [16] In Indonesia the disease was first reported in 1884, in the area of Balaraja Tangerang. [7] SE disease is reported in several regions in Indonesia such as Bengkulu, North Sumatra, Riau, Jambi and East Nusa Tenggara. [19] Pasteurella multocida is a gram-negative bacterium, coccobacillus (short stems) of 0.4-0.8 μm long and 0.3μm in diameter and bipolar, non-motile bacteria, producing toxins, some of which are found as commensal flora in the upper respiratory tract in domestic animals or wild. [15] The pathogenesis of septicemiaepizootica disease is the interaction between host factor and virulence factor of bacteria (pfha, tbpa, toxa), such as lipopolysaccharide (LPS), capsule, outer membrane protein (omp). [17] P. multocida can cause pneumonia in cattle and sheep and in cattle and buffalo. [4] and stress factors such as weather changes, nutrient changes, fatigue etc. can cause fulminant infections. and so attacked in animals that immunospressed cause primary and secondary infections. TbpA has a number of important roles for bacterial cells, such as nutrient uptake, transport of molecules in and out of cells and interactions with the environment and host. [14] The receptors and transferrin and lactoferrin mechanisms involve iron-binding proteins expressed on the surface of bacterial cells, and then directly interact with iron-binding glycoproteins. The problem of SE disease in Indonesia is still commonly endemic, although vaccination has been done once a year using the SE vaccine made from the Katha strain. Identification of the virulence factors is helpful in the determination of the mechanisms of pathogenesis and development of control measures such as the establishment of an efficient vaccine. [11] The purpose of this study was to compare the Transferrin Binding Protein A (TbpA) of P.multocida local isolate from NTT and with vaccine strain.
Materials and Method

Samples: Sample of P. multocida isolate originated from NTT (Nusa Tenggara Timur) were obtained from Balai Besar Veteriner Denpasar, Bali. Sample was cultured on Blood Agar medium by streak and then incubated for 24-48 hours at 37° C in incubator. Previously, this isolate had been tested for its capsular type. Haemorrhagic Septicaemia vaccine (P. multocida Katha strain) from Pusat Veterinaria Farma (Pusvetma) Surabaya was used as a vaccine strain sample.

Re-identification of Pasteurellamultocida:
Inoculation on MacConkey Agar medium was performed to determine the growth properties of Pasteurella multocida. Which is P. multocida do not grow on Mac Conkey media. Furthermore, the examination using biochemical test, namely: TSIA test, SIM test, SCA test, Urease test, and Sugar test. [9]

DNA Extraction: Total genomic DNA of P. multocida was extracted with QIAamp® DNA Mini kit according to standard protocol.[21] Briefly, bacteria that have been cultured on Nutrient Agar (NA) at 37°C overnight, were inserted into tube. After addition of bacteria/vaccine incubated at 60 °C for 30 minutes. The 200μL AL buffer is added to the tube, then vortex. The mixture of the ingredients in the tube is transferred to the spin colomn, then adds 200 μL of 96% ethanol. After that, centrifuged at 8,000 rpm for 1 minute and washed using AW1 500μL. After that, centrifuged again for 3 minutes at 13,000 rpm and the bottom of the spin colomn removed. After that, it was centrifuged again for 1 minute at 13,000 rpm and transferred to an empty sterile tube. After that added 50μL AE Buffer and incubated for 1 minute at room temperature. Then centrifuged for 1 minute at 8,000 rpm.

Detection of TbpA gene by PCR assay:
Amplification of the TbpA gene was performed using both TbpA-F and TbpA-R primer in 20μl PCR mixture. Primer TbpA-F forward F: 5'-GACAGAAATATAGCTCGGGGAG-3’ and TbpA-R reverse R: 5'-TAA CGT GTA CGG AAA AGC CC-3’ with gene target 603bp.[8] The thermal cycling conditions are: 1 cycle at 95°C for 5 minutes; 40 cycles at 94°C for 30 sec, 50°C for 1 minute, and 72°C for 1.5 min; 1 cycle at 72°C for 10 minutes. This PCR profile is repeated three more times to ensure specific PCR products. And then analyzing the pcr product with electrophoresis in gel agarose 1%.

Sequencing: From the precipitation results, the Hi Formahide 25 μl of HI-DI suppressant was added and then heated at 25 C for 2 minutes, then incubated in ice for 3 minutes. After that it is transferred into the microtube to be inserted into the sequencing machine. The sequencing machine used is ABI PRISM 310 GENETIC ANALYSIS-Applied Biosystem 1 capillary with a length of 5-47 cm x 50 μm which can produce a sequence length of up to 700 nucleotides. Running is done overnight. [2]

Results and Discussion

Re-culture and Re-identification of Pasteurellamultocida: The result from recultured of P.multocida on Blood Agar incubated 37 ° C for 24-48 hours .Colonies of clear shiny bacterial bacteria, does not hemolyzed red blood cell and does not growing on Mac Conkey Agar medium can be said suspect P. Multocida. The suspect colonies of P. multocida were then confirmed by biochemical test, the TSIA was obtained in alkaline slat and butt, yielding no gas and H₂S. In the Indol test the pink ring appeared on the surface after Kovach’s reagent was added. In Urease Test this bacteria does not produce urease enzymes so it can not change the color of Urease media. In the Simon Citrate Agar Test this bacteria can not use citrates as carbohydrates so as not to change the color of the media Simon Citrate Agar. And in the sugar test this bacteria show sukrosa(+), glukosa(+), and manitol(+) which means fermenting sugars to form acids and laktosa(-), Maltosa (-) It means negative germ does not ferment sugar.

Detection of tbpA gene by PCR assayand Sequencing: The TbpAgene and from vaccine successfully amplified (Figure 1).And the result of comparison the sequencing between the tbpgene isolates P.multocida and vaccines showed deletion (Figure 2). In Indonesia, SepticemiaEpizootica disease is still commonly endemic, although vaccination has been done once a year using vaccines made from Katha strains.[13] Determination of pathogenesis mechanisms and the development of control measures such as efficient vaccine formation can be assisted by the identification of virulence factors.[11]

Bacteria Pasteurellamultocida serotype B: 2.5, as the cause of Septicemia Epizootica in buffalo and cattle. In the presence of transferin binding proteins, an outer membrane protein weighing 82-kDa that specifically binds to cow transferrin. And in Pasteurellamultocida
serotype B bacteria: 3.4 the same as katha strain vaccine does not express transferin binding protein. These results might indicate a role for transferrin binding in the pathogenesis of Septicaemia Epizootica in cattle and buffalo.

On the basis of presence in this study of tbpA genes in genomes, distinct categories of Pasteurella multocida isolates can be identified in this study; P. multocida isolates that have tbpA in genomes, these bacteria have potential for disease induction. Furthermore, PCR for virulence genes detection showed important role of tbpA in diseased buffaloes. Significant association tbpA virulence factors in P. multocida strains isolated from diseased buffaloes showed their association with the disease status.

The high prevalence of the acquisition of tbpA iron acquired genes in pasteurellamultocida isolates as well as roles associated with pneumonia and septicaemiaepizootica, providing additional bacterial advantages to increase pathogenicity in Septicemia Epizootica.[22]

Significant association results of virulence factor of tbpA gene in pasteurellamultocida isolated from sick livestock indicate disease status. According the TbpA protein is responsible for the extraction of iron from transferrin and also the outer membrane protein Ton B with a large surface to bind and force the separation of iron from the transfer.[19] In poultry strains was the opposite of cattle strains. if the poultry strain can not capture iron from any transferrin molecule, but on the strain of P. multocida cow that utilizes iron from cow transferrin,[15] which might be the explanation for the low frequency of tbpA gene in the chicken isolates.[7]

PCR detection of tbpA gene of P. multocida and Vaccine

PCR detection of tbpA gene of P. multocida and Vaccine

Figure 1. Results of PCR of TbpA gene of P. multocida and Vaccine strain

Figure 2. Results of Sequencing Isolate P. multocida and Vaccine strain.
Conclusion

In this study, the TbpA gene from local isolate P. multocida serotype B and vaccine showed positive. That is, the virulence factor plays an important role in SE disease associated with pneumonia, seen from the role of tbpA as a nutrient uptake transporter that helps regulate bacteria express protein proteins such as OMP to infect susceptible animals so more investigation of virulence and environmental and host associated with bacterial virulence factor. And the result of comparison the sequencing between the tbpA gene isolates P. multocida and vaccines showed deletion. However, this may suggest that virulence and environmental factors, including other genes, may have an important role in the induction of the disease.

Competing Interests: The authors declare that they have no competing interests.

Source of Funding: The authors would like to thank the my parents, Virgianto and Ratna Susilowati.

Ethical Approval: The research does not need ethical approval. However, samples were collected as per standard collection method without any harm and stress to the animals.

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Relationship Between Big Five Personality Traits to Compliance of Site Operational Procedure (SOP) of Grinding Machine in Maintenance Contractor PT. X

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Abstract

Site Operational Procedure (SOP) is implementation work procedures that are more focused on the work are a at PT.X. Initial review mentions that grinding workers do not apply the SOP correctly on their work steps. The behavior of workers was unsafe which could lead to accidents.

The behavior was a manifestation of the worker personality. Different worker personalities will produce different behaviors. The purpose of this study was to analyze the relationship of big five personality traits to compliance of SOP for grinding machine.

This research was observational with a cross sectional design. Respondent research was 54 grinder. Big five personality traits were independent variables. The dependent variable was compliance of SOP for grinding.

The results showed that 50 % of 54 respondents did not complied the SOP and analysis of multiple logistic regression showed about independent variabel that significantly effected to SOP complied was neuroticism traits \( (p = 0.006) \). An assessment of the traits of workers personalities, both openness, conscientiousness, extraversion, agreeableness, and neuroticism, shows a high category for each assessment of traits. The assessment shows that only neuroticism traits were related to SOP compliance with unidirectional values, it cause by workers whom easily worried and anxious tend to careless and self-destructive actions.

It is recommended to paying attention for the dominant personality background of workers while recruitment, especially the mechanical field. Personality can be used as an assessing predictor in compliance behavior with work procedures.

Keywords: SOP, personality, Big five, Grinding, Neuroticism.

Introduction

Compliedness of systematic work procedures is an important factor in the occupational health and safety management system. A job requires a clue as a guideline for workers to reduce the risk of accidents. Workers are required to obey work procedures to establish safe work behavior. Geller’s¹ theory explains that if someone follow and adhere to safe working procedures consistently, then indirectly will make workers safe behavior.

Compliedness of following work procedures will used to be an assessment of the behavior for workers in obeying the rules. Workers who did not complying work procedures properly did unsafely behavior at work. This would provided a great opportunity in causing the incidence of workplace accidents. Data on accident trends in Indonesia recorded around 9,891 cases of workplace accidents.
accidents, 2,218 of them fatal accidents to death, and 65 cases caused by violations of work procedures.\textsuperscript{2,3,4} Violations that often occurs such as work steps is not according to procedures, jokes while working, improper working position, works too close to a rotating machine, uses a machine that exceeds the standard limit.\textsuperscript{5,6} 

Companies are required to implement and supervise the implementation of Site Operational Procedure (SOP) in the workplace, so that workers avoid the risk of danger. SOP is a way of determining an activity or a work process.\textsuperscript{7,8} So that it can be seen that the implementation of SOP is something that cannot be considered trivial, because it is related to the chance of harm if it is not done properly.

Compliance with SOP is a form of behavior that can be influenced by individual internal factors, one of which is personality. The problem that often occurs in failure to comply with SOPs is that workers do not want to know the behavior that causes accidents.\textsuperscript{9} Behavior as a manifestation of personality will determine whether the individual can behave according to the rules or not. The personality of each worker is different, so the behavior that appears will also be different.

Assessment of big five personality is now often used as a predictor in assessing work behavior. The big five personality consists of five traits; openness, conscientiousness, extraversion, agreeableness, and neuroticism. Each of these traits, psychologically provide an overview of the employee’s personality and its relationship with behavior in compliance with workplace safety SOPs.\textsuperscript{10,11,12} For example, workers who have high openness traits in their personality will not necessarily behave well, compared to workers who have low agreeableness traits. Same thing with other big five personality traits.

In this study, researchers focused on SOPs with a special scale in grinding to see big five personality traits that affect their compliance.

**Materials and Method**

The design of this research is cross sectional with observational research. The respondent were included 54 people with inclusion criteria, physically healthy, had never been experienced an accident before and were willing to take part in this study. The independent variables of this study were big five personalities (openness, conscientiousness, extraversion, agreeableness, and neuroticism). The dependent variable was compliance with the SOP for grinding machine.

The data collection technique was filled out a valid questionnaire about the big five personality and compliance of SOP of grinding machine. Then, observated respondents regarding complianced of SOP. The analytical method used include descriptive analysis and quantitatively with Logistic Regression analysis.

**Finding:**

**a. Big Five Personality**

**Table 1. Personality of the Big Five Respondents**

<table>
<thead>
<tr>
<th>Complieded Variable</th>
<th>Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Openness to Experience</td>
<td>High</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>High</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
</tr>
<tr>
<td>Extraversion</td>
<td>High</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>High</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>High</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
</tr>
</tbody>
</table>

Based on the first trait, it showed that 32 respondents (59.3%) response to The Big Five Personality on the agreeableness traits indicator was the highest, while the neuroticism traits indicator gave a balanced response, 27 respondents (50%).

**b. Compliance of SOP of Grinding Machine:**

Half respondent (27 respondents) was found to be compliant with the SOP as many as respondents who did not comply with the SOP. Based on this, it can be seen that there were still workers who behaved non-compliance with SOP of grinding machine.
c. Analysis of Big Five Personality to Compliance of SOP

Table 2. Big Five Personality to Compliance of SOP

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Compliance of SOP</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Openness</td>
<td>High</td>
<td>11</td>
<td>36,7</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>16</td>
<td>66,7</td>
<td>8</td>
</tr>
<tr>
<td>Conscientious</td>
<td>High</td>
<td>10</td>
<td>34,5</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>17</td>
<td>68,0</td>
<td>8</td>
</tr>
<tr>
<td>Extraversion</td>
<td>High</td>
<td>10</td>
<td>33,3</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>17</td>
<td>70,8</td>
<td>7</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>High</td>
<td>12</td>
<td>37,5</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>15</td>
<td>68,2</td>
<td>7</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>High</td>
<td>9</td>
<td>33,3</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>18</td>
<td>66,7</td>
<td>9</td>
</tr>
</tbody>
</table>

The results of respondents showed that most of each personality traits with a high category showed not compliant behaviour to the SOP. The percentage of openness traits was high at 63.3%, high conscientiousness personality at 65.5%, high extraversion personality at 66.7%, and high agreeableness personality at 62.5% which showed non-compliance with SOP. The traits of neuroticism was not given a percentage value that is dominant both in the high neuroticism category and in non-adherence or low and obedient neuroticism, because the value was balanced at 66.7%.

Table 3. Multiple Logistic Regression Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>p-value</th>
<th>PR</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>0.930</td>
<td>1.81</td>
<td>Not related</td>
</tr>
<tr>
<td>Conscientious</td>
<td>0.336</td>
<td>1.97</td>
<td>Not related</td>
</tr>
<tr>
<td>Extraversion</td>
<td>&lt;0.10</td>
<td>0.192</td>
<td>2.12</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>0.380</td>
<td>1.81</td>
<td>Not related</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>0.006</td>
<td>2.00</td>
<td>Related</td>
</tr>
</tbody>
</table>

Based on the result showed that one of five traits has correlation to compliance of SOP grinding machine, it was neuroticism trait. The Prevalence Ratio (PR) was 2.00, showed that respondent who experienced of low neuroticism personality would have a chanced 2.00 more to compliance the SOP grinding machines then respondents who experienced high neuroticism.

Discussion

a. Big Five Personality: The results showed that the value of each personality traits was in the high category. The openness personality traits were the widest personality domain of the Big Five Personality because of the individual’s curiosity towards new things, including science, imagination, and creativity. Individuals with a high openness personality are described as curious, adventurous, and brave.13,14

An individual with high conscientiousness characterized as an individual planner for work, careful, thorough, and has strong goals. Individuals who have high conscientiousness will have greater achievement in organization and professional than individuals with low conscientiousness.15,16

Extraversion personality could be described by social relationships individually. Extraversion is a personality type that assesses social skills, communication and interaction, so this personality was very useful for disseminated information to coworkers.17,18 High individuals in extraversion tend to involve others in conversation, seek attention, and compete with coworkers.

This result explained that respondents who showed higher agreeableness were more than other traits. Personality agreeableness basically can be used as a predictor in assessing compliance, because the main characteristics of individuals who have high agreeableness were trustworthy, obey, honesty, courtesy, and they tend to be cooperative.19,20

The neuroticism traits were closely related to emotional stability. Individuals with high neuroticism personality were easily anxious, irritable, nervous, depressed, and not confident.21,22 Conversely, individuals with low neuroticism would found it easier to feel satisfied, happy and other positive emotions in their personality.12

b. Compliance of SOP of Grinding Machine: The level of the respondents compliance showed the same results whether they were obedient or not obedient. Many stages of work procedures were often not carried out by workers. Workers explained that they know and understand about SOPs of their regular jobs, but sometimes the demands of work targets and work habits that made them feel these
actions are not dangerous. Violation of the procedure would pose a potential hazard for workers, such as sparks, electrocution, scratches on grinding and noise.\textsuperscript{23}

We also find that there were many workers who behave complied with SOP of grinding machine. Workers who complied their work procedures on the basis of the willingness and awareness of workers obey and implement the OHS regulations that have been made by the company. Geller\textsuperscript{1} explained that compliance is a safety behavior that specific to the object of the work environment. Compliance with work procedures has an important role in creating work safety.

c. Analysis of Big Five Personality to Compliance of SOP: The test results showed that of the five big five personality traits, only neuroticism traits had a significant relationship with compliance of SOP of grinding machine. The results of the test value could be interpreted that workers who have low neuroticism traits have the opportunity to behave according to SOP 2 times greater than workers whose high neuroticism traits.

Workers of grinding showed that those who had a high value of neuroticism had properties such as being easily anxious and easily worried. They feel the feeling of being threatened by the danger of their work. That were what made them often work based on their habits that they consider safed and ignore the safety procedures that have been made by the company. In addition, workers who have feelings of worry and are easily anxious tend to act carelessly and endanger themselves.

The opposite results for workers who has low neuroticism personality values, they have more positive emotions and feel confident about every job they do. Those who have high emotional stability like this tend to be easier to think in overcoming problems in their jobs. Workers would showed cooperative behavior towards each job given and tended to be easy to understand the rules made by the company, and tended to behave obediently.

Pervin and Cervone’s\textsuperscript{12} explain that neuroticism is also called emotional instability. High neuroticism individuals tend to be nervous, sensitive, tense and easily anxious in this case they will easily feel worried and insecure. This traits have a strong influence on cognitive failure of individuals.\textsuperscript{24} The cognitive failures in question include disturbances, errors, and omissions would have minor consequences or cause accidents. This nature will have a bad impact on individual behavior in their work. Individuals with high levels of neuroticism are closely related to violations of rules or procedures.\textsuperscript{25,26}

Neuroticism have an influence on unsafe behaviors that cause workplace accidents, so as predictors in the model SOP adherence to the safety of workers.\textsuperscript{10,27} This is because neuroticism individuals who have concerns about a negative event tend not to be optimal at work and very easily disturbed, which increases the risk of their behavior. In addition, when a person has high neuroticism, he may consider feedback as a type of threat will produces anxiety and stimulation too intense. Thus, they often behave negligently, such as careless mistakes, fail to follow work norms or rules, or produce errors in their work.\textsuperscript{28,29}

**Conclusion**

Employees personality contributed to determining employee compliance with the SOP for grinding machine. Assessment of personality traits showed only neuroticism traits associated with SOP compliance. This was because workers who were easily worried and anxious tended to carry out careless and self-destructive actions, so they often violated work rules or procedures. While workers who has low neuroticism having positive emotions and were more confident, so they would behaved more in compliance with the SOP.

**Conflict of Interest:** None

**Source of Funding:** Departement of Occupational Health and Safety, Public Health Faculty, Airlangga University, Surabaya, Indonesia

**Ethical Clearance:** Data collection was carried out after the research proposal passed the ethical test and was declared passed by the Health Research Ethics Commission of the Faculty of Public Health, Airlangga University, with the number: 591-KEPK. All research respondents have been given an explanation and information about the objectives and method of this research and have signed forms of willingness to become respondents.

**References**


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The Influence of Emotional and Spiritual Intelligence on Smoking Cessation Intention in College Student

Dewi Masithah¹, Oedojo Soedirham², Rika S. Triyoga²

¹Post Graduated Student of Department of Health Promotion and Behavior Science, 
²Staff of Department of Health Promotion and Behavior Science, Public Health Faculty, Airlangga University

Abstract

The number of smokers in Indonesia is the highest in the Southeast Asia region. 53.3% of male smokers over 15 years old was smokers. The results of Basic Health Research 2013 stated that every year tobacco users was increase. To stop smoking, a smoker needs strong intentions. The study was conducted at State University in Madura Island with male smoker student respondents with a sample size of 300 students. The sampling technique used the proportionate stratified random sampling method. The result showed that emotional and spiritual intelligence significantly influence on smoking cessation intention

Keywords: Intention, Smoking cessation, Emotional Intelligence, Spiritual Intelligence, Theory of planned behavior.

Introduction

Smoking is one of the behaviors that can trigger various types of diseases. Research conducted in the United States in 2014 showed that cigarettes are a major cause of chronic bronchopulmonary disease. Every year more than 7 million people worldwide died because of tobacco use and 80% of deaths occur in middle and low income countries.¹,²

Globally, 942 million men and 175 million women aged 15 or more are smokers.³ The results of The Indonesia Basic Health Research (IBHR) 2007 showed that the prevalence of tobacco users was 34.2%. In 2010, the prevalence of tobacco users was 34.7%, and increase to 36.3% in 2013. This showed that tobacco users was increased every years.⁴ Quitting smoking causes unpleasant physical and psychological symptoms. Physical symptoms such as felt include chest tightness, heart palpitations, and sweating. Psychological symptoms that occur include feeling sad, restless, angry, insomnia, difficult to concentrate, and irritable.⁵

To stop smoking, smokers need strong intention. Intention is a motivating factor that influences behavior. Intention indicates how hard someone is willing to try and how much effort someone makes to do a behavior. Intention is influenced by attitude toward behavior, subjective norm, and perceived behavior control. Attitude toward behavior is a function of trust about the consequences of behavior and an assessment of that behavior. Subjective norms are related to one’s normative beliefs about behavior. Perceived behavior control describes a person’s feelings, whether the person is capable or not able to perform the behavior. Attitude toward behavior, subjective norm, and perceived behavior control was influenced by background factors. One of this background factors is emotional and spiritual intelligence.⁶

Today there are many studies that connect emotional and spiritual intelligence with healthy living behaviors. The concept of emotional intelligence (EI) was originally introduced by Salovey and Mayer in 1990. Emotional intelligence is the ability to feel emotions, express emotions, regulate emotions, and use emotions to increase emotional and intellectual growth.⁷ Spiritual intelligence (SI) is the ability to handle and solve problems of meaning and value. Intelligence that makes one can judge actions or ways of life that are more meaningful than others.⁸ The purposed of this study was analyses the influence of emotional and spiritual

⁹ DOI Number: 10.37506/v10/i12/2019/ijphrd/192098
intelligence on smoking cessation intent in college student.

**Materials and Method**

This research is an observational analytic study with a cross sectional design with a quantitative approach. The sample in this study was male students. The male sex was chosen because from the initial survey there were no female smokers. The sampling technique was using the proportionate stratified random sampling method with a sample size of 300 respondent.

The independent variables in this study are emotional intelligence and spiritual intelligence. Emotional intelligence was measured by using modified Assessing Emotional Scale (AES) consisting of 20 questions and score range of 20-80. Spiritual intelligence is measured using a modification of The Spiritual Intelligence Self-Report Inventory (SISRI) which consists of 16 questions with a score range of 16-64. The intervening variable in this research is the attitude toward smoking cessation behavior, subjective norm, and perceived behavior control. Attitude toward smoking cessation behavior and subjective norms is measured by a questionnaire, each of which consists of 6 items with a score range 6-24. Perceived behavior control was measured by a questionnaire consisting of 8 item questions with a score range of 8-32. The influence between variables was analyzed by multiple linear regression analysis.

**Findings:** Respondents in this study were college students aged 18-24 years with mean 20.60 years and standard deviation (SD) 1,314. The age of most research respondents was 20 years with a total of 29.33%.

**Table 1. The influence of emotional and spiritual intelligence on attitude toward smoking cessation behavior**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>p</th>
<th>b</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>0.849</td>
<td>0.007</td>
<td>Not significant</td>
</tr>
<tr>
<td>SI</td>
<td>0.024</td>
<td>0.083</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Table 1 show the independent variables that influence attitude toward smoking cessation behavior was spiritual intelligence (SI) with $p < \alpha (0.024 < 0.05)$. The emotional intelligence (EI) variable does not significantly influence attitude toward smoking cessation behavior. Both EI and SI have a positive effect on the attitude toward smoking cessation behavior.

Emotional intelligence (EI) includes the ability to understand, regulate emotions, assess emotions of yourself and others and use emotions to support better thinking skills. A person with high EI has a better ability to regulate emotions. With better emotional regulation, the person does not feel stress and pressure when dealing with peers who force him to smoke.

Spiritual intelligence (SI) is one’s ability to think existentially critical, make personal meaning, have transcendental awareness, and expand conscious states. A person with high spiritual intelligence, the ability to make personal meaning and critical existential thinking is also high. Amirian & Pour (2015) states that someone with high spiritual intelligence, his health status is better than someone with lower spiritual intelligence. This indicates that spiritual intelligence provides support to deal with daily pressures and makes someone more adaptable to competition.

**Table 2. The influence of emotional and spiritual intelligence on subjective norms**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>p</th>
<th>b</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>0.065</td>
<td>0.059</td>
<td>Not significant</td>
</tr>
<tr>
<td>SI</td>
<td>0.087</td>
<td>0.067</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Smoking was a behavior that many student college did. Based on the initial survey, 71% of male college students were smokers. Quitting smoking is difficult if the environment around smokers is not supportive. Family is one of the factors that can influence someone to stop smoking. Family pressure and discomfort when having to smoke in front of family members is a reason given by smokers.

Since ancient times spirituality has become an integral part of human life. Spirituality is something that is related to the religiosity of a society. Spirituality is something that is related to the religiosity of a society. The practice of spirituality in a society can be based on the religion embraced in that society. Differences in ways of thinking and ways of looking at the community towards smoking cessation behavior can influence the norms that exist in these communities. Norms that exist in society can influence individual subjective norms.
Table 3. The influence of emotional and spiritual intelligence on perceived behavior control

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>p</th>
<th>b</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>0.008</td>
<td>0.097</td>
<td>Significant</td>
</tr>
<tr>
<td>SI</td>
<td>0.599</td>
<td>-0.030</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Behavior control is the extent to which an individual controls desire to quit smoking and the individual feels that quitting smoking is easy. This study showed that behavioral control of smoking cessation behavior is low if the respondents gathered with friends. Trinidad et al (2004) state that emotional intelligence is related to the variable risk factors for smoking. Emotional intelligence has a protective association with psychosocial risk factors for smoking. Individuals who have high emotional intelligence feel the greater negative social consequences associated with smoking. This causes the individual to be more able to refuse the offer of smoking and has a low intention to smoke. Individuals with higher emotional intelligence are better able to accept the feeling that if they don’t smoke they will have fewer friends or feelings that they are not desirable to be part of the group.  

Spiritual intelligence is a mechanism that enhances people’s lives through the creation of more effective and deeper interpersonal and internal communication. Spirituality in a person allows individuals to give meaning to difficulties, tensions, and losses that cannot be predicted in everyday life. Spirituality can also make an individual look optimistic. If spirituality can make a person optimistic, someone with high spiritual intelligence should be optimistic about how he feels about quitting smoking. Smoking cessation behavior requires an optimistic view of smokers who intend to quit smoking. This optimistic mind encourages smokers to continue to quit smoking despite experiencing various difficulties.

Table 4 showed attitude variables toward smoking cessation, subjective norms, and perceived behavior control have a significant influence on the intention to quit smoking. These three variables have a positive influence on the intention to quit smoking. This means that the more positive the attitude toward smoking cessation the greater the intention to quit smoking that person has. The higher the subjective norm, the greater the intention to quit smoking that person has. The higher the perceived behavior control the higher the intention to quit smoking that person has. The lower the perceived behavior control the less the intention to stop smoking is owned by that person.

Asare (2015) showed that attitude is a variable that significantly influences intention. The same finding (Sulpat, 2018) showed that the attitude toward smoking cessation is an attitude towards smoking cessation behavior whether or not smoking cessation behavior is beneficial. A person’s attitude is influenced by various backgrounds. This background can come from individual factors, social factors, and information. Individual factors include personality, emotions, and intelligence. Social factors include age, gender, education, and religion. Information factors include experience, knowledge, and media exposure. Attitudes have aspects of thought (cognition), feeling (affection), and action predisposition (conation) but there is no assumption that one component easily overtakes the other components. This tripartite model only stipulates that there will be pressure for three components to be consistently evaluative of each other.

Subjective norms can be a social pressure on individuals to carry out a behavior. The existence of social pressure to stop smoking, for example, a campaign to stop smoking, or the opinion of important or influential figures about smoking cessation behavior is something strong to change behavior. Perceived behavior control describe a person’s feelings of being able or unable to perform the behavior. Perceived behavioral control refers to the individual’s trust in his ability to perform the behavior in question. Along with subjective norm and attitudes toward smoking cessation behavior, perceived behavior control are other important predictors of intention. Martinez & Lawell (2016) stated that low perceived behavior control can be caused by lack of skills or the existence of environmental barriers to individuals.
A person who believes that he cannot do behavior, even if he has a positive attitude or strong subjective norm to stop smoking, will have a reduced effect or weakening the formation of intention. An individual can have positive subjective attitudes and norms towards this behavior, but the perception of behavioral control acts as a precondition in forming intentions. Behavioral control perceptions also tend to vary as a function of various factors, such as previous individual experience, representative experience, persuasion, and physiological conditions. In the context of lifestyle or behavior, for example, perceptions of behavioral control can be influenced by previous individual failures. Perceived behavior control can adjust the ‘volume’ of intentions and the norm-intention relationship that is felt by blunting it between those with lower perceptions of behavioral control, and strengthening it among those whose perceptions of behavior control are higher. This proposition is also consistent with the conceptualization of perceptions of behavioral control as a motivating element in behavior formation and behavior change.22

Conclusion

Emotional and spiritual intelligence influenced the intention of smoking cessation. Emotional intelligence influenced the intention to stop smoking through perceived behavior control. Spiritual intelligence influenced the intention of smoking cessation through attitude toward smoking cessation. Both emotional intelligence and spiritual intelligence did not influence intentions of smoking cessation through subjective norms.

Conflict of Interest: The authors declare that we have no conflict of interest

Source of Funding: This research used personal funds

Ethical Clearance: This research was approved by Health Research Ethic Committee Faculty of Public Health Airlangga University (No: 351-KEPK).

Reference
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Ammonia Gas Release: Study of the Causes and Negative Impact Potential towards Workers and Communities around Fertilizer Company XYZ, Indonesia

Diana Mutia Pratiwi1, Roekmijati Widaningroem Soemantojo2,3, SuyudWarnoUtomo2,4

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Abstract

Exposure to ammonia gas due to specific factor towards the environment, particularly to workers and the community has a potential negative impact, especially in the form of health problems. This study was to analyze the factor that causes ammonia gas release in the environment and the negative effects of especially workers and communities that lived around the plant. Narrative analysis by comparing the key informant interview, field observation, questionnaire with likelihood scale, severity scale, and also t-test sample was used as the method in this research. Based on the study, it was found that 71.11% ammonia gas release because of certain conditions while 28.90% because of the process part. Certain conditions that often caused ammonia gas release are located in ammonia storage tanks, cooling water reservoirs, and pumps and valves, with certain conditions such as clogging, negligence, maintenance, and start-ups. The impacts of ammonia occur on humans through inhalation and directly cause irritation, and respiratory problems that differ in each depends on the exposure duration and concentration level.

Keywords: Ammonia Gas, Ammonia Release, Ammonia Health Impact, Chemical Hazard, Fertilizer Plant.

Introduction

The more complex processes and technology in an industry, the higher the possibility to involve a material that can cause accidents that threaten human life and the surrounding environment(1). Ammonia gas exposure occurs in workers in industries engaged in synthesis, formulation, transportation, along with the use of these substances (2). Ammonia gas can be dangerous when contacted in tissues in living bodies that have moisture or contain water (3). When contact with humans, ammonia gas reacts with water in the surface layer of the eyes, skin, and respiratory tract to form caustic ammonium hydroxide compounds (4), causing a sensation such as burning or irritation in the area (5).

The release of ammonia gas in the air can cause serious health problems for humans and ecosystems, even in small concentrations ranging from tens of ppm (6).

This article presents a case in a fertilizer company XYZ, Indonesia. PT. XYZ is a company engaged in the manufacture of Ammonia and Urea Fertilizers located near the Musi River, approximately 7 km from the center of Palembang City, South Sumatera. The plant has 4 plants with a total production capacity of 1,149,000 tons per year of ammonia and 2,280,000 tons per year of urea. During the manufacturing process, ammonia gas is often released in the air in factory processes caused by instrument/human factors.

On September 14th, 2001, there had been a disruption due to plant activity which was prone to noise that reached 78 dB (A) and was contaminated ammonia gas which reaches 12 ppm near the surrounding community that lived in 700m radius from the plant. This is supported by the study of Navianti(7), it was analyzed that ammonia exposure was around 73.8% for exposure to high concentrations (2330 µg/m³), and 43.9% for exposure to low concentration ammonia gas (174.5 µg/m³). This value is quite high considering the quality standard for ammonia in ambient air according to PP. RI No.41 of 1999 is 1360 µg/m³/24 hours. On March 5th, 2014, tourists and residents who wished to visit Kemaro Island Palembang in the framework of the Cap Go Meh celebration were exposed to mild eye
irritation and discomfort in breathing when crossing the area around XYZ factory due to ammonia gas exposure. This disturbance has been happened for decades up until now. The purpose of this study is to analyze the most factor that often causes ammonia gas to be released in the environment, and the negative effects of ammonia gas release on the environment, especially workers and communities around the plant.

**Methodology**

The research was carried out in two places, namely inside the factory environment and the environment surrounding the factory. In the factory environment, the research location is limited to two criteria, which are the unit in the XYZ factory that produces or uses ammonia in the process, and was operated from 2001 until now, namely X-IB and X-III. In the environment surrounding the factory, the study was carried out in 1 Ilir Sub-District, Ilir Timur II Subdistrict with a distance between 500-1000 m from the factory.

Purposive sampling was carried out to get information about the ammonia gas release and the potential negative impact of free ammonia gas on workers, with the criteria in the form of Ammonia and Urea plants workers over 20 years old with more than 1-year working experience. The questionnaires distributed in the amount of 90 pieces, with the distribution of 22 pieces for workers of X-IB ammonia plant, 23 for workers of X-IB urea plant, 23 for workers at ammonia X-III plant, and 22 for workers at urea X-III. For community samples, the selection of sample locations was determined using random cluster sampling. The sampling locations were RT 19 RW 04, RT 16 RW 04, RT 12 RW 04, and RT 10 RW 04. Furthermore, the selection of samples was narrowed down by the addition of criteria in the form of people living with a distance between 500-1000 m from the PT. PUSRI factory with an age range of 25-40 years for more than 5 years. The questionnaires were distributed by 140 pieces, with the distribution of each RT numbering 35 questionnaires. The results analyzed for differences using the t-test as presented in Table 1. If the significance value obtained is <0.05, then there are differences between the two data variables tested. Conversely, if the significance value obtained is >0.05 then there is no difference between the two data variables tested.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Paired Differences</th>
<th>t</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>95% Confidence Interval of the Difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Result and Discussion**

Based on field observations, it was found that ammonia gas released due to certain conditions, namely:

1. Mechanical Problems at the pump, mainly due to corrosion or the equipment lifetime that cause a leakage
2. Negligence on the distribution and shipping process of Ammonia
3. Clogging in Process Equipment that causes a burden to another section, resulting in an inefficiency in urea conversion that caused excess unconverted ammonia released from the stack.
4. Turn around and plant maintenance that requires to drain the excess material out the equipment.

This is supported by Kidam & Hurme (7) study which states that out of 364 total industrial work accidents, the main contributing factors were equipment problems in the piping system (25%), reactors and storage tanks (14%), and process vessels (10%). Gyenes & Wood (8) has a similar opinion, where the main factor causing industrial workplace accidents is equipment problems which are 30% caused by aging equipment. The aging condition in question is a decrease in conditions and changes in equipment that are used over time (9). Every equipment in the factory has a lifetime or usage period before experiencing depreciation, which usually ranges from 10 years and above (10). In addition to equipment problems, a lack of knowledge of written work procedures, personal protective equipment, education, and work experience, work environment conditions and
work safety management are also supporting factors for potential accidents in industrial workers. 

However, this event has the potential to release ammonia in higher concentrations than other problems and has the potential to harm workers to the community. This statement is also supported in Pratiwi et al. that ammonia release tends to be recorded as accidental cases, where victims experience moderate injuries that require rapid medical treatment. The impact of similar exposure describes that the victim has difficulty breathing, severe irritation of the eyes, nose, and throat, and minor burns. The impact of brief exposure is different for each depending on the individual’s ability to adapt. This is also shown in Pratiwi et al. where the impact of the ammonia occurs in 5 minutes with a concentration of 20-25 ppm.

This study is different from Sekizawa & Tsubone and Federuk et al., namely disorders in individuals who have not adapted to occur in 10-15 minutes with a concentration of 20-30 ppm. Lessengger study states that exposure to ammonia concentrations reaching 32-35 ppm for 5 minutes will have an impact on dryness in the nasal cavity. Thus, it can be inferred that the difference in the description of the symptoms that was felt was different for each individual. This is also in line with the t-test analysis with variable symptoms of disturbances in ammonia and urea plant workers presented in Table 2.

Table 2. T-Test Results on the Disorders symptoms experienced by Ammonia and Urea Plant Workers in XYZ Factory

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health problems of ammonia workers-Health problems of Urea workers</td>
<td>-2.89</td>
<td>5.96</td>
<td>0.89</td>
<td>-4.68, -1.09</td>
<td>-3.252</td>
<td>44</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Based on the results of the t-test in Table 8, the sig value (2-tailed) is obtained 0.002 <0.005. So based on its decision making, it was concluded that there was a significant difference between the health problems experienced by ammonia plant workers and the urea plant. To strengthen the t-test results, the following are the percentage of symptoms experienced by workers which presented in Table 3.

Table 3. Symptoms of disturbance experienced by workers when contacted to ammonia

<table>
<thead>
<tr>
<th>No</th>
<th>Symptoms</th>
<th>Ammonia Plant Workers</th>
<th>Urea Plant Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Respondents</td>
<td>Percentage</td>
</tr>
<tr>
<td>1.</td>
<td>Eye Irritation</td>
<td>14</td>
<td>31.82</td>
</tr>
<tr>
<td>2.</td>
<td>Nasal Irritation</td>
<td>8</td>
<td>18.18</td>
</tr>
<tr>
<td>3.</td>
<td>Dry Throat</td>
<td>7</td>
<td>15.91</td>
</tr>
<tr>
<td>4.</td>
<td>Nausea</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>5.</td>
<td>Irritations in eyes, nasal, and dry throat</td>
<td>5</td>
<td>11.36</td>
</tr>
<tr>
<td>6.</td>
<td>Eye irritation and Dry throat</td>
<td>4</td>
<td>9.09</td>
</tr>
<tr>
<td>7.</td>
<td>Eyes and Nasal Irritations</td>
<td>2</td>
<td>4.44</td>
</tr>
<tr>
<td>8.</td>
<td>Eye irritation and nausea</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>9.</td>
<td>Nasal irritation and dry throat</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Dry throat and nausea</td>
<td>3</td>
<td>6.67</td>
</tr>
</tbody>
</table>

Based on Table 3, there are differences in the symptoms experienced by respondents when exposed to free ammonia. The largest percentage is 31.11% (14 of 45 respondents) experienced irritation to the eyes with painful and dry eye characteristics, 17.78% (8 out of 45 respondents) experienced irritation to the nasal with the characteristics of feeling around the cavity when breathing, and 15.56% (7 out of 45 respondents)
experienced throat dryness with characteristics of a burning sensation and dryness in the throat. Unlike the ammonia plant workers, the largest percentage of the disturbances experienced by urea plant workers is dry throat by 24.44% (11 out of 45 respondents). About 20% (9 out of 45 respondents) experienced irritation to the nasal, while 17.78% (8 out of 45 respondents) experienced dry eye, nasal, and throat irritation in the same sequence of eye irritation and nasal cavity, then the throat felt burn when trying to breathe. Communities also showed different responses. Based on the results of the questionnaire given to 140 people from 4 different RTs, 85.7% of respondents stated that the first thing felt when exposed to ammonia gas was breathing discomfort, followed by eye irritation (92.9%), difficulty breathing in third place (22.9%). Dry nose and throat irritation ranks fourth (4.29% and 5.71%), and feeling nauseous is fifth (3.57%). Thus, it can be inferred that the impacts of ammonia occur through inhalation, directly cause irritation and respiratory problems (17). Ammonia gas will be absorbed directly by the eyes, nose, skin, and respiratory tract to the lungs. However, reactions to the skin and lungs do not occur suddenly, unless exposed to very high concentrations. However, most symptoms of the disorder are experienced only in the short term. The possibility of a long-term impact based on the respondents’ responses was shown in Table 4.

Table 4. Respondents’ Response Regarding Long-Term Health Complaints due to Ammonia Gas Exposure

<table>
<thead>
<tr>
<th>No</th>
<th>Respondent</th>
<th>Long-term Health Complaints due to the Ammonia Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Ammonia Plant X-IB</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Ammonia Plant X-III</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Urea Plant X-IB</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Urea Plant X-III</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Communities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>RT 19 RW 04</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>RT 16 RW 04</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>RT 12 RW 04</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>RT 10 RW 04</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>110</td>
</tr>
</tbody>
</table>

Based on Table 4, only 47.83% of the total respondents stated that there were health complaints due to periodic exposure to ammonia. From the 37 workers who experienced health issues, the disorder experienced by ammonia workers was the differences in skin color (9.09%) and sinusitis (45.45%), while the disorder experienced by urea workers was the differences in skin color (17.86%), 32.14% experience sinusitis and 50% experience changes in breathing patterns. The difference in skin color in question is chemical burns due to high concentrations of ammonia exposure. Sinusitis, in this case, is under the description in the Brautbar study, namely irritation of the mucus membrane in the nasal region due to exposure to ammonia and changes in breathing patterns according to the Sundbland et al. study are symptoms such as wheeze and asthma. Workers exposed to these gases and suffer the health issues need a recovery time of at least 1-4 days a week. The same thing was found in the respondents of the community. Of the 140 total respondents, 73 people (52.14%) complained of symptoms of the disease such as nausea, dizziness, and shortness of breath, while 67 (47.85%) people have no complaints. Based on the percentage of complaints, 94.52% (69 out of 73) respondents stated temporarily, and 5.88% (4 out of 73) respondents stated permanently. The complaints of permanent disruption by community respondents are lung and asthma. However, this cannot be ascertained because of the possibility of other factors (such as the community’s lifestyle or hereditary disease records).

Conclusion

Ammonia gas release that potentially causes a negative impact was due to a certain condition in the factory, mainly located in ammonia storage tanks, cooling water reservoirs, pumps, and valves. The certain condition occurs due to leakage, clogging, maintenance, and negligence. This event has the potential to release ammonia in higher concentrations than other problems and has the potential to hurt workers to the community. The impacts of ammonia occur on humans through inhalation, directly cause irritation and respiratory problems, which differs on each person. Ammonia gas will be absorbed directly by the eyes, nose, skin, and respiratory tract to the lungs. However, reactions to the skin and lungs do not occur suddenly, unless exposed to very high concentrations. Ammonia exposure strongly impacts on short-term diseases such as skin discoloration, sinusitis, wheeze and asthma symptoms that last 1-4 weeks, while long-term disease that caused
by ammonia still debatable due to a possibility of other factors such as lifestyle and genetic disease records.

**Competing Interest:** This article is part of the author thesis to complete the study in the School of Environmental Science, Indonesia University. Therefore, there is no competition in conducting this study.

**Ethical Clearance:** The Institutional Review approved this study at the School of Environmental Science at Indonesia University.

**Source of Funding:** This article is a self-funding research

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Correlation between Types of Parenting with the Development of Children Aged 1-5 Years

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Abstract

Important period in child development is at the age of 1-5 years old. Parenting is one of the factors that cause development of child aged 1-5 years old. The objective of this study is to find the correlation between types of parenting parents with the development of children aged 1-5 years old. This research method is cross-sectional design. Data were collected during June-September 2015. Respondents in this study were parents and children 1-5 years old who met the inclusion and exclusion criteria. We used systematic random sampling technique until total sample of 345 parents and children achieved. Independent variables studies was types of parenting and dependent variable was development of children aged 1-5 years old. Data types of parenting was collected by questionnaire and development of children aged 1-5 years old was measured by Pre-Development Screening Questionnaire (KPSP). Analysis was using Chi Square. The authoritarian parenting 11.6%, 14.5% democratic parenting, 12.7% passive parenting and mixed parenting 62%. 73% of the KPSP with a “correct” development, “doubt” (13.6%), and “possible disorder” (13.3%). There is a significant correlation between types of parenting and development children aged 1-5 years old (p = 0.000) with contingency coefficient value 0.661. Risk factors for the disorder development are 69.7% for the variable parenting variables, maternal education, maternal occupation and nutritional status of children. Types of parenting had correlation with development children aged 1-5 years old.

Keywords: Parenting, development, children.

Introduction

Important period in child development is at the age of 1-5 years. At this aged, basic growth will influence and determine the child’s next development, but many children under 5 years old in developing countries are exposed to various risks, including poverty, malnutrition, poor health and a home environment that does not support stimulation, so this it adversely impact on their cognitive, motoric and social emotional development.(1)

The style of parenting is one of the factors in child development. Children under 5 years old, their development and growth depends on the care they receive. Lack of parenting at the beginning of life has a negative effect on growth and development of child.(2)

There is little data for child development status, but according to estimates more than 200 million children under 5 years old in developing countries do not develop to their maximum potential.(1) Data from the East Java Provincial Health Office shows an increase in hospital referrals from children with developmental deviations, around 23.96% in 2012 to 32.06% in 2013. While specifically in Surabaya around 15.83% of children under 5 years old experiencing developmental irregularities referred to the hospital.(3)

The results of the primaries study conducted on September 13, 2014 in Surabaya showed that from 30 parents and children aged 1-5 years, 65% of parents with mixed parenting had children with developmental categories according to their stages. Authoritarian parents, they have a parenting style by setting rules and guidance that their children are expected to follow. Meanwhile, democratic parenting encourages children to become independent, but still places limits and control over their actions. Democratic parents show support in responding to constructive child behavior. They also respond to adult, independent behavior and according to the age of their children, so that when children fail to meet the expectations of their parents, they are more forgiving than punishing.(4)
According to the research there are influences between parents’ attitudes, perceptions, and psychosocial on child development, poor attitudes and perceptions of parents with or without risk factors have a negative impact on child development.\(^5\)

This research was conducted because of the importance of knowing all aspects of child development and how parenting is applied by parents, therefore researchers want to know the relationship between parenting parents with the development of children aged 1-5 years old.

**Materials and Method**

The research with a cross-sectional method. Sample in this study were parents who had children aged 1-5 years old and children aged 1-5 years old who came to the Maternal and Child Health Center Surabaya in June-September 2015 that met the inclusion criteria. The inclusion criteria for parents in this study were parents who understood Indonesian, were willing to fill out questionnaires and allow their children to be examined for development by signing a letter of agreement to become a respondent. Inclusion criteria for the sample of children in this study were children in a healthy condition, did not have congenital abnormalities or disabilities.

Sampling method with systematic random sampling technique. In this study independent variables are parenting parents in children aged 1-5 years old, the dependent variable is the development that occurs in children aged 1-5 years old. Instruments in the form of parenting questionnaires that have been tested for validity and reliability to assess the type of parenting and Developmental Pre Screening Questionnaire (KPSP) from the Ministry of Health of the Republic of Indonesia to assess the development of children aged 1-5 years.

Statistical analysis using a computer program, SPSS version 21. Analytical analysis used nonparametric statistical tests, namely chi square to find out whether there is a relationship between types of parenting parents and child development. Multivariate analysis used in this study was a multivariate logistic regression analysis. This analysis is used for dependent variables with a measurement scale of categorical variable. In logistic regression the quality of the formula is obtained from the ability of discrimination and calibration. Calibration with the Hosmer and Lameshow method. In addition, the value of Nagelkerke R Square is also seen to see how much the proportions of independent variables can predict the occurrence of the dependent variable.

This research has been approved by the Health Research Ethics Commission (KEPK) from the Medical Faculty of Airlangga University Surabaya by letter No.083/EC/KEPK/FKUA/2015.

**Finding:** The number of samples obtained by systematic random sampling method were 345 respondents of parents and children aged 1-5 years.

**Table 1: Distribution of types of parenting and results of KPSP**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>(n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Types of parenting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authoritarian</td>
<td>40</td>
<td>11.6</td>
</tr>
<tr>
<td>Democratic</td>
<td>50</td>
<td>14.5</td>
</tr>
<tr>
<td>Passive</td>
<td>41</td>
<td>11.9</td>
</tr>
<tr>
<td>Mixed Parenting</td>
<td>214</td>
<td>62</td>
</tr>
<tr>
<td><strong>KPSP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>252</td>
<td>73</td>
</tr>
<tr>
<td>Doubt</td>
<td>47</td>
<td>13.6</td>
</tr>
<tr>
<td>Possible disorder</td>
<td>46</td>
<td>13.3</td>
</tr>
</tbody>
</table>

**Table 2: Correlation between types of parenting with the development of children**

<table>
<thead>
<tr>
<th>Types of parenting</th>
<th>KPSP</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
<td>Doubt</td>
</tr>
<tr>
<td>Authoritarian</td>
<td>7 (17.5%)</td>
<td>15 (37.5%)</td>
</tr>
<tr>
<td>Democratic</td>
<td>32 (64%)</td>
<td>10 (20%)</td>
</tr>
<tr>
<td>Passive</td>
<td>5 (12.2%)</td>
<td>20 (48.8%)</td>
</tr>
<tr>
<td>Mixed Parenting</td>
<td>208 (97.2%)</td>
<td>2 (0.9%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>252 (73%)</td>
<td>47 (13.6%)</td>
</tr>
</tbody>
</table>

* Significant Chi Square
The results of the analysis test using chi square are significant with the value of the contingency coefficient 0.661. Whereas, the results of the analysis test using logistic regression obtained p value <0.05 for the categories of parenting variables, maternal education, maternal occupation and nutritional status of children. Hosmer and Lameshow values 0.440. From the results of Nagelkerke R square obtained a value of 0.697, parenting variables, maternal education, maternal occupation and nutritional status of children having a risk effect on the incidence of below normal growth of 69.7% and 30.3% due to other factors.

**Discussion**

In the study of 345 parents respondents obtained the results of authoritarian parenting 11.6%, democratic parenting 14.5%, passive parenting 11.9% and mixed parenting 62%. In developmental tasks, 45% of children with authoritarian parenting cannot perform developmental tasks according to age. In mixed parenting, 73% of children can carry out developmental tasks according to age. In democratic parenting, 16% of children cannot perform developmental tasks according to age, while in passive parenting, 39% of children cannot perform developmental tasks according to age.

The five main factors that contribute to children’s growth and development are nutrition, parental behavior, parenting, social and cultural and environmental. The patterns of parenting is an important factor in the child development process. Family is the first social environment for children so that it gives the biggest influence on children’s development. Families, especially fathers and mothers provide the basis for the formation of behavior, character, morals and children’s education. The experience of interaction in the family will determine the pattern and behavior of children towards others people in the community.\(^{(2,4,6)}\)

Authoritarian parents place strict limits and controls on children. Authoritarian parents also enforce rigid rules, but do not explain to children reason for enforcing rigid rules, and authoritarian parents often show anger to children. Excessive and dominant parental control over children can cause children to behave aggressively and often sue others or behave otherwise, which is to be passive individuals who tend to avoid socializing.\(^{(7,8)}\)

The results of the study indicate that poor child care, with or without psychosocial factors, negatively influences early child development from the age of 6 months. Other studies also mention that it is very important to consider parenting styles for caring for children, because this can reduce parental anxiety in the care process.\(^{(5,9)}\)

Parenting has a significant relationship to the development of children aged 1-5 years old. The results of the analysis of parenting and child development analysis using chi square test showed that the results of p = 0.000 (p <0.05) then Ho was rejected and H1 was accepted. Contingency coefficient value is equal to 0.613 which means the strength of the relationship between variables of parenting and child development variables is strong. This result is consistent with other studies, namely the flexible balance between democratic and authoritarian parenting (mixed upbringing), is the most desirable parenting style for a child’s developmental needs.\(^{(10)}\)

Other research findings indicate that the relationship between parent and child is a special subsystem from the family, which is the most important determinant of children’s mental development, children’s emotional and socialization processes. The main characteristics of the parent and child relationship system are love that determines credibility of a child, communication with children, the desire to protect and provide security to children, and acceptance and unconditional attention, and holistic attitude.\(^{(11)}\)

Many factors influence the development of children in addition to parenting parents. Parents, especially mothers who have multiple roles, are often faced with conflicts between work interests and their presence in the family. High job demands and time consuming often hamper meeting the need for family togetherness, caring for and caring for children.\(^{(12)}\)

In this study the results of the analysis test using logistic regression test showed the results of p <0.05 for the category of parenting variables, maternal education, maternal occupation and nutritional status of children. The results of logistic regression analysis obtained the value of Hosmer and Lameshow with a significance value of 0.440, which means p > 0.05, so it can be concluded that Ho is accepted which means the model of estimation results is significant fit (model worthy of use). In addition, from the results obtained Nagelkerke R square value of 0.697, which means that the variables of parenting variables, maternal education, maternal occupation and nutritional status of the children are able to explain the effect of risk on development under normal conditions of 69.7% and 30.3% caused by other factors.
In addition to parenting, socioeconomic status can affect the growth and development of children. Children with families who have high socioeconomic conditions generally meet the needs fairly well compared to low socioeconomic children.\(^{(12)}\) Mothers who do not work, have more time to spend with their children. Mother can train and educate children, so that language development and children’s academic achievements are better if compared to working mothers.\(^{(13)}\)

Mothers who work still involved in meeting the needs of children and fulfill their role as mothers will provide comfort and emotional security to children. Relationships between children and mothers who are safe will have feelings of joy and cheerfulness. Such satisfying feelings allow the child to face a life that is free from the mother because she understands and accepts that the mother must sacrifice other things and not as a substitute for the mother. The child understands that the mother will be there if the child needs it and consumes time with her after the mother comes home from work. In such relationships, children understand that children are their mother’s priority and no one can change that.\(^{(14)}\)

Children’s nutritional status can affect development and growth. The first 1000 days of life from conception to the end of the second year of life are important periods of carrying out interventions to ensure healthy nutrition and development of children. In addition to interventions on the nutritional status of children, it is also important that children have a supportive and friendly environment to form strong bonds with their caregivers as a basis for optimal child development.\(^{(15)}\)

**Conclusion**

From this cross sectional study, we can conclude that the risk factors for children not being able to carry out developmental tasks according to their age are parenting. In addition to parenting, risk factors for maternal education, maternal occupation and nutritional status of children also influence children’s development. Therefore, the choice of parenting patterns, maternal education, mother’s work and children’s nutritional status are very important to be considered to optimize the development of children aged 1-5 years old.

**Conflict of Interest:** The Authors declare no conflicts of interest.

**Source of Funding:** Self

**Ethical Clearance:** Parents who agreed to be involved in this study signed informed consent. This study has been approved by the Health Research Ethics Commission (KEPK) from the Medical Faculty of Airlangga University Surabaya by letter No.083/EC/KEPK/FKUA/2015.

**References**


A Comparison of Leisure Activities in Patients before and After a Stroke

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Abstract

This study analyzes the characteristics of leisure activities of stroke patients according to gender, and comparatively assesses their activity levels before and after the onset of the disease. Leisure activity-related data were collected from 125 stroke patients using the Korean-Activity Card Sort and analyzed according to gender. An independent t-test and paired t-test were conducted to compare the retained level of leisure activity (RLA) after stroke according to the patients’ general characteristics. Most of the leisure activities men and women continued with after stroke were passive ones that did not require exercise or rely on cognitive abilities. The RLA after stroke in both men and women demonstrated a statistically significant difference as their roles changed in accordance with age. Healthcare practitioners should analyze the leisure activities of stroke patients and provide interventions to help them retain the current level of leisure activity or engage in new leisure activities.

Keywords: Activities, Activity Card Sort, Leisure, Health care, Stroke.

Introduction

Interest in therapeutic interventions to encourage stroke patients’ participation in local communities is on the rise\textsuperscript{1}. Leisure-based interventions are important as they have positive effects on personal life and strengthen the motivations for rehabilitation\textsuperscript{2}. Although the social interest in leisure activities continues to grow, the level of leisure activity participation in stroke patients is still low. Studies suggest that stroke patients spend most of their time engaging in passive activities such as watching TV in restricted areas, not participating much in social activities such as sports\textsuperscript{3}.

Existing studies have reported that participation in leisure activities in local communities has positive effects on improving the quality of life and life satisfaction of stroke patients. In addition, participation in leisure activities contributes to improving physical and psychological health management. It offers positive motivation for life and revitalizes the rehabilitation process of patients\textsuperscript{4,5}. Therapeutic intervention using leisure in the rehabilitation of stroke patients is a useful approach in promoting motivation\textsuperscript{3}. It is an essential factor associated with quality of life, which should be considered fundamental to the treatment process\textsuperscript{6}.

In previous studies, various factors influence leisure participation. Particularly, there are differences in leisure activities according to gender, education level and income\textsuperscript{7,8}. Considering these factors, identifying changes in leisure activities after stroke is essential for intervention planning\textsuperscript{9}. The present study attempted to investigate the evidence for leisure intervention. To this end, we conducted a comparative analysis of the characteristics of leisure activity before and after stroke according to gender.

Subjects and Method

A total of 125 stroke patients being treated at a rehabilitation center participated in our study. The selection criteria were: those who were diagnosed with stroke, who recorded 26 points or higher in the Mini-Mental State Examination-Korean (MMSE-K), and...
who were able to communicate smoothly\textsuperscript{10}. Table 1 shows the general characteristics of study participants. All participants were given an explanation of the study procedure and signed a written consent form for participation. We obtained approval from the institutional review board prior to the implementation of the research.

The Korean-Activity Card Sort (K-ACS) was used to assess the level of leisure activity of study participants. K-ACS and general characteristics information were collected face to face by the researchers. The K-ACS is a variant of the American ACS, modified according to Korean culture\textsuperscript{11}. The 67 activity cards consisted of 33 instrumental activities, 18 leisure activities, and 16 social activities. The K-ACS is classified into recovery and community-living versions. The scores for the five categories are ‘Never done = 0 score’, ‘Do now = 1 score’, ‘Given up = 0 score’, ‘Restart = 0.5 score’, and ‘New activity = 1 score’. Participants classify 18 leisure cards into one category. The level of leisure activity, including current, previous, and retained, was evaluated using the 18 leisure activity cards. The score calculation formula is as follows. 1) Level of current activity = ‘Do now’ + ‘Restart’ + ‘New activity’, 2) Level of previous activity = ‘Do now’ + ‘Given up’ + ‘Restart’, 3) Retained level of activity (%) = Level of current activity/Level of previous activity 100. Cronbach’s \(\alpha\) of the leisure activities area of the K-ACS was .93.

Data collected in our study were analyzed using SPSS 18.0. The general characteristics of study participants were analyzed using descriptive statistics. Changes in the level of leisure activity in subjects before and after stroke according to gender were analyzed using the paired t-test. The independent t-test and paired t-test were used to compare the retained level of leisure activity (RLA) after stroke based on gender and general characteristics. The statistical significance level \(\alpha\) was set at 0.05.

**Results**

Male participants showed a statistically significant post-stroke reduction in 15 leisure items except for watching TV, resting, and sitting and speculating. After stroke, all participants mostly spent time on passive leisure activities such as watching TV, resting, and sitting and speculating (Table 2).

Table 3 compares the RLA after stroke based on gender and general characteristics. A statistically significant difference was observed in the post-stroke comparison based on gender, general characteristics, and age. The female stroke patient group aged 65 years or older showed the highest RLA. In the comparison within each gender group, the female patient group aged 65 years or older showed more significant differences than the group aged between 55 and 64. Within the male group, significant differences were observed according to education level. The uneducated group showed a higher RLA than the educated group.

Table 1. General characteristics of the participants
\(n=125\)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70</td>
<td>56.0</td>
</tr>
<tr>
<td>Female</td>
<td>55</td>
<td>44.0</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55~64</td>
<td>54</td>
<td>43.2</td>
</tr>
<tr>
<td>65~74</td>
<td>43</td>
<td>34.4</td>
</tr>
<tr>
<td>75&lt;</td>
<td>28</td>
<td>22.4</td>
</tr>
<tr>
<td>Time since stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>26</td>
<td>20.8</td>
</tr>
<tr>
<td>7~12 months</td>
<td>26</td>
<td>20.8</td>
</tr>
<tr>
<td>13~24 months</td>
<td>27</td>
<td>21.6</td>
</tr>
<tr>
<td>&gt;25 months</td>
<td>46</td>
<td>36.8</td>
</tr>
<tr>
<td>Paretic side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rt.</td>
<td>48</td>
<td>38.4</td>
</tr>
<tr>
<td>Lt.</td>
<td>70</td>
<td>56.0</td>
</tr>
<tr>
<td>Both</td>
<td>7</td>
<td>5.6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>26</td>
<td>20.8</td>
</tr>
<tr>
<td>Elementary school</td>
<td>29</td>
<td>23.2</td>
</tr>
<tr>
<td>Middle school</td>
<td>19</td>
<td>15.2</td>
</tr>
<tr>
<td>High school</td>
<td>32</td>
<td>25.6</td>
</tr>
<tr>
<td>Above college</td>
<td>19</td>
<td>23.2</td>
</tr>
<tr>
<td>Spending money for month (USD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 200</td>
<td>46</td>
<td>36.8</td>
</tr>
<tr>
<td>200~500</td>
<td>53</td>
<td>42.4</td>
</tr>
<tr>
<td>&gt;500</td>
<td>26</td>
<td>20.8</td>
</tr>
</tbody>
</table>
Table 2. The changes in leisure activities according to gender after stroke

<table>
<thead>
<tr>
<th>Leisure activity</th>
<th>Male (n=70)</th>
<th>Female (n=55)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Watch TV</td>
<td>0.98±0.11</td>
<td>0.98±0.11</td>
</tr>
<tr>
<td>Take a rest</td>
<td>0.95±0.20</td>
<td>0.97±0.16</td>
</tr>
<tr>
<td>Take a walk</td>
<td>0.97±0.16</td>
<td>0.68±0.39***</td>
</tr>
<tr>
<td>Vegetable gardening</td>
<td>0.81±0.39</td>
<td>0.10±0.25***</td>
</tr>
<tr>
<td>Go to the park</td>
<td>0.88±0.32</td>
<td>0.46±0.44***</td>
</tr>
<tr>
<td>Tourism/Travel</td>
<td>0.87±0.33</td>
<td>0.23±0.37***</td>
</tr>
<tr>
<td>Read newspaper</td>
<td>0.92±0.25</td>
<td>0.53±0.46***</td>
</tr>
<tr>
<td>Flowerpot gardening</td>
<td>0.88±0.32</td>
<td>0.29±0.41***</td>
</tr>
<tr>
<td>Read Bible/Buddhist scriptures</td>
<td>0.68±0.46</td>
<td>0.27±0.43***</td>
</tr>
<tr>
<td>Playing cards</td>
<td>0.90±0.30</td>
<td>0.25±0.39***</td>
</tr>
<tr>
<td>To sit and speculate</td>
<td>0.87±0.33</td>
<td>0.77±0.39</td>
</tr>
<tr>
<td>Go to the speculate</td>
<td>0.77±0.42</td>
<td>0.22±0.37***</td>
</tr>
<tr>
<td>Listening to music</td>
<td>0.67±0.47</td>
<td>0.54±0.47</td>
</tr>
<tr>
<td>Climbing</td>
<td>0.94±0.23</td>
<td>0.13±0.30***</td>
</tr>
<tr>
<td>Listen to the radio</td>
<td>0.68±0.46</td>
<td>0.58±0.46</td>
</tr>
<tr>
<td>Read books/Magazines</td>
<td>0.81±0.39</td>
<td>0.39±0.46***</td>
</tr>
<tr>
<td>Biking</td>
<td>0.88±0.32</td>
<td>0.14±0.32***</td>
</tr>
<tr>
<td>Playing Korean chess</td>
<td>0.91±0.28</td>
<td>0.42±0.44***</td>
</tr>
</tbody>
</table>

** p<0.01, *** p<0.001 compared within leisure activity, Pre: level of previous activity, Post: level of current activity, The closer the Mean value is to 1, the activity increase., The closer the Mean value is to 0, the activity decrease.

Table 3. The comparison of the RLA by gender and general characteristics after stroke

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Male (n=70)</th>
<th>Female (n=55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>55~64</td>
<td>55.9±18.68 (n=31)</td>
</tr>
<tr>
<td></td>
<td>&gt; 65</td>
<td>48.3±20.52 (n=39)</td>
</tr>
<tr>
<td>Education</td>
<td>Uneducated</td>
<td>61.7±19.84 (n=14)</td>
</tr>
<tr>
<td></td>
<td>Educated</td>
<td>49.18±19.35 (n=56)</td>
</tr>
<tr>
<td>Spending money for month (USD)</td>
<td>&lt; 50</td>
<td>51.5±20.86 (n=53)</td>
</tr>
<tr>
<td></td>
<td>&gt; 50</td>
<td>52.20±17.39 (n=17)</td>
</tr>
</tbody>
</table>

* p<0.05, ** p<0.01 compared between male and female, † p<0.05, ‡ p<0.01 compared within male and female, Retained level of leisure activity (RLA) = level of current activity/level of previous activity 100%

Discussion

Leisure activities refer to the enjoyment of free time without feeling a sense of duty. Leisure activities are a crucial factor in encouraging stroke patients to participate in the local community upon their return. Therefore, it is essential for stroke patients to maintain the occupational balance through exploration of and participation in leisure activities. However, the physical and psychological difficulties caused by stroke limit their exploration and participation. This eventually causes occupational imbalance and delays their return to the local community.

After stroke, both men and women engaged in leisure activities such as watching TV, resting, and sitting and speculating. However, while men continued with leisure activities such as listening to music and the radio, women showed reduced levels of engagement in these activities. Most of the leisure activities men and women engaged in after stroke were those that did not require exercise or rely on cognitive abilities. These
results correspond to the findings of existing studies that stroke patients have difficulties in participating in leisure activities relying on physical and cognitive skills.9, 14

The comparison between the genders demonstrated that women had a significantly lower RLA after stroke compared to men in the 55-64-year-old group. In the 65-years-or-older group, women showed a significantly higher RLA after stroke than men. The low RLA after stroke in women aged between 55 and 64 is probably because, being responsible for managing their households, it was not easy for them to participate in leisure activities. The elevated level in the older group is probably the result of a higher bandwidth for leisure activity given that a woman’s role in the family changes at around 65 years.15

In men, educated subjects higher RLA than those who were not educated. Before stroke, those without educational backgrounds were mainly engaged in occupations requiring physical activity such as agriculture, whereas the educated subjects were engaged in jobs requiring less physical exertion. Qualitative study on leisure activities in stroke patients have reported that patients made efforts to continue leisure activities similar to their past occupational activities.16 The 18 leisure activities included in the K-ACS focus on relatively basic physical skills. It is likely that the RLA after stroke was low in educated participants because the leisure activities were loosely associated with their pre-stroke activities.17

Conclusion
Disabilities caused by stroke interrupt patients’ engagement in leisure activities. It is recommended that healthcare specialists compare patients’ leisure activity history before stroke with the status after stroke and help them maintain the current level or engage in new activities to improve quality of life and maintain occupational balance. The limitation of this study is that it does not address various factors affecting leisure participation. In addition, K-ACS has 18 leisure activities, and other leisure activities are not included in the study data. Future research is expected to be conducted in consideration of these limitations.

Ethical Clearance: Not required

Funding: This paper was supported by Wonkwang university in 2018.

Conflict of Interest: Nil.

References


Improving the Village Health Volunteers’ Knowledge, Malaria Diagnostic Skill and Home Visits through the Observed Training

(Study in Municipality of Tidore Islands North Maluku Province Indonesia)

Dwi Soesilo¹, Catharina U. Wahyuni²

¹Student Doctoral Program, ²Professor of Epidemiology, Department of Epidemiology, Faculty of Public Health, Airlangga University, Surabaya, Indonesia

Abstract

Municipality of Tidore Islands in North Maluku province, Indonesia, where this study conducted was a malaria endemic area. The malaria Annual Parasite Incidence in this area was 10.8 per 1000 inhabitants in 2010, 8.3 per 1000 inhabitants in 2011, 7.5 per 1000 inhabitants in 2012, 6.11 per 1000 inhabitants in 2013 and 2.10 per 1000 inhabitants in 2014, 2.10 per 1000 inhabitants in 2015. Geographically, this area is consisting of a number of separated islands. This reality reflects the complexity of delivering access, especially health care access to all those separated remote areas.

The aim of this study was to increase village health volunteers’ knowledge of malaria and diagnostic skill and home visit through observed training and to analyze the correlation between the knowledge of the village health volunteers toward the diagnostic skill.

This research was a Quasi-experimental research based in the community by observing the effects or developments of the results of training interventions called “The One Group Pretest-Posttest Design”. A linear regression analysis also conducted to analyze the correlation of observed health volunteer training toward the knowledge and the correlation between knowledge and the diagnostic skill.

Result: There has been an increase in village health volunteers’ knowledge after the observed training conducted which included knowledge about malaria in general and the provision of skills to diagnose malaria with sensitivity of 73.4% and specificity of 54.2%. Village health volunteers’ knowledge was significantly having correlation toward diagnostic skill (p=0.047) and 90.5% patients that visited completely by village health volunteers taking antimalarial drugs regularly.

Keywords: Malaria, village health volunteer, knowledge, diagnosis skill, home visit, observed training.

Introduction

Malaria remains one of the major public health problems worldwide. Based on the result of Basic Health Research, the Malaria’s Annual Parasite Incidences in Indonesia shown a decreasing incident from 2.47 per 1000 inhabitants in 2008 to 1.38 per 1000 inhabitants (¹). Data from Indonesia Health Profile informed that the Malaria’s Annual Parasite Incidents in Indonesia decrease from 1.8 per 1000 inhabitants in 2009 to 0.84 per 1000 inhabitants in 2016 (²)

North Maluku was the 5th highest Malaria’s Annual Parasite Incidence in Indonesia i.e. 2.44 per 1000 inhabitants in 2016 (¹)(²)(³). The Annual Parasite Incidents from 2013 to 2016 was 4.51 per 1000 inhabitants, 3.32 per 1000 inhabitants and 2.77 per 1000 inhabitants, respectively (²).

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Beside the high incidents of malaria cases, drugs resistance also became an important issue in malaria control all over the world including in Indonesia. The fact that people can get anti-malarial drugs from various places makes inaccurate and inadequate treatment and it has an implication for the increasing of resistance of anti-malarial drugs. In 1996 there have been cases of chloroquine Plasmodium falciparum resistance with different degrees in various regions as well as Sulfadoxin–Primetamine in vivo and in vitro. An alarming development is the discovery of Plasmodium Vivax which is resistant to chloroquine between Papua regions, Nias, Maluku and Flores Islands.

Municipality of Tidore Islands in North Maluku province, Indonesia, where this study conducted was a malaria endemic area. The total population of this municipality was 110,102 inhabitants and 29,253 households in 2015. The malaria Annual Parasite Incidence 10.8 per 1000 inhabitants in 2010, 8.3 per 1000 inhabitants in 2011, 7.5 per 1000 inhabitants in 2012, 6.11 per 1000 inhabitants in 2013 and 2.10 per 1000 inhabitants in 2014, 2.10 per 1000 inhabitants in 2015. Geographically, this area is consisting of a number of separated islands. This reality reflects the complexity of delivering access, especially health care access to all those separated remote areas. The health facilities available in this municipality were one public hospital and tensub district public health centre. Limited human resources were also another problem.

Because of this, community empowerment became a crucial initiative to help the health officers in delivering health services access especially for malaria control in this island. Health volunteer trainings have been conducted, but unfortunately there was no information about the result of this training that had been observed.

Hence, the aim of this study was to increase village health volunteers’ knowledge of malaria and diagnostic skill and home visit through observed training and to analyze the correlation between the malaria knowledge of the village health volunteers toward the diagnostic skill.

**Method**

This research was a Quasi-experimental research based in the community by observing the effects or developments of the results of training interventions. Observation of the result variable was done before and after the treatment called “The One Group Pretest-Posttest Design”.

Data obtained through interview with 44 village health volunteers using a structured questionnaire before and after the observed training. An observation employed to evaluate the home visit after the observed training. The collected data was tabulated according to the variables and information needed.

A linear regression analysis also conducted to analyze the correlation of observed health volunteer training toward the knowledge and the correlation between knowledge and the diagnostic skill of village health volunteers.

**Result**

**Village Health Volunteers’ Knowledge:** Result of statistical analysis using paired t test with Confidence Interval 95% and α 0.05 was significance 0.000, meaning that there was a significant correlation between the observed training and the knowledge as shown in table 1.

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>T</th>
<th>Degree of Freedom (Df)</th>
<th>Significance (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>95% confidence interval of the difference</td>
</tr>
<tr>
<td>-228.18</td>
<td>64.227</td>
<td>9.690</td>
<td>-247.72</td>
</tr>
</tbody>
</table>

Knowledge that had been given in the observed training included of the knowledge about the cause of malaria, the symptom of malaria, the transmission of malaria, the vector of malaria, the complication of severe malaria, the prevention activities for malaria control, the eradication of malaria and the drugs and also the treatment of malaria patients.
Village Health Volunteers’ Diagnostic Skill:
There was no test for village health diagnostic skill before the observed training. The result of village health volunteers diagnostic skill tested after the observed training was confirmed with the laboratory test result to determine the accuracy. Diagnostic skill result after the training and laboratory test confirmation presented in cross tabulation as shown in table 2.

Table 2: Crosstabulation between the Village Health Volunteer Diagnostic Skill Test Result and the Laboratory Test result

<table>
<thead>
<tr>
<th>Laboratory Test Result</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>VHV Diagnostic Result</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>69</td>
</tr>
<tr>
<td>% within VHC Diagnostic</td>
<td>54.8%</td>
</tr>
<tr>
<td>% within Lab Test Result</td>
<td>73.4%</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>25</td>
</tr>
<tr>
<td>% within VHC Diagnostic</td>
<td>26.6%</td>
</tr>
<tr>
<td>% within Lab Test Result</td>
<td>26.6%</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
</tr>
<tr>
<td>% within VHC Diagnostic</td>
<td>42.7%</td>
</tr>
<tr>
<td>% within Lab Test Result</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The sensitivity of the crosstabulation was 73.4%, which can be interpreted as 73.4% cases that was diagnosed malaria positive by the village health volunteer confirmed positive by the laboratory test result. The specificity of the crosstabulation was 54.8%, which can be interpreted as 54.8% cases that was diagnostic malaria negative by the village health volunteers also was confirmed negative by the laboratory test result.

Therefore the false (+) for village health volunteer diagnostic skill was 45.2% and the false (+) was 26.6% with the positive prediction 54.8% and negative prediction was 73.4%.

Home Visit by Village Health Volunteers (Observed in the field after the training conducted):
The home visit activities conducted by the village health volunteers had observed after the training completed for 94 patients in one cycle anti-malarial drug treatment. There was also no pre-test for a home visit by the village health volunteers, so no statistical correlation analyses had been conducted.

Table 3: Home Visit by the Village Health Volunteer after the Observed Training

<table>
<thead>
<tr>
<th>Complete</th>
<th>Incomplete</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>Home Visit By Village Health Volunteers</td>
<td>42</td>
<td>44.7%</td>
</tr>
</tbody>
</table>

After the observed training, 44.7% of patients that consumed anti-malarial drug treatment completely visit by the village health volunteers and 55.3% not completely visit. This result can be interpreted that the training hasn’t had a significant influence in the activity of home visit by the village health volunteers.

Correlation between knowledge and diagnostic skill of Village Health Volunteers after the Observed Training: The correlation between knowledge and diagnostic skill of village health volunteers after the observed training were analysis using Pearson correlation as the result shown in table 4.

Table 4: The Correlation between Knowledge and the Diagnosis Skill (Pearson Correlation)

<table>
<thead>
<tr>
<th>Diagnostic Skill</th>
<th>Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson correlation</td>
<td>.301*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.047</td>
</tr>
<tr>
<td>N</td>
<td>44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post Test</th>
<th>Diagnostic Skill</th>
<th>Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson correlation</td>
<td>.301*</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.047</td>
<td>-</td>
</tr>
<tr>
<td>N</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

*correlation is significant at the 0.05 level (2-tailed)
Result from statistic test using Pearson correlation shown that the knowledge of village health volunteers about malaria had a significant correlation toward the diagnostic’s skill with Confidence Interval 95% (p = 0.047).

**Discussion**

Early diagnosis and prompt effective treatment of uncomplicated malaria is critical to prevent severe disease, death and malaria transmission (7). Therefore, to help the health professional in order to deliver the services, especially in the remote area with geographical difficulties, the role of the village health volunteers became very crucial. In order to provide the knowledge and skill needed to perform the task. It is very important to provide trainings to improve the knowledge and skill of the village health volunteers with a measurable evaluation and observation.

The result of this research showed there was a significant correlation with knowledge level before and after the training conducted. It means the observed training has a significant correlation with the knowledge level of malaria gained by the village health volunteers.

It is important to increase the village health volunteers’ knowledge about malaria because the knowledge has a significant correlation toward the village health volunteers’ diagnostic skill. Therefore the increase of the knowledge will be improved the diagnostic skill of the village health volunteers. Early diagnosis will lead to early treatment that can prevent a complication and severe malaria and also prevent the transmission of the malaria.

The observed training conducted did not show any improvement on home visit by the village health volunteers. The observation trough a cycle of drug treatment for 94 patients with antimalarial shown that 44.7% or 42 visits completely by village health volunteers and 55.3% or 52 patients did not completely visit by the village health volunteers.

So that it is important to create other interventions in order to increase the activity of home visit by the village health volunteers because from crosstabulation that have done the 90.5% of patients with the complete home visit regularly taking antimalarial drugs as shown in table 5.

**Table 5: The Cross Tabulation of Home Visit by Village Health Volunteers and the compliance of taking antimalarial drugs**

<table>
<thead>
<tr>
<th></th>
<th>Compliance in taking antimalarial drugs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regularly</td>
<td>Not Regularly</td>
</tr>
<tr>
<td>Home Visit Complete</td>
<td>38</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>57.6%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Home Visit Not Complete</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>42.4%</td>
<td>85.7%</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

No data showed which kind of intervention will be effective globally. However, a combine intervention always reported has a better result compare with just one intervention. Hence, for better result it is important to seek for what kind of intervention that will give a better performance in order to increase the home visit by the village health volunteers.

**Conclusion**

Based on this research, there has been an increase in village health volunteer knowledge after observed training which was included knowledge about malaria in general and the provision of skills to diagnose malaria with sensitivity of 73.4% and specificity of 54.2%. It was sufficient as a step for early detection of malaria.
sufferers, especially in areas with difficult reach and limited laboratory facilities, further improvement will be achieved along with the skills and experience gained later.

Village health volunteers’ knowledge was significantly having correlation toward diagnostic skill. In order to increase the sensitivity and specificity of the malaria diagnostic skill by the village health volunteer equipped them with Malaria Rapid Diagnostic Test (RDTs) can be done as have been done in several endemic malaria countries such as in Zambia\(^8\), Tanzania\(^7\), Laos\(^9\) and other countries especially the country that have difficulties in delivering health services access to the community due to geographical condition.

The visit by village health volunteers may not have correlation with the success of malaria treatment. However, 90.5% patients that visited completely by village health volunteers taking antimalarial drugs regularly.

**Conflict of Interest:** There is no conflict of interest for both authors.

**Source of Funding:** This research was funded by the authors themselves. No other financial support received.

**Ethical Clearance:** All procedures performed in studies involving human participants had gotten ethical approval from the Health Research Ethics Committee, Faculty of Public Health Airlangga University

**Informed Consent:** Informed consent was obtained from all individual participants included in the study.

**References**


Physical Activity Changes Impact the Nutritional Status of the Elderly: A Longitudinal Study

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¹Department of Nutrition, Faculty of Public Health, Universitas Indonesia

Abstract

This study to determine the impact of physical activity on the nutritional status of elderly people. This longitudinal study used 2007 pre-elderly aged 55-59 years (808 subjects) and followed for 7 years until 2014. Data physical activity were assessed to evaluate changes in nutritional status as body mass index (BMI). The factors associated with nutritional status are reported in this study. For 7 years, no physical activity changes were reported (60,8%). Physical activity changes were only reported by a few subjects (16,1%), and improved from no physical activity to periods of < 30 min or ≥ 30 min. BMI increased as physical activity decreased, in terms of both types and duration. Regular physical activity is an important factor to enhance the quality of life for elderly people.

Keywords: Nutritional status, body mass index, physical activity, elderly, pre-elderly.

Introduction

The composition of elderly population is increasing rapidly in both developed and developing countries because of increased life expectancy. Data from Ministry of Health Indonesia reported that since 2015 Asia and Indonesia have an era characterized by an aging population because > 7% aged 60 years and older. The elderly population experience decreased physical endurance and are more susceptible to diseases, the elderly morbidity rate of 28.2% in 2015.

Nutritional status is an indicators used to measure the health status of people. The nutritional status of the adult population (> 18 years old) can be determined by body mass index (BMI). The BMI is divided into categories of thin (< 18), normal (≥18–< 24.9), overweight (≥25–< 27.0) and obese (≥27.0) (10). Ferra et al stated that low or high BMI is associated with several general conditions and diseases in elderly and it indicates that nutrition is an important part in medical evaluation in elderly patients. Study from Hwang et al found that BMI is a predictor for mortality in the elderly, with obesity (BMI > 25) as the significant independent predictor for all causes of mortality, whereas being overweight (BMI > 23) elevates the risks of mortality caused by cancer, cardiovascular disease, and diabetes.

Physical activity determines a person’s health. Excess energy due to a low level of physical activity can increase the risks of being overweight and the risk of obesity. Regular physical activity of moderate intensity has significant health benefit and may decrease the risks of cardiovascular disease, diabetes, breast cancer, and depression. Physical activity performed regularly tends to fix body composition by the reduction of abdominal fat and overall improvement toward weight control.

The WHO has published globally recommended physical activities for the health of adults aged 18–64 years, which include free-time physical activities, transportation (i.e. walking or cycling), occupation (jobs), household chores, games, and sports or planned exercise, in the contexts of daily life, family, and community activities. The present study, we aimed to analyze physical activity as a risk factor for pre-elderly and elderly obesity using BMI values published in the Indonesia Family Life Survey (IFLS) from 2007 and 2014 data.
Materials and Method

Study Design: This study was a longitudinal study. This design was deemed the best way to analyze body mass index and other factors that were measured repeatedly over a certain period time, between individuals and between times. The data were collected from secondary data by the Indonesian Family Life Survey (IFLS), which was a public domain from IFLS4 (2007) and IFLS5 (2014) data. This research was done in 13 selected provinces from Indonesian Life Households Survey. Altogether these provinces represented approximately 83% of Indonesia.

Subjects in this study was comprised of the elderly (55-59 years old) in 2007 then followed for 7 years until they were 62-66 years old in 2014. The number of individuals for was 808 subjects. The independent variable for this study was physical activity and dependent variable was nutritional status (BMI). Subjects were divided into three groups in terms of physical activity: 1) those not performing regular physical activity (mild, moderate or heavy), 2) those performing physical activity for periods of < 30 min, and 3) those performing regular physical activity for periods ≥ 30 min. Additional variables were observed including age sex, marital status, tribe, education level, occupation status, income, insurance ownership, smoking habits, accident records, fall records, nutritional status, and eating habits.

Univariate and bivariate analysis were performed. Univariate analysis was performed as the frequency distribution of the mean and standard deviation sociodemographic data. Bivariate analysis was performed to know relationship between independent variable and dependent variable.

Findings: The sociodemographic features are shows that 200 people (24.8%) were 55 years old, the greatest number of elderly subjects. The sex of elderly subjects was evenly distributed with 50.4% male and 49.6% female. Most subjects were married (71.2%), were Javanese (68.9%), were not elementary graduates (50.5%), were employed (68.8%), had income at percentile 1 (31.8%), did not posses insurance (54.8%), were non-smokers (57.9%), did not not have accident records (87.5%), had never fallen (89.5%), had normal nutritional status (58.4%), practiced physical activities for ≥ 30 min (70.8%), frequently consumed carbohydrate in a week (68.3%), frequently consumed protein (54.8%), and frequently consumed vegetables (59.7%) and fruits (61.3%).

Table 1 shows that the mean elderly BMI was 22.64, The mean carbohydrate consumption score, protein, fat/oil, vegetable and fruit respectively was 2.99, 1.94, 2.22, 3.75, 1.16.

Table 1. Body mass index (BMI) and food consumption scores of the subjects in 2014 (n=808)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min-Max</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>22.64</td>
<td>3.84</td>
<td>12.78-32.85</td>
<td>22.37-22.90</td>
</tr>
<tr>
<td>Score of Carbohydrate Consumption (day/week)</td>
<td>2.99</td>
<td>0.77</td>
<td>1.33-7.00</td>
<td>2.94-3.04</td>
</tr>
<tr>
<td>Score of Protein Consumption (day/week)</td>
<td>1.94</td>
<td>1.31</td>
<td>0.00-7.00</td>
<td>1.85-2.02</td>
</tr>
<tr>
<td>Score of Fat Consumption (day/week)</td>
<td>2.22</td>
<td>2.63</td>
<td>0.00-7.00</td>
<td>2.04-2.40</td>
</tr>
<tr>
<td>Score of Veg Consumption (day/week)</td>
<td>3.75</td>
<td>2.69</td>
<td>0.00-7.00</td>
<td>3.57-3.94</td>
</tr>
<tr>
<td>Score of Fruit Consumption (day/week)</td>
<td>1.16</td>
<td>1.08</td>
<td>0.00-6.00</td>
<td>1.09-1.23</td>
</tr>
</tbody>
</table>

Table 2 indicates that the mean BMI decrease as physical activity increases in duration. This could be seen through the mean BMI, which decreased from 23.5 kg/m² to 22.7 kg/m² when the physical activity increased to ≥ 30 min. In contrast, the mean BMI increased from 22.7 kg/m² to 23.0 kg/m² when the physical activity decreased to durations of < 30 min or didn’t perform physical activity.
Table 2. Physical activity changes and mean BMI of subjects in 2007 and 2014 (n = 808)

<table>
<thead>
<tr>
<th>Physical Activity Changes</th>
<th>n</th>
<th>%</th>
<th>Mean BMI 2007 (kg/m²)</th>
<th>Mean BMI 2014 (kg/m²)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No changes in Physical Activity</td>
<td>491</td>
<td>60.8</td>
<td>22.4</td>
<td>22.4</td>
<td>-</td>
</tr>
<tr>
<td>Increase in Physical Activity, if:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no physical activity → physical activity &lt; 30 min, and/or physical activity &lt; 30 min → physical activity ≥30 min</td>
<td>113</td>
<td>14.0</td>
<td>23.3</td>
<td>23.5</td>
<td>0.008*</td>
</tr>
<tr>
<td>Increase in Physical Activity, if:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no physical activity → physical activity ≥30 min</td>
<td>17</td>
<td>2.1</td>
<td>22.7</td>
<td>22.7</td>
<td>0.762</td>
</tr>
<tr>
<td>Decrease in Physical Activity, if:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>physical activity ≥ 30 min → physical activity &lt; 30 min, and/or physical activity &lt; 30 min → no physical activity</td>
<td>107</td>
<td>13.2</td>
<td>22.8</td>
<td>23.0</td>
<td>0.176</td>
</tr>
<tr>
<td>Decrease in Physical Activity, if:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>physical activity ≥30 min → no physical activity</td>
<td>80</td>
<td>9.9</td>
<td>22.1</td>
<td>21.9</td>
<td>0.248</td>
</tr>
</tbody>
</table>

Note: * significant statistic p<0.05

Table 3. Comparison of Mean BMI of subjects in 2014

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean BMI (kg/m²)</th>
<th>SD</th>
<th>P Value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>23.4</td>
<td>4.1</td>
<td>&lt;0.0001*</td>
<td>1.10-2.14</td>
</tr>
<tr>
<td>Male</td>
<td>21.8</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Married</td>
<td>22.8</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>22.6</td>
<td>3.8</td>
<td>0.496</td>
<td>-0.38-0.79</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumateranese</td>
<td>22.9</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Javanese</td>
<td>22.7</td>
<td>3.8</td>
<td>0.507</td>
<td>-0.53-1.07</td>
</tr>
<tr>
<td>Others</td>
<td>22.1</td>
<td>3.8</td>
<td>0.068</td>
<td>-0.07-1.86</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not graduated in primary school</td>
<td>22.2</td>
<td>3.8</td>
<td>0.342</td>
<td>0.94-0.32</td>
</tr>
<tr>
<td>Graduated in primary school</td>
<td>22.5</td>
<td>3.8</td>
<td>0.003*</td>
<td>-2.44-(-0.51)</td>
</tr>
<tr>
<td>Graduated in junior high school</td>
<td>23.7</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduated in senior high school</td>
<td>23.8</td>
<td>3.9</td>
<td>&lt;0.001*</td>
<td>-2.14-(-0.41)</td>
</tr>
<tr>
<td>Working status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>23.2</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>22.4</td>
<td>3.8</td>
<td>0.005*</td>
<td>0.25-1.42</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentil 1 (Rp 0)</td>
<td>22.9</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentil 2 (&lt; Rp 1,000,000)</td>
<td>21.8</td>
<td>4.2</td>
<td>0.073*</td>
<td>-0.10-2.24</td>
</tr>
<tr>
<td>Percentil 3 (≥ Rp 1,000,000-&lt; Rp 10,000,000)</td>
<td>22.4</td>
<td>3.8</td>
<td>0.189</td>
<td>-0.23-1.16</td>
</tr>
<tr>
<td>Percentil 4 (≥ Rp 10,000,000-&lt; Rp 20,000,0000)</td>
<td>22.4</td>
<td>3.8</td>
<td>0.154</td>
<td>-0.20-1.28</td>
</tr>
<tr>
<td>Percentil 5 (≥ Rp 20,000,000)</td>
<td>23.3</td>
<td>3.5</td>
<td>0.362</td>
<td>-1.26-0.46</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does not have</td>
<td>22.5</td>
<td>3.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has</td>
<td>22.8</td>
<td>3.9</td>
<td>0.343</td>
<td>-0.79-0.27</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No smoking</td>
<td>23.4</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>21.6</td>
<td>3.4</td>
<td>&lt;0.001*</td>
<td>1.23-2.28</td>
</tr>
</tbody>
</table>
Table 3 reveals a significant relationship between the mean elderly BMI (p < 0.05) and sex, education level, occupation status, income, and smoking habits. The mean BMI in females (23.4 kg/m²) was higher than that in males (21.8 kg/m²). Higher levels of education correlated with higher mean BMI values in the elderly. The highest mean BMI was found in the elderly group that graduated from senior high school (23.8 kg/m²) whereas the lowest was observed in the elderly group that had not graduated from elementary school (22.2 kg/m²). The unemployed elderly exhibited a higher mean BMI (23.2 kg/m²) value than observed in those who were employed (22.4 kg/m²). The non-smoker elderly group had a higher mean BMI (23.4 kg/m²) than the smokers (21.6 kg/m²).

**Discussion**

The nutritional status of elderly subjects in the present study was determined using BMI as an indicator and we found that mean BMI of females was observed to be greater (23.4%) than that of males (21.8%). This result agrees with the observations of the NCD Risk Factor Collaboration 11 which reported the 2014 the prevalence of obesity in females greater than males. BMI influences by change in body composition of the elderly and related to the aging process, which increases BMI by 1.5–2.5 kg/m². Decreasing height is another characteristic of the aging process, resulting from spinal thinning or osteoporosis. The decrease in height starts after the age of 30 years, with continued decrease approximately 1 cm per decade until the age of 70 years, and 0.5 cm per year afterwards 2.

The mean BMI of the elderly in this study is associated with education level which is higher education correlating with a higher mean BMI. It was observed that the primary school-graduated and secondary school-graduated elderly group had an mean BMI that differed significantly compared with the elderly group who had not graduated from elementary school. This result is consistent with that reported in the study by Zhoua et al., (17) which showed that greater BMI is found among those with elementary level of education or above compared with those less educated. A higher level education is associated with a better socioeconomic condition as supported by an adequate income.

The smoker elderly have a lower BMI (21.6 kg/m²) than the smoker elderly (23.4 kg/m²). This supports the results published by Jitnatrin et al., 9 showing that the BMI of smoker males was lower (21.6 kg/m²) than that of non-smoker males (22.2 kg/m²) with similar results observed for the mean BMI of smoker females (22.1 kg/m²) which was lower than that of non-smoker females (22.9 kg/m²). This may be due to the elevation of metabolic rate and/or reduced appetite caused by nicotine in smokers.

Most of the elderly (68.8%) in the present study were employed, and the mean BMI of the employed elderly was lower (22.4 kg/m²) than that of the unemployed elderly (23.2 kg/m²). A statistically significant relationship was observed between the BMI values of subjects with employed versus unemployed status (p < 0.05). This is likely due to greater physical activity performed by employed people than unemployed people.

Data on physical activities in the elderly group show that the majority (70.8%) spent ≥ 30 min performing physical activities. Most of the elderly subjects (491 people) did not exhibit changes in the type of physical activity although a small proportion (17 people) increased their physical activity from zero time spent to ≥ 30 minutes. The mean BMI increases as both type and duration of physical activity decrease, and vice versa. The mean BMI can reduced when physical activity is performed after not doing so.

Age and levels of sports and recreational physical activity are associated with fat-free mass change 7. The fat-free mass contributes 19% in people who experience
weight gain when decreasing physical activity. The fat-free mass represents 33% of the weight lost in people who experience a decrease in weight. The fat-free mass in the male elderly drops with age (0.2% per decade), whereas the fat mass is gained equally gains in both sex (7.5% per decade). Nelson et al.\textsuperscript{13} stated that the recommended physical activity for the elderly is to enlarge the volume of aerobic physical activity, helping to prevent unhealthy weight. Additional physical activities also help prevent weight gain in the elderly. The recommended goal includes aerobic physical activity performed 30–60 min per day moderate activity.

Barrigan et al.,\textsuperscript{3} showed that the elderly aged 60–69 years generally only have 6–10 min for physical activity with moderate intensity or more per day. Duray & Genc\textsuperscript{4} showed that due to decreased aerobic capacity in elderly people, walking and balance changes may cause a decrease in functional capacity. The WHO\textsuperscript{17} recommends that physical activity should be performed at least 150 min a week for moderate-intensity physical activity, 75 min a week for high-intensity physical activity, or an equal combination of the two activities.

In the present study, most of the elderly possessed normal nutritional status and practiced constant activities, except for increasing or decreasing physical activity due to specific physical limitations. Aging itself can be defined as the progressive deterioration or loss of functional capacity that occurs in an organism after a period of reproductive maturity. Specific functional capacities change with age and the physiological capacities of organs show aging at different rates. Between individuals, more difference is noted in older people than younger people\textsuperscript{1}.

According to Sun et al.,\textsuperscript{16} regular physical activity can lead to a significant health improvement at all ages, and can prolong the active years of independent living as well as enhance the quality of life for the elderly. The decrease in physical activity is due to indications of constant work and dietary changes. Physical activity in the elderly is needed to inform public health strategies for improved quality of life for the elderly. Sahin et al.\textsuperscript{14} have determined that elderly people may become more dependent on additional assistance at advanced ages for some instrumental activities.

**Conclusion**

However, our findings suggest that increased physical activity influences the nutritional status of elderly people, by reducing BMI. These results will help to improve the quality of life and strongly indicate the importance of a regular physical activity program.

**Conflict of Interest:** The authors declare no conflict of interest

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**Ethical Clearance:** The procedures of the IFLS survey have been reviewed and approved by Institutional Review Boards in the United States (at Rand Corporation, Santa Monica, California) and in Indonesia (Ethics Committee of Gadjah Mada University Yogyakarta for IFLS3-IFLS5, and University of Indonesia, Jakarta for IFLS1-IFLS2) (https://www.rand.org).

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Open defecation, E. Coli contamination, Sosialization, and Behavior Change of the People of Sumur Batu Village, Babakan Madang Subdistrict, Bogor District

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1Department of Environmental Health, Faculty of Public Health and Graduate School of Environment, University of Indonesia, 16424 Depok, 2Public Health Study Program, Institute of Health Indonesia

Abstract

Result study in Sumur Batu Village in 2017 discovered that open defecation (OD) contributes to E.coli contamination in water flow at RW 04 Sumur Batu Village. The amount of people that has septic tank is expected having contribution to the contamination. From 10 water samples taken, show that the level of contaminant is exceeding the standard thus risking health. The increases of activity such as public bathing, washing and toilet facilities on the upstream and downstream and also feces final disposal on watershed/river basin, raise the risk of contamination of water flow in Sumur Batu Village.

In general, the program that will be conducted is the effort to organize, to maintain the environment, to analyze needs, and to increase the knowledge. With this activity, community is expected having concern to their health and environment. The aim of this community service is increasing people’s knowledge about the effect of open defecation, healthy latrine and the benefits of its use, related diseases, and then the behavior change and decreases in the incidence of the diseases.

From the results of activities before and after the intervention it was known that knowledge and attitudes increased from 37,5% to 54,3% and 53,1% to 78,6%, but not with behavior (from 53,1% to 37,1%).

Keywords: Open Defecation, Clean and Healthy Lifestyle, Sanitation.

Introduction

Indonesia health profile in 2014 shows that West Java Province is in top 5 province with the highest Community-Based Total Sanitation with the number 30,47% and in 2017 is increasing to 70,81% and the lowest open defecation free (ODF) is Bogor District (24,5%). Bogor district as one of the lowest percentage of ODF placed ODF as a priority program in the long-term development plan (RPJP).

The result of Laboratory tests conducted on 10 water source points in Sumur Batu Village (both tap water from groundwater and the flow of water around resident’s houses) showed that all water samples in the environment had E.coli contamination levels that aren’t in accordance with the standards regulation of the Minister of Health of Republic of Indonesia number 416 year 1990 about Requirements and Water Quality Supervision, and 41,6% of respondents stated that they still do OD along the river flow in Sumur Batu Village. This shows that the 70% ODF target in Sumur Batu Village has not yet been achieved which is indicated to have an impact on water pollution in the area. This can be attributed to the low level of public knowledge about ODF program and the risk of OD.

Anthropogenic activity and the results of E. coli content testing in the water flow in Sumur Batu Village showed a significant correlation, where fecal activity occurred in the tested stream. High E. coli contamination is found in not piping water or open water flow. In the upstream part of the waters showed
numbers of 122 coliform colony/ml samples and 64 coliform colony/ml samples. This amount increases with the length of the flow. 41.6% respondents claimed that they still did OD in the river flow, while 58.4% of them already had latrines and didn’t do OD. However, only 38.6% respondents had septic tanks as stools and 61.4% of other respondents still use rivers/stream as the final place for disposal of feces. 

62.4% of respondents in Sumur Batu Village who use tap water as their main water source are likely to have consumed contaminated water. The contamination is probably caused by the condition of the well that doesn’t meet the standards. Based on observation result, the wells are close to the open water flow that residents use for their activities. If the condition of the well doesn’t meet the standards or a leak occurs, it’s very possible for contaminated water to contaminate well water. The community’s highest complaint is itchy (67.3%). The low level of learning about sanitation from an early age can be one of the factors that contribute to the low of public awareness of the risk of OD. Sanitation learning and knowledge about OD that is still low, doesn’t have a significant effect on the feelings of most people when faced with OD behavior. This is indicated by the high of being disturbed and uncomfortable feeling when someone is doing OD around them. Most people also consider water that has been contaminated with feces from OD to be unclean and feel disgusted if they use it. External factors are thought to have impact on the application of community values to everyday life. Although people feel uncomfortable, the abundant availability of water in open streams makes them prefer doing OD. Since the high number of public inconveniences towards OD, the community has a high commitment in terms of the construction of communal latrines with qualified facilities to prevent OD activities (94.1%). Community commitment in such way and the core problems found can make community-based total sanitation as the right problem solving approach to achieve the ODF target in Sumur Batu Village. 

The availability of water, especially in dry season, can be used as a confounding factor on the decision of people doing OD. The value or trust of residents towards water contaminated with feces and the commitment of citizens in overcoming ODF is quite good. The purpose of this community service program is to increase public knowledge about adverse effects of OD, increase community knowledge about healthy latrines, improve community understanding of the benefits of using health latrines and septic tanks, change community behavior that is still defecated, and ultimately reduce the incidence of environmental-based diseases in Sumur Batu Village.

**Method**

Started with increasing knowledge in the community in the hope that increased knowledge will change community behavior, so that the community will be motivated to participate and concern about the community development and continued with the analysis of community needs. Program needs are identified starting from what is known, desired, done in the community, and what the target group feels about the behavior so that the program designed for the community is based on the answers or those questions.

Behavior change is influenced by 3 main factors, which are skills, availability of access/facilities, and social support. Other intervention efforts carried out based on priority issues are:

1. Community is not aware of health problems that will occur if doing OD.

**Activity plan (intervention):** Provide education to the community regarding the impact of open defecation and community-based total sanitation.

**Method and approach:**

a. Provide education through method of counseling to the community regarding the effects of OD and community-based total sanitation, which include:

- 5 pillars of community-based total sanitation
- Explanation the reasons for community still doing OD
- Diseases that can occur due to OD behavior from mild to severe
- Reasons to stop OD
- Flow of disease transmission through defecation
- Benefits of stop doing OD
- Introducing of various types of latrines

b. Conduct Q & A forum on environmental health, especially related to stopping OD.

2. Elderly who are used to defecating carelessly have
a psychological feeling that they will not be able to defecate if they don’t defecate on the river or at the garden.

**Activity plan (intervention):** Provide education to the community especially elderly who are still doing OD.

**Method and approach:**

- Provide good education through counseling method and personal approach to the community, especially the elderly regarding the dangers of health problems that may arise from OD.

- Provide confidence and motivation that the use of the toilet will give more comfort and safe to defecate.

3. Community is less aware of how to keep clean.

**Activity plan (intervention):** Provide education to the community on the importance of hand washing, provision of drinking water, and disposal household waste.

**Method and approach:**

- Teaching a good handwashing (6 hand washing steps) with soap and explaining the importance of health with the goal of being motivated to keep the people clean after being defecated as an effort to improve health and clean lifestyle.

- Explain the importance of clean water, clean water requirements, and types of clean water that can be sought.

- Teach how to manage household waste disposal either in the form of waste or water

4. People are having difficulties in obtaining clean water sources.

**Activity plan (intervention):** Create a discussion among citizens and provide option of solutions.

**Method and approach:** Providing advise to RW, RT administrators, and community leaders to conduct hygiene programs, prepare peer educators, in collaboration with village representatives, village head, and local health centers.

Furthermore, the evaluation phase is conducted to measure the success rate of the program. At this stage, the survey was conducted in the form of observation/observation of the checklist on the behavior of the community in the use of latrines and clean waterways and the spread of questionnaires about defecation to measure the level of knowledge and behavior of intervened residents. The data obtained from the baseline and endline surveys will be analyzed to determine the achievement of a predetermined success indicator, using the appropriate statistical method.

**Results and Discussion**

29.2% respondents didn’t have a toilet as a means of sewage, so that the activities were done on the river (15.6%), gutters (4.2%), public toilet (7.3%), and neighbor’s toilet (2.1%). From 70.8% respondents who had a latrine, it was known that 46.9% of them had no latrine to septic tank, but to the river (40.7%) and gutters (5.2%). In addition, 36.5% of the respondents didn’t have sewerage system but flowed to the river and the yard, 14.6% of respondents didn’t have clean water at their home and 43.8% claimed to have difficulty getting daily clean water.

Respondents with good knowledge on defecation before the intervention are about 37.5%, and increase after intervention (54.3%) and respondents with good attitude on defecation before intervention are about 53.1% and increase after intervention 78.6%. Thus behavior variable on defecation is decreasing from 53.1% to 37.1% after intervention (table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Before Intervention</th>
<th>After Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>%</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>36</td>
<td>37.5</td>
</tr>
<tr>
<td>Poor</td>
<td>60</td>
<td>62.5</td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>51</td>
<td>53.1</td>
</tr>
<tr>
<td>Poor</td>
<td>45</td>
<td>46.9</td>
</tr>
<tr>
<td>Behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>51</td>
<td>53.1</td>
</tr>
<tr>
<td>Poor</td>
<td>45</td>
<td>46.9</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Primary Data (2018)

Basically, good knowledge will increase awareness, encourage attitude change and at led to behavior change.
Knowledge will change the behavior, change paradigm, and motivate people to adopt given information so community will be empowered to increase the health level so that community willing to participate and pay attention. Effort to create behavior change is a big problem because it’s related to social, culture (habit), education, and limited community’s economy, access, knowledge and community characteristics that lies within the community. Behavioral change can be attempted through skills, availability of access/facilities and social support. This will be done by doing promotive and preventive efforts and also accompanied by an appropriate approach to empower the community and forming self-help groups that are motivated actively participate.\(^{(8)}\)

This socialization program is expected the knowledge on sanitation and hygiene and at the end increasing the health level. Table 2 shows that the probability of the diseases to occur related to OD that are diarrhea (9,4%), symptom of diarrhea (25,0%, 10,4% and 22.9%) and also skin diseases (27,1%).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Freq</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea in the last month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>9,4</td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>90,6</td>
</tr>
<tr>
<td>Defecation 3-6 times a day in the last month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>25,0</td>
</tr>
<tr>
<td>No</td>
<td>72</td>
<td>75,0</td>
</tr>
<tr>
<td>Defecation more than 6 time in the last month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>10,4</td>
</tr>
<tr>
<td>No</td>
<td>86</td>
<td>89,6</td>
</tr>
<tr>
<td>Soft stool in the last month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>22</td>
<td>22,9</td>
</tr>
<tr>
<td>No</td>
<td>74</td>
<td>77,1</td>
</tr>
<tr>
<td>Skin disorder/itchy in the last month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26</td>
<td>27,1</td>
</tr>
<tr>
<td>No</td>
<td>70</td>
<td>72,9</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Sumber: Primary Data (2018)

Conclusions

From the results of activities before and after the intervention it was known that knowledge and attitudes increased, but not with behavior. Basically, good knowledge will increase awareness, encourage attitude change and at led to behavior change. Effort to create behavior change is a big problem because it’s related to social, culture (habit), education, and limited community’s economy, access, knowledge and community characteristics that lies within the community. Behavior changes can be attempted but changes do not occur instantly.

Ethical Clearance: The ethical clearance of this research taken from Ethics Committee of Faculty of Public Health, Universitas Indonesia.

Source of Funding: All funds used to support this research come from Directorate of Research and Community Service, University of Indonesia (Science and Technology Program for the Community).

Conflict of Interest Statement: The authors of this research declare that there is no conflict of interest related to this study.

References


Effects of Integrating PBL and Simulation in Senior Nursing Students in Korea

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Abstract
The purpose of this study was to identify the effects of integrating PBL and simulation in senior nursing students. The present study was conducted with a quasi-experimental, single group, pretest-posttest design. Forty-seven senior students enrolled in an integrating nursing course in the fall semester of 2016 in South Korea. Life skills, knowledge, and confidence of basic nursing performance were administered before and after the use of integrating PBL and simulation. The data were analyzed using the paired t-test. The level of life skills (p=.001), knowledge (p<.001), confidence of basic nursing performance (p<.001) was significantly increased after taking course. This finding suggests that integrating PBL and simulation is an effective learning and teaching method in senior nursing student.

Keywords: Problem solving, Communication skill, Self-directed learning, Problem based learning, Simulation.

Introduction
The worldwide scarcity in the number of nurses is becoming a concern in the field of medicine. Although this phenomenon is also occurring in Korea, the shortage of nurses in Korea is different from that of other countries. According to the data released by the organization for economic cooperation and development (OECD) in 2018, the number of nurses per 1,000 individuals in Korea is 19.69, which is 1.5 times higher than the average of 13.60 in OECD countries. However, the number of nurses working at clinics is 6.8, which is lower than the average of 8.88 in OECD countries. This indicates that the shortage of nurses in Korea can be attributed to the shortage of nurses working in clinics rather than the shortage of nurse license holders. To understand the domestic nurse shortage, it is necessary to determine the status of job turnover. According to the study results of the Hospital Nurses Association, the turnover rate of general nurses was 13.9%; however, the turnover rate of new nurses was 29%, which is more than twice of that of the general nurse. This suggests that efforts are required to reduce the turnover rate of nurses.

New nurses fear that their inexperience in nursing can cause harm to a patient. The study of turnover experience of new nurses shows that differences between school education and real work environment and decreased self-confidence owing to inadequate job handling experience were the causes of job turnover, in addition to difficulties in their relationships with colleagues or patients, their own health problems, and skepticism about life. This indicates that it is possible to reduce the fear in new nurses regarding their skills and thereby reduce the turnover rate by performing competent nursing work. Therefore, it is suggested that efforts are needed to reduce the turnover rate of the nursing staff.

Nursing students can become familiar with nursing skills by observing and practicing them. However experiences of clinical skills training are concentrated on fundamentals of nursing practicum and are the least in clinical practice from the report. To achieve the goals of clinical practice education, self-initiative of the students is essential. Nursing students worry and fear that their inexperienced nursing skills will harm the patient. It is becoming a factor that makes college students...
Because confidence in performing basic nursing practices improves the satisfaction of clinical practice in nursing college students and the performance of new nurses, there is a need for intervention to improve confidence of basic nursing performance.

As it has been previously described, it is difficult to learn basic nursing directly in clinical practice. To overcome these clinical practice problems, it has been recently reported that the education method combining problem-based learning (PBL) and simulation has been used in nursing education and it has improved learning attitude, problem solving process, clinical performance, and nursing competence. The preceptor who is in charge of new nurses and the nursing managers in hospitals emphasize the necessity of basic nursing and problem-solving skills for patient nursing as core competencies of new nurses. In addition, it has been shown that simulation education before graduation is continued after graduating as a new nurse, who helped in improving clinical performance and critical thinking skills, and has also affected job turnover rate. Therefore, this study aimed to investigate the effects of integrating PBL and simulation (IPS) education on the confidence of nursing students with respect to basic nursing performance, communication skills, problem-solving skills, and self-directed learning skills and to propose an education method for nursing education as expected from the clinics.

**Method**

**Design:** This study is quasi-experimental, single-group and pre-test-post-test in design.

**Participants:** Participants were selected using convenience sampling from a population of undergraduate senior students enrolled in a mandatory integrating nursing course in the fall semesters of 2016 at a nursing college in Gangneung, Korea. There were 76.6% female and their average age was 24.13±1.75 years.

**Measures:** Life skill questionnaire for Korean college students and adults was used for communication skills (49 items), problem-solving skills (45 items), and self-directed learning skills (45 items). Each item is scored on a 5-point Likert-type scale, from 1 (very uncommon) to 5 (very frequent), with higher scores indicating a higher level of life skills. Cronbach’s alpha was .80~.93 for the sub-scales. In this study, Cronbach’s alpha was .92~.94. Knowledge were measured a self-administered questionnaire designed to assess senior nursing students’ knowledge about course topics. It was developed by researcher. It consists of chest pain (8 items), dyspnea (9 items), and fracture (5 items) patients care. Each item is scored on a 5-point Likert-type scale (not true=1, very true=5), with higher scores indicating a higher level of knowledge. In this study, α coefficient ranged .93 ~ .95. Confidence of basic nursing performance were measured a self-administered questionnaire with questions. It was developed by researcher. It consists of confidence of nursing performance on medication (IV, oral medication, 2 items), oxygen therapy (1 item), EKG & SPO₂ monitoring (1 item), intubation assist (1 item), crutch walking support (1 item). Each item is scored on a 5-point Likert-type scale (very low=1, very high=5), with higher scores indicating a higher level of confidence on basic nursing performance. In the current study, α coefficient ranged from .79 to .83.

**Procedure:** The IPS education was employed in the nursing course. The study duration was from October to December, 2016. This course was a two credit course (total 30 hours). This course was designed based on the framework of PBL combined with simulation and aimed to improve core nursing competency in the cardiovascular, respiratory and musculoskeletal nursing. The nursing students were assigned to 8 groups with 6 students each.

1. **Pre-test:** The preliminary survey was conducted immediately after the curriculum orientation. Pre-survey questionnaires comprise general characteristics, life skill questionnaire, knowledge, and confidence of basic nursing performance.

2. **Integrating PBL and simulation:** The program was run with a total of three sessions. Each session was organized based on various subjects. The PBL scenarios were evaluated by three experienced clinical nurses who served as subject matter experts. The three sessions were organized by considering patients with chest pain, those with dyspnea, and those with fracture as subjects. Each session comprised two scenarios related to the subject (total 6 scenarios). The first scenario was used for PBL and the second was used for the simulation scenario. The specific process is as follows.

   It took 4 h for each PBL scenario. Based on symptoms of PBL scenario, subject cases were analyzed from various perspectives and necessary data were collected to identify nursing problems and to determine
solutions for nursing problems. Simulation scenarios reduce the scope of nursing problems by focusing on diseases. Myocardial infarction in the first session, chronic obstructive pulmonary disease in the second session, and nursing problems in tibia fracture in the third session were organized as subjects to be addressed. Through the scenarios for each PBL and simulation, nursing students were given the opportunity to perform initial assessment, core assessment, and nursing intervention, to design problem-solving plans, and to choose and apply the necessary nursing skills directly to standardized patients.

In the nursing intervention for myocardial infarction and chronic obstructive pulmonary disease patients, nursing performance of ECG and SPO2 monitoring, oxygen therapy, administration of oral medication, IV side shooting and endotracheal intubation assist is included. Nursing intervention of tibia fracture patients includes crutch walking support and administration of oral medication.

For simulation education, trained personnel were recruited to perform the role of patient and guardian, and orientation on the role of patient and guardian was performed. Skills that could not be performed on the patient, IV side shooting and endotracheal intubation assist, were performed on IV simulator and intubation trainer. The 5-h simulation session was followed by a three step simulation process comprising briefing, simulation, and debriefing. The topics that must be learned for the simulation exercise, scenario outline, and learning objectives were included in the briefing. The simulations were run for 15 min per scenario. The group who did not perform the simulation practice was directed to perform hands on simulation, evaluate simulation practice of the other group, and group discussion for the simulation practice under the guidance of the teaching assistant. The group who finished the simulation practice was directed to write a reflection journal. Once all groups were finished with the simulation practice, there was an hour long debriefing period for the entire team. The course was directly managed by the researcher who has many years of experience in PBL and simulation education.

3. Post test: The post test was conducted immediately after completing integrating PBL and simulation.

Data analysis: The collected data was analysed using SPSS Statistics 21 version. In addition to using descriptive statistics, the paired t-test was used to compare the mean scores and the changes in the scores of variables at a significance level of .05.

Ethical Consideration: All participants were enrolled in a mandatory integrating nursing care course. However, participants who completed the questionnaire survey also filled out informed consent form agreeing to participate in the study. Students were briefed on the study purpose and process, as well their right to withdraw participation at any time without any adverse effect on their course grade.

Findings: Problem-solving skills (t=4.77, p<.001) and self-directed learning skills (t=2.53, p=.015) were statistically significant; however, communication ability was not statistically significant (t=1.76, p=.085). Knowledge was statistically significant in all three items (t=12.03, p<.001). In the confidence of basic nursing performance, the total score was increased with a statistical significance (t=3.92, p<.001), but among the sub-domains, oxygen therapy care was not significant (t=0.66, p=.511) (Table 2).

### Table 1: Effects of integrating PBL and simulation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Mean ±SD</th>
<th>Post Mean ±SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life skill</td>
<td>3.56±0.42</td>
<td>3.71±0.40</td>
<td>3.45</td>
<td>.001</td>
</tr>
<tr>
<td>Problem Solving ability</td>
<td>3.49±0.45</td>
<td>3.72±0.43</td>
<td>4.77</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Self-directed learning</td>
<td>3.54±0.51</td>
<td>3.68±0.46</td>
<td>2.53</td>
<td>.015</td>
</tr>
<tr>
<td>Communication ability</td>
<td>3.72±0.43</td>
<td>3.80±0.46</td>
<td>1.76</td>
<td>.085</td>
</tr>
<tr>
<td>Knowledge</td>
<td>2.91±0.51</td>
<td>3.91±0.49</td>
<td>12.03</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Chest pain patient care</td>
<td>2.66±0.53</td>
<td>3.66±0.55</td>
<td>11.14</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Dyspnea patient care</td>
<td>3.33±0.69</td>
<td>4.27±0.59</td>
<td>8.20</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Fracture patient care</td>
<td>2.62±0.62</td>
<td>3.74±0.54</td>
<td>11.24</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Confidence of Basic Nursing</td>
<td>3.72±0.61</td>
<td>4.06±0.57</td>
<td>3.92</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>IV shooting care</td>
<td>2.59±0.85</td>
<td>3.45±0.85</td>
<td>4.88</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Oral medication care</td>
<td>2.57±0.97</td>
<td>3.34±0.75</td>
<td>4.51</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Oxygen therapy care</td>
<td>4.40±0.69</td>
<td>4.49±0.64</td>
<td>0.66</td>
<td>.511</td>
</tr>
<tr>
<td>EKG &amp; oximeter care</td>
<td>3.79±1.16</td>
<td>4.19±0.74</td>
<td>2.29</td>
<td>.027</td>
</tr>
<tr>
<td>Intubation assist</td>
<td>3.02±1.26</td>
<td>3.60±0.94</td>
<td>3.35</td>
<td>.002</td>
</tr>
<tr>
<td>Crutch walking support</td>
<td>2.11±0.91</td>
<td>3.79±0.90</td>
<td>10.62</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Discussion

In this study, IPS improves the problem-solving skills and self-directed learning skills. PBL education is an education method where learners organize their knowledge through the process of acquiring and utilizing the knowledge required for self-directed problem solving. It is a self-directed learning education as the learners strive to find the best solution for the problem in the process. Therefore, it appears that the process of finding the nursing problems together by group members and finding the solutions for the problems, has affected to improve the subjects’ problem-solving and self-directed learning skills. It may also be that providing additional opportunities to solve modified situations by applying PBL and simulation scenarios differently has helped to improve problem-solving skills. In addition, to successfully integrate PBL and simulation education in a nursing college, it is necessary to have a professor who serves as a learning guide and facilitator. It may have helped in improving problem-solving and self-directed learning skills that the researcher who has experience of PBL education and simulation education using various scenarios for many years has performed education.

We showed that IPS education has an effect on knowledge and confidence of basic nursing performance in this study. The confidence of the basic nursing performance might have improved because the basic nursing skills were directly performed through simulation. Considering the fact that the confidence of basic nursing performance improves job performance of new nurses and improved job performance lowers job turnover, it might help reduce the turnover of new nurses by applying the IPS education to the nursing college students who are about to graduate.

The researchers expected the communication skills of the nurses to be improved because they were communicating during the simulation process with the standardized patients; however, there was no difference in the communication ability of the subjects before and after the experiment. Programs for improving communication skills include helping students find problems in listening, empathizing, and communicating by themselves. In this study, however, we provided a virtual hospital situation and only the opportunity to talk with standardized patients and it might be the cause that we obtained the result. From a different perspective, we can think of the reasons underlying the insufficient basic nursing skills of the students. As mentioned earlier, because the basic nursing performance of nursing college students is focused in the fundamental nursing practice curriculum and there is little opportunity to practice the basic nursing skills in the clinical practice, the nursing skills is in a premature state although they are senior students before graduation. Therefore, IPS might not have improved communication skills because students concentrate on basic nursing skills that they need to develop rather than communication with standardized patients in the situation where students need to analyze and apply necessary nursing skills selectively. We propose a future study in which a program that allows the students to practice the basic nursing skills required in the scenarios is first executed, followed by the program analyzing its effect on the communication skills of nursing students.

Conclusion

This study confirms the effects of integrating PBL and simulation. However, this study has limitations; the subjects were nursing students of the same college; hence, it is difficult to generalize the results of the research; and we cannot exclude the possibility that the test effect and the effect of maturity could have intervened in the experimental design of pretest and posttest with the single group. We propose a study that includes intervention for improvement of communication skills and a study using a control group.

Conflict of Interest: No conflict of interest.

Source of Funding: Self

References
4. Im BM, Park JM, Kim MJ, Kim SY, Maeng JH, Lee LL, Kang KA. A phenomenological study on


19. Park HS, Koh HS. The effects of communication training program on communication ability, cognitive emotional empathy as vocational competency. The Journal of Employment and career. 2018;8(2):75-95.
Descriptive Quality of Sleep to Clients with Hypertension

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¹Department of Nursing, Health Politechnic of Banjarmasin, Banjarbaru, Kalimantan Selatan, Indonesia

Abstract

Sleep quality in hypertension patients is generally disrupted due to several factors that can impact on poor sleep quality and will affect the increase in blood pressure. The objective of the study was to assess the sleep quality of clients with hypertension. Sample collection conducted here was the accidental sampling technique based on 35 respondents suffering from hypertension. The data were collected using PSQI questionnaire and tension metre (sphygmomanometer). The results showed that there were classified into 3 degrees I, II, and III respondents having poor sleep quality. This may occur because of the higher degree of hypertension classification. It is likely to experience poor sleep quality based on some components of sleep quality such as subjectivity, sleep quality, sleep latency, sleep duration and sleep disturbance; thus, resulting in disruption of activity on the next day. It was suggested that the clients should pay an attention on the quality of sleep including in the work place.

Keywords: Sleep Quality, Hypertension, client.

Introduction

Hypertension is one of the important factors as the trigger of non-communicable diseases such as heart disease and stroke which is currently the number one cause of death in the world.¹ Hypertension has killed 9.4 million people worldwide each year. The World Health Organization estimates that the number of hypertensive patients will continue to increase as the population grows. In the next 2025, about 1.5 billion people in the world were affected by hypertension.²

The comparison of people suffering from hypertension is quite high, i.e. 51 people from 100 people suffering from hypertension.³ Based on the data of Basic Health Research 2013, some non-communicable disease cause death in South Borneo, one of them hypertension reaches 30.8%. Based on the hypertension patients per city in South Borneo in 2015, Banjarmasin is the highest hypertension patients with 18,730 patients, followed by Tanah laut 14.121 people, Banjar Regency 7,738 people, Kotabaru 6,680 people, Banjarbaru 5,629 people, Tapin 3,085 people, Barito Kuala 2,985 people and the rest ranged from 2,500 to over a thousand people.⁴

In general, people with hypertension suffered sleep disorders due to some physical conditions and environmental conditions experience so that the impact on poor sleep quality and will affect the increase in blood pressure decreases while normal (10-20% is still considered normal). This occurs because of a decrease in sympathetic activity during sleep. If sleep disorders, then there is no decrease in blood pressure during in blood pressure during sleep so that will increase the risk of hypertension. Every 5% of normal decline should occur and not be experienced by some one who suffers hypertension, and then the possibility of 20% will increase blood pressure.⁵ Sleep deprivation was a risk factor for hypertension in adults. Shorter sleep results can cause metabolic and endocrine disorders that can cause cardiovascular disorders.⁶

Based on a preliminary study that researchers conducted at the South community health center Banjarbaru some clients who suffer from hypertension complain often feel sleepy at 9-11 a.m, at night some people who suffer from hypertension have difficulty sleeping because of headache and some clients say should take drugs that give side effects drowsiness to make falling asleep. Based on the described problems, it was interested in conducting research on sleep quality on clients with hypertension in the work area of community health center Banjarbaru Selatan, Kalimantan, Indonesia.

Method

Types of Research: This research method is descriptive research that aims to assess the quality of
sleep on clients with hypertension in the work area of community health center Banjarbaru Selatan.

**Population & Sampling:** The population in this study was all hypertension clients in the work area of community health center Banjarbaru Selatan new cases and amounted to 4,498 people. Sample in this research is part of hypertension patient in working area of community health center Banjarbaru Selatan. Sampling technique in this research is by using accidental sampling technique.

**Data Collection:** In this study primary data about sleep quality on clients with hypertension obtained from questionnaires in the form of structured questions asked to the respondent and blood pressure measurement using tensi meter (*sphygmomanometer*).

**Ingredients:** The instrument of data collection used in this research is questionnaire PSQI (Buysse, et al, 1989) and tensimeter (*sphygmomanometer*).

**Data Analysis:** Data analysis used in this research use descriptive data analysis by using frequency distribution formula and presented by frequency distribution table, then drawn conclusion. From the characteristics of the respondent was made tabulation of frequency distribution of tabulation (cross tabulation).

**Results**

**Characteristics of Respondent**

**Table 1: Frequency distribution characteristics of responden by sex**

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>16</td>
<td>45.7</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>19</td>
<td>54.3</td>
</tr>
</tbody>
</table>

Based on table 1, 35 respondents researched showed that most of the respondents were female sex of 19 people (54.3%).

**Table 2: Frequency distribution characteristics of responden by age**

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;45 years</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>2</td>
<td>45–59 years</td>
<td>17</td>
<td>48.6</td>
</tr>
<tr>
<td>3</td>
<td>60–75 years</td>
<td>15</td>
<td>42.9</td>
</tr>
</tbody>
</table>

Based on table 2 of 35 respondents studied showed that most respondents aged between 45–59 years as many as 17 people (48.6%).

**Frequency distribution of hypertension classification**

**Table 3: Frequency distribution of hypertension classification**

<table>
<thead>
<tr>
<th>No</th>
<th>Hypertension Classification</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grade I (Light)</td>
<td>17</td>
<td>48.6</td>
</tr>
<tr>
<td>2</td>
<td>Grade II (Medium)</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>3</td>
<td>Grade III (Weight)</td>
<td>8</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Based on table 3 of 35 respondents studied showed that respondents with hypertension classification grade I as much as 17 people (48.6%).

**Distribution of Sleep Quality Frequency in Clients with Hypertension**

**Table 4: Distribution of sleep quality frequency in clients with hypertension**

<table>
<thead>
<tr>
<th>No</th>
<th>Sleep Quality</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>2</td>
<td>Bad</td>
<td>29</td>
<td>82.9</td>
</tr>
</tbody>
</table>

Based on table 4 of 35 respondents studied showed that the majority of respondents have poor sleep quality of 29 people (82.9%).

**Cross Sample Sleep Quality in Clients with Hypertension Based on Hypertension Classification**

**Table 5: Cross Sample sleep quality in clients with hypertension based on hypertension clasifikasi**

<table>
<thead>
<tr>
<th>Hypertension Classification</th>
<th>Sleep Quality</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Bad</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
</tbody>
</table>

Based on table 5 of 35 respondents studied showed that respondents who have poor sleep quality with classification of grade I hypertension as many as 11 people (31.4%), respondents who have bad sleep quality with classification of grade II hypertension as much as 10 people (100%), of respondents who have bad sleep quality
quality with classification of grade III hypertension as many as 8 people (100%) and no respondents who have good sleep quality with classification hypertension grade II or grade III.

**Discussion**

**Hypertension Classification:** Based on table 3 it is found that from 35 respondents, respondents mostly have classification of hypertension degree I as much as 17 people (48.6%), this can be caused by age and gender factors where respondents came more than half of female respondents as many as 19 people (54.3%), and most aged between 45-59 years as many as 17 people (48.6%). So in this study, women aged 45–59 years tend to be affected by hypertension, which at that age will experience menopause women who cause estrogen hormones begin to disappear, the hormone estrogen is able to protect blood vessels.

In the pre menopause women begin to lose little by little the hor, one esterogen that can protect blood vessels from damage. This process continues as the amount of estrogen hormone decreases with age, which generally occurs in women aged 45–55 years. Prevalence of hypertension in women found is higher than men. Kumar explains that someone who is at risk of suffering from hypertension is over 45 years of age and high blood pressure around the age of 40 years, although it can occur in young age. Hypertensive progressiveness begins with pre-hypertension in patients aged 20–29 years (with increased cardic output), then becomes premature hypertension in patients aged 30–39 years (where peripheral resistance increases) hypertension at the age of 40–49 yers and eventually become hypertensive with complications at the age of 50+ years. The most suffering from hypertension was 41–65 years old (63.80%), followed by 25–40 years (25.50%), >65 years (8.50%), and <25 years (2.10%). Generally, blood pressure increases in age. Usually it was caused by decreased organ function.

Respondents suffering from pre-hypertension are female (5.88%), while those suffering from grade I hypertension (30.39%), and who suffer from grade II hypertension of female (19.63%).

**Quality of Sleep to Clients with Hypertension:** Based on the results of research conducted by researchers found that the majority of respondents ie as many as 29 people (82.9%) of the 35 respondents who studied had poor sleep quality based on some components of sleep quality. People suffering from hypertension will have a risk of getting poor quality sleep quality. Poor sleep quality in this study tends to occur in the subjectivity of the quality of sleep, sleep latency, sleep duration, sleep disturbance and disruption of activity in the day. In this study, more than 50% have poor sleep quality based on sleep disorders such as frequent to the bathroom, difficulty breathing, dizziness, pain and difficulty sleeping, which can wake her sleep. In America, 10% of the population in the United States experience hypertension associated with sleep sleep disorders.

Patients about 33% suffered from hypertension almost all experience sleep disorders. According Ingram et al., people with hypertension generally experience pain, other than that the patients is also easily tired, feel uncomfortable difficult breathing and difficulty sleeping that can disturb sleep in people with hypertension. 68% of the most common symptoms of hypertensive patients are nocturia. About 91% of people with hypertension have difficulty breathing during sleep. A total of 15 people (42.9%) of respondents who studied had poor sleep quality based on sleep duration. Most respondents studied said sleeping <6hours a day. Tarwoto and Wartonah explained that the duration of sleep for age <45 years is 7-9 hours/day, sleep duration for age 40-60 years ie ± 7 hours/day and sleep duration for age >60 years ie ± 6 hours/day.

Most respondents experienced difficulty sleeping, respondents need ± 60 minutes to be able to fall asleep. This is in accordance with research conducted by Mansoor which explains that people with hypertension usually take a longer time to start falling asleep. Normal people usually fall asleep within 20 minutes.

According to Buysse sleep quality is a complex phenomenon involving various domains, among others, assessment of subjective sleep quality, sleep latency, sleep duration or duration of sleep, efficiency of sleeping habits, sleep disturbances and disruption of daytime activities, so if wrong one of the seven domains are disturbed it will result in decreased quality of sleep. In this study the respondents had poor sleep quality based on subjective response about sleep quality as much as 22 people (62.9%), respondents had poor sleep quality based on sleep latency as many as 17 people (48.6%),
respondents had very high sleep quality both based on the efficiency of sleeping habits as much as 16 people (45.7%), and respondents have very good sleep quality based on the use of drugs as many as 32 people (91.4%).

In this study respondents had poor sleep quality based on the disruption of daytime activities as many as 18 people (51.43%), this is in accordance with research conducted by Potter & Perry\(^\text{13}\) showed that dizziness in people with hypertension can wake the patient does not get enough sleep, which will affect the activity in the next day, people suffering from hypertension will have the risk of getting poor sleep quality.

Autonomic cardiovascular control changes across sleep stages. Thus, blood pressure, heart rate and peripheral vascular resistance progressively decrease in non-rapid eye movement sleep. Any deterioration in sleep quality or quantity may be associated with in increase in nocturnal blood pressure which could participate in the development or poor control of hypertension. In the present report, sleep problems/disorders, which impact either the quality or quantity of sleep, are reviewed for their interaction with blood pressure regulation and their potential association with prevalent or incident hypertension. Obstructive sleep apnea syndrome, sleep duration/deprivation, insomnia, restless legs syndrome and narcolepsy are successively reviewed.

**Sleep Quality in Clients with Hypertension Classification:** Based on the results of research conducted by researchers showed that respondents classification tend to have poor sleep quality based on some components of sleep quality, it can be caused by age factor where the increasing of age hence decreasing of sleep quality which can influence health such as hypertension, on the contrary the higher the grade of hypertension have complaints such as dizziness, difficulty sleeping and have a short duration of sleep, which will affect sleep quality on clients with hypertension. Poor sleep quality is associated with increased risk of hypertension, and thus increases the risk of cardiovascular disease.\(^6\)

Remmes\(^23\) explains that sleep disorders can cause or worsen medical and psychiatric disorders such as hypertension, vascular disease, heart or brain, obesity and depression. In another study conducted by Calhoun and Harding\(^24\) explained that if poor sleep quality can increase blood pressure in a person. Poor sleep quality can lead to hormone regulation of blood pressure balance or aldosterone hormone does not work optimally, so less sleep time can make the nervous system become hyperactive which then affects the whole body including the heart and blood vessels.

Adults who had sleep disturbances, short sleep, and poor sleep quality were 1.84 times more likely to have hypertension than adults who did not have sleep disorders, short sleep, and poor sleep quality.\(^15\) On the other hand, if there is a lack of sleep will increase blood pressure and activate the sympathetic nervous system that in the long term it will trigger hypertension.\(^25\)

**Conclusion**

Based on the conclusions obtained from the results of research entitled sleep quality overview in Clients with Hypertension in the Work Area of community health center Banjarbaru Selatan are:

1. The results showed that most respondents have classification of grade I hypertension with 17 people (48.6%).
2. The results showed most of the respondents had poor sleep quality of 29 people (82.9%)
3. The results showed that the tendency in classification of grade I, II and III hypertension has poor sleep quality.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

**Source of Funding:** The self-funding was conducted in this research.

**Ethical Clearance:** Ethical clearance was provided by the Ethics Committee of Banjarmasin Health Politechnic

**References**

Patients’ Attendants Community Empowerment as Clean and Healthy Behaviors’ Volunteers in Hospital Setting

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Abstract

Background: Clean and Healthy Behaviors (CHB) is one of important program in enhancing hospital’s therapeutic-environment. It invites active contributions from hospital’s acquaintances including patients’ attendants (PAs). Though, PAs play significant roles in patients’ care, most of hospital managements in Indonesia are seen less seriously concern about them. To succeed CHB program, it is essential to identify PA’s attitude, behaviors, perceived barriers in implementing CHB and PA’s characteristics that potentially support them become hospital’s CHB volunteer.

Method: This descriptive study involved 136 PAs who recruited conveniently from a district hospital in West Java Indonesia. All respondents asked to fulfill questionnaires including demographic data, attitude (10 items), behaviors questionnaire (10 items), and interviewed for their understanding on CHB program and their perceived barriers in performing CHB in hospital setting. The questionnaires were developed by researchers and tested for the validity and reliability (CVI: .75-1; CVR: +.5-1; Chronbach alpha .827 (attitude questionnaire) and .630 (behaviors questionnaire).

Results: The data showed that slightly-above half of PAs (50.7%) had favorable attitude toward CHB but reported low compliance in performing CHB (54.41%). Favorable and compliance PAs were mostly identified in those who were males, patients’ spouse or relatives, in-continuously accompanied patients, higher education, understood about CHB and report as PA to hospital. Additionally, most of compliance PAs identified had favorable attitude (70.79%; p < .05). This signifies the previous finding suggested that positive attitude is required for positive behaviors.

Conclusion: Generally, most of PA’s attitude and behaviors related CHB required improvement and PAs who were males, higher educational level, patients’ spouse/relatives, in-continuously accompanying patients and knew about CHB were potentially empowered to be hospital’s CHB volunteers.

Keywords: Clean & healthy behaviors, hospital, patients’ attendants, volunteer.

Introduction

Hospital as healthcare provider is a vital component in achieving communities’ highest health status. As a center of healthcare services, hospital is expected able to provide comprehensive services including preventive, curative as well as rehabilitative. In the other words, hospital ideally become an institution provides optimum therapeutic environment for individual, group or communities in gaining the highest health status.

In the other hand, however hospital also has been shown to be a reservoir for infectious agents including bacteria, viruses and fungi¹. Patients, staff, and neighbors of the health-care setting face unacceptable risks of infection if environmental hygiene is inadequate. Hospital environmental contamination may contribute to diseases transmission when hospital’s staffs contaminate their hands or gloves by touching contaminated surfaces, or when patients or visitors directly contact with contaminated surfaces. Thus, hospital might even become the epicenter of certain diseases’ outbreaks.

In order to improve hospital hygiene, previous studies proved that infection control program that include
enhanced cleaning effectively reduced the hospital acquired infection\textsuperscript{2,3}. Housekeeping and cleaning staff are important element in gaining effective hospital hygiene. It also proved that instituting direct observation, supervision, and education of staff as they clean, showed reductions of important hospital pathogens\textsuperscript{4,5,6,7}.

However then, there is a concern that these interventions might lose impact over time, since cleaning is physically demanding, poorly paid, and subject to inadequate staffing\textsuperscript{8,9}. Furthermore, there tends to be rapid turnover among janitorial and housekeeping staff, and this may be related to sickness levels as well as payment dissatisfaction, status, and conditions\textsuperscript{8}. It signifies that in achieving optimum hospital hygiene required other hospital’s acquaintances involvement rather than relied on hospital cleaning staffs.

In Indonesian context, there is one of important national program developed to improve hospital hygiene, “Perilaku Hidup Bersih dan Sehat (PHBS)” [clean and healthy behaviors (CHB)]. This program encourage hospital’s staffs, patients, and visitors to know, will, and enable their self in applying CHB in the healthcare service center setting and actively involved in gaining the healthy work place. The CHB in healthcare services center consist of hand hygiene, using clean water, using proper toilet, no smoking, no littering, no spitting, preventing diseases transmission, as well as eradicating mosquito larvae. Unfortunately, the national survey reported that CHB adherence in the healthcare services setting in each province still less than 50\%\textsuperscript{10}.

In Indonesia, almost each patient is companied by at least one patient’s attendant (PA) that play significant roles in fulfilling patients’ private needs and decision making that in some conditions hospital staffs face limitation in dealing with. In the other hand however PAs also increase the hospital’s resources burden (water, electricity, and facilities), infection risk, patient safety, as well as challenges in succeeding CHB program implementation.

As a behavior, there are some contributing factors related to CHB adherence. Previous studies conducted among students and public society reported that CHB adherence was closely related to individual’s knowledge, attitude, and facilities availability\textsuperscript{11,12} as well as gender and educational level\textsuperscript{13}. Whereas, study conducted among patients’ attendants (PAs) found that most of PAs reported the lack information, lack of social support, and lack of hand rub facilities accessibility\textsuperscript{14}.

Since PAs in Indonesian context is a general phenomenon, potential problem and the problem solving strategy should be identified. Thus it is important to conduct a study that aimed to identify PA’s perspective, attitude, and behaviors related to CHB, as well as their characteristics that potentially support them to be hospital’s CHB volunteers.

**Material and Method**

This descriptive study involved 136 patients’ attendants(PAs) that conveniently recruited from 5 inpatient units of adistrict general hospital in West Java Indonesia. Informed consent was applied prior to data collection. Data were collected using questionnaires and interview. Demographic questionnaire consisted of age, gender, educational level, type of PAs, PAs–patients’ relationship, and permission status. The attitude of CHB questionnaire consisted of 10 items with four scales from most agree to disagree, while CHB questionnaire consisted of 10 yes or no questions. The questionnaires were developed by authors based on CHB related literatures and tested for its’ validity and reliability before used. Questionnaires content validity test were conducted by four university experts that asked for evaluating the questionnaires’ content validity index (CVI) and content validity ratio (CVR). The experts scoring resulted in CVI: .75-1 and CVR: .5-1. The Chronbach alpha values were 0.827 and 0.630 for attitude and behaviors questionnaire respectively. The collected data were analyzed descriptively (frequency, mean, and percentage) as well as inferentially using Chi-square.

**Findings**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>97</td>
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</tr>
<tr>
<td>Male</td>
<td>39</td>
<td>28.7</td>
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<td>48</td>
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<td>Junior high school</td>
<td>25</td>
<td>18.3</td>
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<td>51</td>
<td>37.5</td>
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<tr>
<td>University</td>
<td>12</td>
<td>8.5</td>
</tr>
<tr>
<td>Type of Patients Attendants (PAs)</td>
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<td></td>
</tr>
<tr>
<td>Continuously stayed in Hospital</td>
<td>49</td>
<td>36</td>
</tr>
<tr>
<td>Alternately</td>
<td>80</td>
<td>58.8</td>
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<tr>
<td>Shift based PAs</td>
<td>6</td>
<td>4.4</td>
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<tr>
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<td>1</td>
<td>0.7</td>
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<tr>
<td>Relationship with patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>24</td>
<td>17.6</td>
</tr>
<tr>
<td>Son/Daughter</td>
<td>80</td>
<td>58.8</td>
</tr>
<tr>
<td>Relative</td>
<td>31</td>
<td>22.8</td>
</tr>
<tr>
<td>Parent</td>
<td>1</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Table 1: Characteristic of respondents (n = 136)
Most of respondents were female (73%), reported not being informed about CHB (61.8%), and did not report to the hospital as PAs (86%). Additionally, more than half of respondents are patients’ son/daughter (58.8%), alternately stayed at hospital (58.8%) and hold the 9 years education (53.6%).

The table described that favorable attitude toward CHB was mostly found in male respondents (69.23%), patients’ spouse (80%), university educational level (80%), companying patients regularly in particular shift (83.33%), reported being informed regarding CHB in hospital (59.61%) and reported as PAs to the hospital (89.47%). Regarding the compliance, high compliance CHB was mostly identified among respondents who were male (69.23%), education level higher than elementary school (50–54.90%), patients’ relative (58.06%), not-continuously stay with patients (76.38%), reported being informed regarding CHB (51.92%) and reported to the hospital as PAs (63.16%).

Table 2. Patients Attendants’ Characteristic, Attitude, and CHB (n = 136)

<table>
<thead>
<tr>
<th>No</th>
<th>Characteristics</th>
<th>Attitude</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Favorable</td>
<td>Unfavorable</td>
</tr>
<tr>
<td>1</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>42 (43.30)</td>
<td>55 (56.70)</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>27 (69.23)</td>
<td>12 (30.77)</td>
</tr>
<tr>
<td>2</td>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elementary school</td>
<td>15 (31.25)</td>
<td>33 (68.75)</td>
</tr>
<tr>
<td></td>
<td>Junior high school</td>
<td>15 (60)</td>
<td>10 (40)</td>
</tr>
<tr>
<td></td>
<td>Senior high school</td>
<td>29 (56.86)</td>
<td>22 (42.14)</td>
</tr>
<tr>
<td></td>
<td>University</td>
<td>10 (80)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>3</td>
<td>Type of Patients Attendants (PAs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuously stayed</td>
<td>20 (40.81)</td>
<td>29 (59.19)</td>
</tr>
<tr>
<td></td>
<td>Alternately</td>
<td>44 (55)</td>
<td>36 (45)</td>
</tr>
<tr>
<td></td>
<td>Shift based PAs</td>
<td>5 (83.33)</td>
<td>1 (16.67)</td>
</tr>
<tr>
<td></td>
<td>Not complete questionnaire</td>
<td>0 (0)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>4</td>
<td>Relationship with patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spouse</td>
<td>18 (75)</td>
<td>6 (25)</td>
</tr>
<tr>
<td></td>
<td>Son/Daughter</td>
<td>32 (40)</td>
<td>48 (60)</td>
</tr>
<tr>
<td></td>
<td>Relative</td>
<td>19 (61.29)</td>
<td>12 (38.71)</td>
</tr>
<tr>
<td></td>
<td>Parent</td>
<td>0 (0)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>5</td>
<td>Informed about CHB status</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Being informed</td>
<td>31 (59.61)</td>
<td>21 (40.39)</td>
</tr>
<tr>
<td></td>
<td>Didn’t informed</td>
<td>38 (45.24)</td>
<td>46 (54.76)</td>
</tr>
<tr>
<td>6</td>
<td>Report to the hospital as PAs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>17 (89.47)</td>
<td>2 (10.53)</td>
</tr>
<tr>
<td></td>
<td>Did not</td>
<td>52 (44.44)</td>
<td>65 (55.56)</td>
</tr>
</tbody>
</table>

Table 3. Patients’ Attendants Clean and Healthy Behaviors and Attitude (n = 136)

<table>
<thead>
<tr>
<th>Clean and Healthy Behaviors (CHB)</th>
<th>Attitude toward CHB</th>
<th>Total</th>
<th>Chi Square (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Favorable</td>
<td>Unfavorable</td>
<td></td>
</tr>
<tr>
<td>High CHB</td>
<td>44 (70.97)</td>
<td>18 (29.03)</td>
<td>62 (45.59)</td>
</tr>
<tr>
<td>Low CHB</td>
<td>25 (33.78)</td>
<td>49 (66.22)</td>
<td>74 (54.41)</td>
</tr>
<tr>
<td>Total</td>
<td>69 (50.73)</td>
<td>67 (49.27)</td>
<td>136 (100)</td>
</tr>
</tbody>
</table>
It is found that slightly higher percentage of favorable respondents (50.7%) and low CHB (54.41%). There was also a significant relationship between attitude and CHB practice ($p = .00$), high CHB respondents mostly found among favorable attitude (70.79%) and oppositely low CHB respondents noticeably seen in the unfavorable ones (66.22%).

**Interview Finding:** Some issues identified through interview namely unexposed information regarding CHB in hospital setting, and never read the hospital poster introducing CHB. Mostly respondents suggested that they had been suggested to perform hand wash and do not litter. During companying patients in the hospital, most of PAs reported that they eat, drank, slept, did not perform hand hygiene, as well as used the similar toilet with the patients. PAs reasoned that there were no PA’s facilities for eat, drunk, and slept, while the available public toilets were dirty.

**Discussion**

Though the findings of this study indicate that either attitude or behaviors of PAs need an improvement, it provide new information that in the hospital setting, individual behaviors also consistently related to individual’s attitude. This strengthen previous study findings that conducted in non-hospital setting.11,13

There were some aspects might contribute to the results of this study, such as CHB program conducted by the hospital, and PAs characteristics involved. This Hospital Management conducting CHB program by involving all hospital staffs particularly healthcare providers (physicians, nurses, pharmacists, and nutritionists) to deliver the CHB message to their patients and PAs. Additionally, CHB posters are placed in some accessible places in hospital to improve hospitals attendants’ exposure to the CHB program. However, this study indicates that these strategies might not run as expected since more than half of PAs (61.8%) did not know about CHB, not access CHB posters and some who knows CHB expressed that CHB as hand hygiene and do not litter only.

Additional analysis found that patient’s bed utilization as the lowest item’s score in the attitude questionnaire. Whereas, using patients’ toilet, eat and drink as well as sleep in the patients’ room identified as the lowest items’ score in CHB questionnaire. These findings also clarified by interview findings suggested that PAs mostly utilize similar toilet with patients, eat, drink, as well as slept in the patient room. Respondent reported that the inconvenience public toilets, no garbage box, as well as lack of awareness and responsibilities on CHB as the main reasons for those actions. These conditions strengthen previous finding suggested that low adherence of CHB (particularly hand hygiene) was closely related to facilities availability and accessibility, support, and lack of information14.

These current PAs behaviors potentially increase the severity of hospital’s role in diseases transmission that harms the hospital attendants including patients, PA and staffs. Hospitalized patients and their diseases are highly potent to contaminate hospital environment and facilities. If the PAs utilize same room, toilet, and other hospital facilities, they are vulnerable for developing some infection diseases. In the other hand, PAs also potent to contaminate the hospital facilities and environment that further threaten patients as well as hospital staffs healthiness. These findings should be carefully concerned otherwise further impacts become unavoidable.

This study found that PAs who reported that they understood CHB program tend to hold favorable attitude and high CHB than those who did not. Understandings on the reasons why an action must be performed broaden individuals’ motivation and opportunities in performing expected behaviors. This study also found that favorable attitude and high CHB were more frequently identified among PAs who are male, patients’ spouse or relatives, intermediate to high educational level, alternately or shift based attendant, report that they informed and know about CHB, and report to the hospital as PA. It was different with previous finding suggested that females were more likely to perform better CHB13. In terms of educational level, higher level will improve possibility in exposing formal situation that CHB related topics, policy, culture, as well as habituation become part of the educational processes. Thus, more educated PAs will potentially be more favorable and perform CHB better than those who less educated ones.

Moreover, the favorable and better CHB mostly identified among respondents who not continuously attending patients. Though, the continuous attendants would have wider possibility being exposed with the information related program, policy and staffs responsible for the program, they also tend to have bigger burdens that threaten their personals’ needs fulfillment. These conditions may lessen their motivation in doing expected behaviors.
Since PAs number are similar or even bigger than hospitalized patients’ number, it is potent for them to be additional human resources for hospital in maintain and supervise the implementation of CHB in the hospital setting. In the social context, PAs have equivalent level “as PAs” they may potent to be more effectively deliver the CHB program message to the other PAs.

**Conclusion**

In general, although PA’s attitude and their CHB practice need to be improved, both are significantly correlated. Additionally, PAs with characteristics; male, spouse or patient’s relative, had higher educational level, in-continuous attending patients, reported knowing CHB, and reported to hospital as PAs are the PAs who are potential become hospital CHB volunteers.

Besides intensifying the efforts in exposing PAs to the CHB program and improve the facilities availability, it also important for hospital to develop PAs volunteers empowerment program as part of succeeding CHB program in hospital setting.

**Ethical Clearance.** This study is part of a Universitas Padjadjaran’s research and social service project in 2017 that fully funded by the university. It gained ethical clearance from the Dr. Hasan Sadikin General Hospital – a provincial tertiary teaching hospital located in Bandung West Java, Indonesia– document No: LB. 04.01/A05/EC/273/IX/2017.

**Conflict of Interest:** No conflict of interest should be declared.

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A Study on Influence on Foreign Direct Investment with Special Reference to India’s Automobile Industry

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Abstract

The inflows of foreign direct investment (FDI) to Automobile Industry have been at an increasing rate as India has witnessed a major economic liberalization over the last few years in terms of various industries. The automobile sector in India is growing by 18 percent per year. The basic advantages provided by India in the automobile sector include, advanced technology, cost-effectiveness, and efficient manpower. Besides, India has a well-developed and competent Auto Ancillary Industry along with automobile testing and R & D Centers. The automobile sector in India ranks third in manufacturing three wheelers and second in manufacturing of two wheelers. The major investing countries are Mauritius (mainly routed from developed countries), USA, Japan, UK, Germany, the Netherlands, and South Korea. India needs to concern regarding the foreign direct investment (FDI) front. Future prospect of Indian Automotive Sector is looking bright. Indigenous automobile companies are replacing foreign multinationals paniesintermsofconsu mer satisfaction. Since 2002, automotive sector has chodeliverintheyearstocome. DirectInvestmentInflowsinIndia-OpportunitiesandBenefits, ImportantAspectsofFDIinAutomobileIndustry, RecentFDITrendsinIndia, Themajorforeignplayerswhohaveasignificantroleinthe development of Indian automobile industry, werediscussed and the passenger car segment growth, Production, Sales and Investment were analyzed. Here these archers using three statistical tools for analyzing the study, ARIMA, Linear & Compound Model for analysis purpose to measure future reproduction using timeseriesanalysis.

Keywords: FDI, Automobile Industry, Technology, Passenger Car Segments, etc.,

Introduction

Driving the most luxurious car has been made possible by the stiff competition in the automobile industry in India, with overseas players gathering the same momentum as the domestic participants. Hyundai Motor India Ltd is a wholly owned subsidiary of the Hyundai Motor Company headquartered in South Korea. It is the second largest automobile manufacturer with 17% market share as of 2017 and 5.5 billion USD turn-over in India, Hyundai Motors alone exported 240,000 cars made in India. Nissan Motors plans to export 250,000 vehicles manufactured in its India plant by 2019. It is the 5th largest automobile manufacturing company in India after Maruti Suzuki, Hyundai, Tata Motors and Mahindra. After 21 years of operations in India, General Motors announced that it will stop selling cars in India by the end of 2017, as a part of its global restructuring actions. Indian economy seems to bear a down trend in its major economic factors such as poor unemployment, low capital formulation, poor standard of living, undergrowth in GDP, increased Trade deficit, low infrastructural developments etc., In view of the economic crisis and the shortage of capital, the Government of India realized the importance of foreign capital for the development of the country. The developing countries started opening their economy, out of the compulsion, to achieve faster rate of economic growth and development. Even a communist country like China adopted liberalization policy as a strategy for accelerated economic growth during 1979. India also joined the race by 1991. FDI inflows to automobile sector have started pouring in since 2000. This study makes use of the published data from different sources, which in research referred to as the secondary data. The FDI inflow into automobile industry is increasing in position due to huge demand in this sector.
Passenger Vehicle: 15.96%  
Source: Society of Indian Automobile Manufacturers (SIAM)  
Commercial Vehicle: 3.95%  
Three wheelers: 3.60%  
Two wheelers: 76.49%  

Figure 1: Segmentation of Market Share of Automobile Industry in India

Top Automobile Companies in India

Tata Motors: Tata Motors is the largest automobile manufacturing companies in India. Established way back in 1945 Tata Motors is a multinational automobile company with its headquarters in Mumbai. Previously known as Telco TATA Engineering and Locomotive Company Tata Motors belongs to Tata Group. This company manufactures compact medium sized utility vehicles. Over the last few decades it has stood as the undisputed leader in the commercial vehicles segment.

Hindustan Motors Limited: Hindustan Motors Limited was founded in the year 1942 by B.M Birla. It is an operative subsidy of the Birla Technical Services group. This company held the title of the biggest manufacturer of cars in India before MarutiUdyog. Hindustan Motors was the pioneer in manufacturing automobiles in India. Some of the important cars and multi utility vehicles manufactured by Hindustan Motors Limited include; Mitsubishi Lancer, Trekker, Contessa, Ambassador, Porter, Pushpak and the Mitsubishi.

Ashok Leyland: Ashok Leyland is a leading commercial vehicle manufacturer in India. It was established in 1948. The company over the years has become synonymous with the production of trucks, passenger buses and emergency military vehicles. It happens to be the second largest commercial vehicle producer in India holding a market share of almost 30 percent.

Maruti Suzuki India Limited: Maruti Suzuki India Limited was established in 1981. A part of this company is owned by Suzuki Motor Corporation of Japan. It is the country’s largest passenger car manufacturing company. Credited for having brought in the automobile revolution in the country Maruti Suzuki India Limited was known as MarutiUdyog Limited till 2007.

Hyundai Motor India Limited: Hyundai Motor India Limited (HMIL) is owned entirely by Hyundai Motors of South Korea. Established on May 6 1996 this company in a short span of time has taken the Indian automobile industry by storm. Some of the popular cars manufactured by this company are; Santro, Getz Prime, Hyundai i10, Hyundai i20 Accent and the Verna and Sonata.

SWOT Analysis for Indian Automobile Industry

Strengths
- Domestic Market is large
- Government provides monetary assistance for manufacturing units
- Low Labor cost

Weaknesses
- Infrastructural setbacks
- Low productivity
- Too many taxes levied by government increase the cost of production

Opportunities
- Reduction in Excise duty
- Rural demand is rising
- Income level is at a constant increase

Threats
- Increasing rates of interest
- Too much competition
- Rising cost of raw materials

Automobile Technology in India: Automobile Technology or automotive technology refers to the technologies that are incorporated in automobiles or vehicles. With the continuous advancement of technologies new inventions in the field of automobile technology is only paving the way for more and more technologically superior and sophisticated vehicles. Automobile technology is one of the most essential parts of the automobile industry today.

Changes in Automobile Engines Technology: However the most important changes that has taken
place in the automobile industry in India pertains to the development of the engine. In the cars using petrol the carburetor engine has been replaced by the Multi Point Fuel Injection (MPFI) engine.

**Suspension technology:** The suspension system of a vehicle consists of springs, shock absorbers and linkages these together connect the vehicle to its wheels. However the main function of the suspension system remains to minimize jerks and to provide a smooth journey to its occupants. Apart from the above mentioned technologies steering technologies and safety technologies have also helped the automotive industry to reach great heights. Some of the most essential tips required for the owner and also the driver to follow seriously for the well-being of the vehicle and for a proper automobile maintenance in India are as under:

1. to focus the lights of the automobile properly
2. to check the air pressure of all the tires regularly
3. to change the water required for the engine

Apart from these general tips on the automobile maintenance in India for safe drive and the driver should also follow some preventative automobile maintenance policies like to check the air-filter every month, to be cautious while handling the battery, to check the brake fluid monthly, to get the oil filter replaced with every oil change, and many others.

**Foreign Direct Investment (FDI):** A foreign direct investment (FDI) is an investment in the form of a controlling ownership in a business in one country by an entity based in another country. It is thus distinguished from a foreign portfolio investment by a notion of direct control.

**FDI Policy of Government of India:** Government of India has taken various effective steps to simplify the Foreign Direct investment policy. The Foreign Direct Investment Policy (FDI Policy) of the Government of India prescribes the foreign investment cap in specified industrial sectors. Srivastava (2003) But in the recent times many activities have been transferred to unrestricted sectors in which 100% Foreign Direct investment is permitted. Broadly, the industrial sectors are categorized as:

1. Restricted
2. Prohibited
3. Unrestricted Sectors (Up to 100% foreign ownership)

All the sectors other than those mentioned below subject to terms and conditions in the FDI policy come under unrestricted sectors.

**Objectives of the Study:** The FDI in Automobile Industry has experienced huge growth within the past few years. The increase in the demand for cars and the vehicles is powered by the increased levels of disposable income in India. The automobile industry in India is growing by 18 percent per year. The automobile sector in India opened up to foreign direct investments in the year 1991. 100% Foreign Direct Investment (FDI) is allowed in the automobile industry in India. The production level of the auto mobile sector has increased from 2 million in 1991 to 259.7 million in 2016 after the participation of global players in the sector.

1. The main objective of this study is to analyze the FDI inflows in India's Automobile Industries.
2. To examine the trends and composition of FDI flow in Automobile Industry.
3. To Examine the source of FDI on Economic Growth

We present a methodology that holds special interest on FDI in flows in Automobile and other studies have found a special effect on passenger car segment growth rate and also explains automobile sector growth, production, sales, export and import rates, passenger car growth rate, and other factors related to FDI and Automobile Industry.

**Methodology:** In our study we focused on FDI flows, which has become a very important source of capital to developing countries. This section of the study presents the empirical results of the impact of FDI flows in India’s economic growth in automobiles sector after post liberalization era, especially with passenger car segment. The result will be based on regression analysis (ARIMA, Co-efficient, linear & Compound Model). The period of study is from 1992 to 2015 collection of FDI flows to India.

**FDI for Automobile Industry:** Automobile industry comprises FDI approvals granted for automobile sector, passenger car, Auto ancillaries etc. During the period from January 2000 to December 2009, cumulative FDI inflows received from FIPB/SIA, acquisition of existing shares & RBI’s automatic routes only. The amount of FDI inflows project specific in respect of all countries & Sector are not centrally maintained prior to January 2000. The liberalization of the portfolio investment
led to a surge inflow of capital for investment in the primary and secondary market for Indian equity and corporate bond market. In 2009, the automobile industry is expected to see a growth rate of around 9%, with the disclaimer that the auto industry in India has been hit badly by the ongoing global financial crisis.

### Table 1: Foreign investment inflows in Automobile Industry (2005-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Investment</th>
<th>Fit for DIR_INV from CURVEFIT,</th>
<th>Fit for DIR_INV from CURVEFIT,</th>
<th>Portfolio Investment</th>
<th>Fit for POR_INV from CURVEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2006</td>
<td>39674</td>
<td>85795</td>
<td>59211</td>
<td>55307</td>
</tr>
<tr>
<td>2.</td>
<td>2007</td>
<td>103367</td>
<td>94381</td>
<td>78260</td>
<td>31713</td>
</tr>
<tr>
<td>3.</td>
<td>2008</td>
<td>138276</td>
<td>102967</td>
<td>103437</td>
<td>109741</td>
</tr>
<tr>
<td>4.</td>
<td>2009</td>
<td>161481</td>
<td>111553</td>
<td>136714</td>
<td>-63618</td>
</tr>
<tr>
<td>5.</td>
<td>2010</td>
<td>188815</td>
<td>120139</td>
<td>180697</td>
<td>161880</td>
</tr>
<tr>
<td>6.</td>
<td>2011</td>
<td>135120</td>
<td>128725</td>
<td>238830</td>
<td>157355</td>
</tr>
<tr>
<td>7.</td>
<td>2012</td>
<td>-</td>
<td>137312</td>
<td>315665</td>
<td>.</td>
</tr>
<tr>
<td>8.</td>
<td>2013</td>
<td>-</td>
<td>145898</td>
<td>417219</td>
<td>.</td>
</tr>
<tr>
<td>10.</td>
<td>2015</td>
<td>-</td>
<td>163070</td>
<td>728850</td>
<td>.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Direct Investment</th>
<th>Portfolio Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.563(**)</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.010</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed), Linear Model: \( Y = a + bt \), \( Y =-42998+8586.16 \), Compound Model: \( Y = a (bt) \)

A **linear equation** is an algebraic equation in which each term is either a constant or the product of a constant and (the first power of) a single variable. A linear equation can involve more than two variables.

The general linear equation in \( n \) variables is:

\[ a_1x_1 + a_2x_2 + \cdots + a_nx_n = b. \]

In this form, \( a_1, a_2, \ldots, a_n \) are the coefficients, \( x_1, x_2, \ldots, x_n \) are the variables, and \( b \) is the constant. When dealing with three or fewer variables, it is common to replace \( x_1 \) with just \( x \), \( x_2 \) with \( y \), and \( x_3 \) with \( z \), as appropriate.

**FDI Growth Rate for Automobile Industry:**

The favorable Indian market conditions are acting as a catalyst for luxury and premium carmakers, which are receiving impetus from new launches. (Czech National Bank, 2016) The top-end carmakers have posted double-digit growth for the quarter ended June 30, 2013, with firms like Honda at 45 per cent and Audi recording 28.8 per cent, besides others. The production of passenger vehicles in India was recorded at 3.23 million in 2012-13 and is expected to grow at a compound annual growth rate (CAGR) of 13 per cent during 2012-2021, as per data published by Automotive Component Manufacturers Association of India (ACMA). Profit after Tax growth is only after 1993-94 228.6% decreased to 16.1% at 1996-97 and gradually increased to 139.4 % (2002-03) and reduced to-31.4 % due to US crises at 2008-09. Sales also 0.2% (2001-02) increased to 25%. (2009-10). Total income growth rate of the automobile industry is increased from 3.4 (2008-09) to 24.2% (2009-10) (Safiuddin, 2010)

**Passenger Car and Multi Utility Vehicles:**

India is emerging as an export hub for sports utility vehicles (SUVs). Global automobile majors are looking to leverage India’s cost-competitive manufacturing practices and are assessing opportunities to export SUVs
to Europe, South Africa and Southeast Asia too. India is also one of the key markets for hybrid and electric medium-heavy-duty trucks and buses.

Passenger car sales stood at 1.89 million units in 2012-13. Additionally, share of luxury cars to the total passenger car market of India is expected to increase to four per cent by 2020. The total number of passenger cars in India is likely to touch around 8 million units by 2020. (Britton, 1980)

Table 2: Growth Rate of Passenger Car and Multi Utility Vehicle (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>PAT %</th>
<th>Sales %</th>
<th>Total Income %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>13.3</td>
<td>15.6</td>
<td>1.1.4</td>
</tr>
<tr>
<td>2005-06</td>
<td>13.3</td>
<td>9.2</td>
<td>12.3</td>
</tr>
<tr>
<td>2006-07</td>
<td>13.6</td>
<td>13.3</td>
<td>15.5</td>
</tr>
<tr>
<td>2007-08</td>
<td>6.2</td>
<td>7.4</td>
<td>51.5</td>
</tr>
<tr>
<td>2008-09</td>
<td>-11.4</td>
<td>1.1</td>
<td>1.5</td>
</tr>
<tr>
<td>2009-10</td>
<td>52.3</td>
<td>3.4</td>
<td>4.5</td>
</tr>
</tbody>
</table>


Profit after Tax on Passenger Car and MUV is 103.9(1994-95) decreased to-44.5% (1998-99) and increased to 52.3 % (2009-10). Sales also increased from 7.1% (2002-03) to 15.6% (2004-05) and decreased to 3.4 % (2009-10) and are expected to remain stable in 2011-12 4.5 to 5 %.

Passenger Car Growth Rate: Excise duty hike, high interest rates and fuel prices hit passenger car sales in April 2012. Sales in this segment grew a mere 3.4% in the month, data from industry body Society of Indian Manufacturers Association (Siam) showed. After record high sales in March, domestic passenger car sales grew to 1, 68,351 units in April 2011-12, from 2, 29,866 units a month earlier. Growth in the popular entry-level car segment crawled by a mere 0.7%, indicating the common man is finding it tough to drive in their dream car10.

Conclusion

The Indian automotive industry is the second fastest growing in the world. About 8 million vehicles are produced annually in this country. During 1991-2015, India has emerged as the third largest market in the Asia Pacific Region. With various car manufacturing companies setting up their units in different parts of the country, the production of the cars will increase at a very fast rate.

Ethical Clearance: Nil

Source of Funding: Self

Conflict of Interest: Nil

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Sequence Homology and Epitope Prediction of 37 kDa Outer Membrane Protein H(ompH) Gene of Pasteurella Multocida Type B Isolate from Nusa Tenggara Timur (NTT)

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Abstract

Haemorrhagic Septicaemia (HS), in Indonesia known as Ngorok disease is a fatal acute septicemia disease in cattle and buffalo caused by Pasteurella multocida. Outer membrane Protein H (OmpH) is one of the major proteins in P. multocida envelope has been purified and characterized as porin immunodominant. The aim of this study is to find out the homology of nucleotide sequence of 37 kDa OmpH gene of P. multocida of local isolate from NTT with vaccine strain (Katha) and 5 referen isolates and predict the epitope of 37 kDa OmpH gene. Detection of 37 kDa OmpH gene was done using PCR. Homology analysis of nucleotide and amino acid sequences was performed on the BLAST program at NCBI. Epitope prediction of 37 kDa OmpH genes P. multocida from NTT and vaccine strains was performed using the online programme B Cell Epitope Prediction Tools. The results showed that 37 kDa OmpH gene of P. multocida from NTT has 99% homology to vaccine strain (Katha) and isolates from China, Iran, India, Mesir, and 89% homology to isolate from USA and 37 kDa OmpH gene of P. multocida local isolate from NTT were likely to be immunogen candidates based on B cell epitope that had 11 epitopes. These findings indicate that P. multocida local isolate from NTT has a chance as immunogen candidate, which can be developed as a vaccine candidate and diagnostic kit for HS.

Keywords: Haemorrhagic septicaemia; P. multocidatype B; outer membrane protein H(omp H) gene; PCR; sequence; epitope.

Introduction

Hemorrhagic Septicemia caused by Pasteurella multocida is a fatal acute septicemia disease in cattle and buffalo. In perspective of economic, it becomes the most important bacterial disease in Southeast Asia including Indonesia, Philippines, Thailand, Malaysia, Middle East and South Africa[1].

In Indonesia, HS outbreak still occurs although vaccination has been done once a year using vaccine made from Katha strain. The most recent case is the sudden death of 24 livestock in Kupang district, NTT in December 2016. The results of laboratory tests at the Balai Besar Veteriner Denpasar, confirmed the death of these livestock due to HS[2].

P. multocida strains belong to sero group B and E are the one who cause HS. The complex interactions between host factors and bacterial virulence factors, such as lipopolysaccharide (LPS), capsule, protein outer membrane (omp), and putative hemolysin has an effect on the pathogenesis of the disease[3].

Outer membrane Protein H (OmpH) is one of the main proteins in P. multocida envelopes that has been
purified and marked as immunodominant porin. This porin is highly immunogenic, showing epitopes on the surface of bacteria \[4\]. Study by Tan et al.\[5\] using mice polyclonal antiserum in immunoblotting studies showed that omp with a molecular weight of 37 kDa was reactive to all local isolates and ATCC strains. In the same study, recombinant 37 kDa OmpH can protect mice and be able to stimulate high antibody titers.

The new vaccination approach based on the rational design of B cell and T cells epitopes (epitope-based vaccines) promises a great induction of immune responses, and can handle more effective pathogens with genetic variation\[6\]. Identification of epitopes suitable for diagnostic use or prophylactic intervention is an important prerequisite for epitope-based vaccines and diagnostics.

The purpose of this study is to find out the homology of nucleotide sequence of 37 kDa OmpH gene of \(P.\) multocida of local isolate from NTT with vaccine strain (Katha strain) and 5 referen isolates and predict epitope of 37 kDa OmpH gene.

**Material and Method**

**Sample:** \(P.\) multocida isolate from NTT (Nusa Tenggara Timur) were obtained from Balai Besar Veteriner Denpasar, Bali. Previously, this isolate had been tested for its capsular type. Haemorrhagic Septicaemia vaccine from Pusat Veterinaria Farma (Pusvetma) Surabaya was used as a vaccine strain (Katha) sample. Reference isolates from GenBank were used as a comparison with accession numbers, namely: HM582886.1 (China), CP017961.1 (Iran), FN908433.1 (India), KY436382.1 (Egypt), CP015562.1 (USA).

**Reculture and Identification of \(P.\) multocida:** \(P.\) multocida isolate was re-cultured in Blood Agar media and incubated for 24-28 hours at 37\(^\circ\) C. After that, the morphology was seen using Gram examination and its growth on MacConkey Agar (MCA). Furthermore, the examination using biochemical test, namely: TSIA test, SIM test, SCA test, Urease test, and Sugar test\[7\].

**DNA Extraction:** Total genomic DNA was extracted with QIAamp® DNA Mini kit according to standard protocol Qiagen\[8\]. Briefly, bacteria that have been cultured on Nutrient Agar (NA) at 37\(^\circ\)C overnight, were inserted into tube. After addition of bacteria/vaccine incubated at 60 \(^\circ\)C for 30 minutes. The 200\(\mu\)L AL buffer is added to the tube, then vortex. The mixture of the ingredients in the tube is transferred to the spin colomn, then adds 200 \(\mu\)L of 96% ethanol. After that, centrifuged at 8,000 rpm for 1 minute and washed using AW1 500\(\mu\)L. Then centrifuged back at 8,000rpm for 1 minute and washed again using AW2 as much as 500\(\mu\)L. After that centrifuged at 13,000 rpm for 3 minutes and the bottom of the spin colomn removed. After that, it was centrifuged again for 1 minute at 13,000 rpm and transferred to an empty sterile tube. After that added 50\(\mu\)L AE Buffer and incubated at room temperature for 1 minute. Then centrifuged at 8,000 rpm for 1 minute.

**PCR assay:** Amplification of the ompH gene was performed using both ompH-F and ompH-R primer in 20\(\mu\)l PCR mixture. The primers used was developed from the primers used by Tan et al.\[5\]. Primer ompH-F forward 5’-CAGCAACACGTTTACAATCAAGACGGTAC-3’ and ompH-R reverse 3’-GAAGTGTACGCGTAAA CC-5’ with gene target 946 bp. The thermal cycling conditions are: 1 cycle at 95\(^\circ\)C for 5 minutes; 40 cycles at 94\(^\circ\)C for 30 s; 50\(^\circ\)C for 1 minute, and 72\(^\circ\)C for 1.5 min; 1 cycle at 72\(^\circ\)C for 10 minutes. This PCR profile is repeated three more times to ensure specific PCR products. The PCR product was analyzed by electrophoresis in 1% agarose gel.

**Sequencing:** Purification of the PCR product was carried out with QIA quick spin column from Qiagen. Addition of Big Dye Terminator 1.1 cycle version as much as 1.6 \(\mu\)l and 5x sequencing buffer as much as 6.4 \(\mu\)l, then added H\(_2\)O ad libitum. Then the mixture was put into the PCR machine with a pre denaturation program of 96\(^\circ\)C for 3 minutes. 25 cycles for denaturation 96\(^\circ\)C for 10 seconds, annealing 50\(^\circ\)C for 5 seconds, extension temperature 60\(^\circ\)C for 4 minutes. Final extension 4\(^\circ\)C. After that, 3M NaOAC 2 \(\mu\)l (\(\pm\) 1/10 x vol) and 95% ethanol 50 \(\mu\)l (\(\pm\) 2 x Vol) were added then vortexed and incubated in ice for 10 minutes. Then centrifuged 14,000 rpm for 20 minutes at 4\(^\circ\)C. Then the ethanol solution is slowly taken, after that pellet is added 200\(\mu\)l 70%-80% ethanol, then centrifuged 14,000 rpm for 5 minutes at 4\(^\circ\)C. Then a 70% ethanol solution is slowly taken, then the resulting pellets are dried in the vaccum pump for 10 minutes, and stored at-20\(^\circ\)C\[9\].

**Homology Analysis and Epitope Prediction:** Sequencing results were processed using Bioedit program. Homology analysis was carried out using the BLAST program atNCBI (National Center for Biotechnology Information). Homology analysis of sequence of 37 kDa OmpH of NTT local isolate
compared with vaccine and nucleotide sequence data of 5 isolates from other countries accessed from GenBank. The nucleotide sequences of the 37 kDa OmpH were then translated into amino acid sequences using the online DNA to Protein Translation program. Epitope prediction was carried out through the B Cell Epitope Prediction Tools online program.

**Nucleotide Sequence Accession Number:** The DNA sequence of the 37 kDa OmpH gene of *P. multocida* isolate from NTT and vaccine were submitted to GenBank and assigned the accession number MK183754 and MK205393.

**Result and Discussion**

Reculture and Re-identification of *Pasteurella multocida*: Recultured Blood Agar showed the colonies were transparent, grayish, shiny, and were found to be non-haemolytic. No growth was observed on Mac Conkey Agar medium. The colonies were then confirmed by biochemical test, while it fermented glucose, fructose, mannitol and sucrose, but did not fermented maltose and lactose, the TSIA was obtained in alkaline slat and butt, yielding no gas and H₂S. The colonies were positive for indole test and no reaction was seen with Simon Citrate Agar and Urease medium.

The ompH gene was successfully amplified using OmpH-F and OmpH-R primers. The PCR product was obtained with the same bandsize of 946 bp of both samples (Fig. 1).

Study by Kanaiyalal [10] on the OmpH gene *P. multocida* HS case obtained 1kb PCR products. Whereas Tan et al. [5] whose primers was used in this study 37 kDa OmpH gene was obtained 980 bp.

The sequencing results of *P. multocida* isolate from NTT was 894 bp while for *P. multocida* from vaccine was 893 bp. In the analysis of nucleotides sequence of the 37 kDa OmpH gene *P. multocida*, the total length of the nucleotides that are parallel to the gap and insertion is 909 nucleotides. Table 1 shows the results of homology analysis.

The results showed that 37 kDa OmpH gene *P. multocida* from NTT isolate was relatively more similar to isolates from the continents of Asia and the Middle East. Nucleotide sequences of 37 kDa OmpH *P. multocida* isolates NTT and vaccines showed high homological levels of *P. multocida* OmpH from other countries.

The results of the protein sequences of the 37 kDa OmpH *P. multocida* NTT isolates were 298 amino acids while the vaccines were 297 bp amino acids. Kanaiyalal [10] obtained 296 amino acids of OmpH protein sequence in cattle and buffaloes. Multiple sequence alignment from amino acid sequences showed that 37 kDa Omp HP *P. multocida* from several countries shows high homology with little variation in amino acid composition in several parts. Luo et al. [11] aligned the OmpH sequence of 15 *P. multocida* serotypes and found that this protein was very conserved (72-100% identity), which supports the findings of this study.

Results of analysis of amino acid sequence OmpH *P. multocida* P-52 by Singh et al. [12] obtained the greatest variation limited to two discrete regions that are associated with the hydrophilic domain, i.e. amino acids to 82-102 and 223-240. According to Selleyei et al. [13] these two discrete regions encode large external loops that might interact with the host’s immune system. This variable area can work as a strain-specific epitope that takes an important role in serotype-specific immune responses [12].

Epitope prediction was done using Kolaskar and Tongaonkar Antigenicity scale. The results of the prediction of B cell epitope on 37 kDa OmpH were found 11 epitopes in NTT isolate and vaccine, with 9 identical epitopes, namely: GLSALAYAEL, DVHVKRLYAGF, DVGVSDDYTYFLG, GAYVFS, GFVVAGL, SQKYVTVA, ALEVGLN, KVYTDL, and SIILGAGYKLHKQVETF (Table 2 and Table 3).

The ability of epitope to induce an immune response is determined by the log score, the greater the log score, the better the ability of epitope to induce immunity. The linear epitope prediction results showed that 37 kDa *P.
multocida OmpH local isolates NTT and vaccine strains were immunogenous and had almost the same ability to induce humoral responses, with the best ability, namely epitope with the largest log score of 1,266.

Epitope identification and analysis can show that proteins are responsible for triggering the body’s immune response, and proteins with high immunogenic properties can be used for the development of peptide-based vaccines from Indonesian local isolates. In the diversity of epitopes in pathogens, it is important to note that not all epitopes, even those that appear dominant, are equally capable of producing antibody production. Particularly for linear epitope B cells there are several reasons, including, the accuracy of epitope prediction results is only 75% and most B cell epitopes (approximately 90%) are conformational, some studies have found that linear B epitope cells produce antibodies that do not cross reacting with original antigens and linear B epitope cells does not always give rise to memory cells so that to know the ability of the epitope to protect exactly need continuous research [14][15].

### Table 1. Homological Value of Nucleotide Sequences of OmpH P. multocida NTT Isolate and Vaccine

<table>
<thead>
<tr>
<th>Reference Isolate (GenBank)</th>
<th>NTT isolate</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasteurella multocida outer membrane protein H (OmpH) gene, complete cds. Accession HM582886.1. Cina</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>Pasteurella multocida strain Razi Pm0001, complete genome. Accession CP017961.1. Iran</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>Pasteurella multocida partial OmpH gene for outer membrane protein H, strain P52. Accession FN908433.1. India</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>Pasteurella multocida strain PM/VSVRI/1962 outer membrane protein (OmpH) gene, partial cds. Accession KY436382.1. Egypt</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>Pasteurella multocida strain USDA-ARS-USMARC-59910 chromosome, complete genome. Accession CP015562.1. USA</td>
<td>89%</td>
<td>89%</td>
</tr>
<tr>
<td>Vaccine Katha strain</td>
<td>99%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 2. Prediction of Cell B Epitope from Sequence of Amino Acid OmpH P. multocida NTT Isolate

<table>
<thead>
<tr>
<th>No.</th>
<th>Amino Acid Position</th>
<th>Peptide</th>
<th>Length</th>
<th>Log Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4-10</td>
<td>SVRLILK</td>
<td>7</td>
<td>0.877</td>
</tr>
<tr>
<td>2.</td>
<td>37-46</td>
<td>GLSALAYAEL</td>
<td>10</td>
<td>1.027</td>
</tr>
<tr>
<td>3.</td>
<td>69-79</td>
<td>DVHKRLYAGF</td>
<td>11</td>
<td>1.073</td>
</tr>
<tr>
<td>4.</td>
<td>98-109</td>
<td>DGVSDYTYFLG</td>
<td>12</td>
<td>1.102</td>
</tr>
<tr>
<td>5.</td>
<td>136-142</td>
<td>GAYVFA</td>
<td>7</td>
<td>0.876</td>
</tr>
<tr>
<td>6.</td>
<td>154-160</td>
<td>GFVVAGL</td>
<td>7</td>
<td>0.885</td>
</tr>
<tr>
<td>7.</td>
<td>177-184</td>
<td>SQKVVTA</td>
<td>8</td>
<td>0.941</td>
</tr>
<tr>
<td>8.</td>
<td>197-212</td>
<td>ELSYAGLALGVDYADS</td>
<td>16</td>
<td>1.206</td>
</tr>
<tr>
<td>9.</td>
<td>223-229</td>
<td>ALEVGLN</td>
<td>7</td>
<td>0.868</td>
</tr>
<tr>
<td>10.</td>
<td>237-242</td>
<td>KVYTDL</td>
<td>6</td>
<td>0.804</td>
</tr>
<tr>
<td>11.</td>
<td>258-274</td>
<td>SIILGAGYKHLQVETF</td>
<td>17</td>
<td>1.226</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Prediction of Cell B Epitope from Sequence of Amino Acid OmpHP. multocida Vaccine strain (Katha)

<table>
<thead>
<tr>
<th>No.</th>
<th>Posisi Asam Amino</th>
<th>Peptide</th>
<th>Length</th>
<th>Log Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4-12</td>
<td>NGSVRLILK</td>
<td>9</td>
<td>0.985</td>
</tr>
<tr>
<td>2.</td>
<td>39-48</td>
<td>GLSALAYAEL</td>
<td>10</td>
<td>1.027</td>
</tr>
<tr>
<td>3.</td>
<td>71-81</td>
<td>DVHKRLYAGF</td>
<td>11</td>
<td>1.073</td>
</tr>
<tr>
<td>4.</td>
<td>100-111</td>
<td>DGVSDYTYFLG</td>
<td>12</td>
<td>1.102</td>
</tr>
<tr>
<td>5.</td>
<td>138-144</td>
<td>GAYVFA</td>
<td>7</td>
<td>0.876</td>
</tr>
<tr>
<td>6.</td>
<td>156-162</td>
<td>GFVVAGL</td>
<td>7</td>
<td>0.885</td>
</tr>
</tbody>
</table>
Conclusion

From this study it can be concluded that *P. multocida* local isolate from NTT has a high homology in nucleotide sequence and gene of 37 kDa OmpH *P. multocida* local isolate from NTT can be potential as immunogenic candidates that can be used as vaccine candidates and diagnostic kits.

Ethical Approval: Not required.

Conflict of Interest: None declared.

Acknowledgments: We would like to thank the Balai Besar Veteriner Denpasar, Department of Microbiology and Mycology and Bacteriology and Mycology Laboratory of Veterinary Medicine Faculty of Airlangga University for the permission to use the facility.

Source of Funding: Self fund.

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Whole Cell Vaccine Vibrio Alginoliticus with Microcapsul Particle Alginate Process to Improve Cantang Grouper’s Life Epinephelus Fuscoguttatus-Lanceolatus

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Abstract

Grouper cultivation is still constrained by the availability of seeds due to diseases caused by bacteria. Vibriosis is a disease caused by bacterial infections of the Vibrio genus such as *Vibrio alginolyticus* and *Vibrio parahaemolyticus* which are the most common in hatcheries. Whole Cell Vaccine (WCV) contains endotoxin components as antigens to stimulate antibody formation, including lipopolysaccharide from the cell wall of gram-negative bacteria. There is a problem of oral vaccination which can damage when it enters the low pH digestive system. Therefore, it is necessary to conduct a research to find out the ability of the Whole cell vaccine (WCV) of *Vibrio alginoliticus* bacteria by microencapsulation method of alginate gel as an oral alginate particle vaccine *Vibrio alginoliticus* to increase the survival of the grouper seeds of *Epinephelus sp*. This study used four types of treatment, namely control (-) without vaccine, control (+) using alginate only, dosage treatment 0.025 mg/5gr BB fish/day and 0.05 mg/5gr BB fish/day. The results of the Whole Cell Vaccine using alginate gel microcapsules process can increase the life range of cantang grouper seeds by 80% at 0.05 mg/5gr BB fish/day and 73% at 0.025 mg/5gr BB fish/day.

**Keywords:** *Vibrio alginolyticus*, Whole Cell Vaccine, Alginate, Grouper, Vibriosis.

Introduction

Vibriosis has been found in grouper cultivation\(^1\). More than 70% of grouper diseases were caused by this. There has been a report regarding to the prevention of vibrio disease using vaccines given by injection. However, the ineffective treatment on how to give the vaccines as the prevention becomes an obstacle. Furthermore, the use of vaccines orally, especially vibrio disease, has not been widely reported.

Vibriosis is caused by bacterial infection from the Vibrio genus such as *Vibrio alginolyticus* and *Vibrio parahaemolyticus*\(^2\). According to Suprapto\(^3\), the use of Whole Cell vaccines and Extracellular products can provide high life range on shrimp. However, the use of WCV on cantang grouper seeds still needs to be investigated for its effectiveness.

Taslihan\(^4\) et al. (2000) stated that *V. alginolyticus* in rat grouper caused several symptoms such as red mouth, red spots, ulcers in the mouth, swelling of the abdominal cavity (due to swelling of internal organs and accumulation of residual metabolic fluid), and breaking of the fins.

Sumaryam\(^2\) stated that for seed-sized fish, the most appropriate vaccination is orally. Unfortunately, the problem may exist during the oral vaccination obstacle which is the dissolution of antigens in the water before they can enter the fish body and damage the antigen when passing through the digestive tract because of the low pH, so the vaccine must be given a layer that can protect the antigens while in the water and prevent the damage while passing the digestive system.

Microencapsulation is widely used in pharmaceuticals and other fields to cover a taste or a smell, extend the range of the drug release, improve the drug molecular stability, improve the bioavailability and as a multi-particle dosage form to produce controlled drug delivery systems and target\(^5\).
Sodium alginate is used for microencapsulation of drugs without using organic solvents, thus it minimizes the toxic effects due to the use of organic solvents in the manufacture of microcapsules\(^6\).

To find out the success of the anti-genes which enters the intestinal cells, it is necessary to prove microscopically. One such verification technique is to use the Scanning Electron Microscope (SEM) method.

**Method**

**Isolation and Culture of Vibrio alginolyticus**

**Bacteria:** *Vibrio alginolyticus* bacteria were obtained from Pathology Laboratories collection at the Center for Marine Aquaculture Research and Fisheries Extension, Gondol, Singaraja. *Vibrio alginolyticus* bacteria are grown on TCBS media.

Bacterial isolates were cultured in petri dishes with TCBS media. To make 400 ml culture media, 35 g of TCBS is needed to be mixed into 400 ml of distilled water. The Erlenmeyer is covered with aluminum foil and put in an autoclave at 100\(^\circ\)C, for 10 minutes to sterilize the medium from another pathogen. TCBS is poured into a petri dish, and then stored at room temperature for 24 hours. Isolate *Vibrio alginolyticus* was put into the media, then incubated for 24-48 hours in an incubator at 30\(^\circ\)C.

**Whole Cell Vaccine (WCV) Vibrio alginolyticus**

**Bacteria:** Petri which contains bacteria added 2 ml PBS and washed 3 times for 10 minutes. The bacteria obtained were turned off with 3% formalin for 72 hours. Each WCV was washed 3 times for 10 minutes by centrifugation. Bacterial density was made as much as 50 mg/ml, then stored in-4\(^\circ\)C until it was used.

**WCV Microcapsules Vibrio alginolyticus**

**Bacteria:** The mixture of 300 ml distilled water with 6 grams of sodium alginate was used to make a solution. The WCV suspension with alginate is dropped into CaCl\(_2\) solution. The comparison of WCV and alginate used is 1: 6 v/v\(^7\). Next, the microcapsules formed in CaCl\(_2\) solution were washed using distilled water by centrifugation at 4000 rpm for 10 minutes. Then, the supernatant was washed again at the same speed and time.

The washing process was done three times until the microcapsules were free from CaCl\(_2\) solution. After the washing process, microcapsules were dried by aeration at room temperature for about 3-7 days. Dry microcapsules were then crushed and filtered using a 400 mesh filter, and stored in a sterile bottle.

**Vaccination and Tests for Grouper Seeds:**

Vaccination is carried out by mixing the microcapsule vaccines on feed with (A) 0.025 and (B) 0.05 mg/5gr BB fish/day. This dose refers to the research of Fandina\(^8\). The control (-) treatment was not given a vaccine, while the control (+) was only given alginate. Then, vaccination was given to grouper seeds in the hatchery pool of 15 birds/m3 which are 1-2 months old and 5-7 cm for 7 days and then tested by soaking in water mixed with 10\(^8\) CFU/ml *Vibrio alginolyticus* suspension\(^9\). The soaking process was done for about 3 hours, furthermore the feed was given 5% of fish biomass per day. Feeding phase was done twice a day, and was observed during the maintenance for seven days for monitoring the water quality, finding the mortality rate and calculating the survival rate of seeds by using this formula\(^10\):

\[
SR = \frac{N_t}{N_0} \times 100\%
\]

**Note:** SR = Grouper seed survival rate, N\(_0\) = The initial number of grouper seeds, N\(_t\) = The final number of grouper seeds

**Scanning Electron Microscope (SEM) in Grouper Intestines:** SEM was done to detect the results of vaccines which were found in the intestine, based on proposed method by Ghosh\(^11\). 1 cm intestine was taken after 60 minutes feeding which the vaccine was already mixed in the feed. Then, it was soaked with glutaraldehyde solution. The processes of intestinal segment as follows; The intestine was inscribed longitudinally to expose the mucosal surface, then it was cut into small pieces and applied to thin thermocol sheets with the upper mucosal surface. After that, the segment was soaked with 2.5% glutaraldehyde in a buffer solution for 30 minutes, the intestine was repeatedly washed with heparin salt [2 g heparin (10,000-15000 iu)] and added 20 ml of 0.67% NaCl solution for 5 to 7 minutes to remove the mucus. After rinsing in a phosphate buffer (pH 7.2), the tissue was immersed in glutaraldehyde for 18 hours at 4\(^\circ\)C.

Then it was dehydrated in graded ethanol as follows: 50% (30 minutes), 70% (45 minutes), 90% (1 hour) and absolut Ethanol (1 hour). Next, the tissue was immersed in pure amyl acetate for 24 hours. Critical Point Drying (CPD) was carried out by nitrogen liquid in a vacuum. Then the tissue is coated with gold on the IBCoater ion and placed under a scanning electron microscope for subsequent observation and photography.
Observation after Testing: Observations were conducted after testing the immersion of $10^8$ CFU/ml bacteria, which was observing the clinical symptoms due to bacterial infection and the life range of fish for seven days and continued with Scanning Electron Microscopy (SEM) in the grouper intestine.

Results and Discussion: The color of the colonies from *Vibrio alginolyticus* bacteria was yellow, swarm-shaped, with sleekly edges, and convex elevation. This bacteria is fermentative on sugar (glucose, sucrose and mannitol), and produced the oxidase enzyme and catalase. The characteristics of these isolates showed that the species were based on the Bergey Manual of Determinative Bacteriology Identification Guidelines\(^\text{[12]}\) called *Vibrio alginolyticus*. The final result of microcapsules vaccine with alginate gel was powder. The egg white was used to mix the vaccine and the feed. The mixture form of both vaccine and the feed was shown in Figure 1.

There was an enhancement of the body’s ability to stimulate an antibody production on the fish seed which was which was feed the WCV vaccine, as a result that the life range of the experiment was higher than the control treatment. This research was in accordance with the results of the study reported by several researchers namely Kamiso\(^\text{[13]}\), Hernayanti\(^\text{[14]}\), Astuti\(^\text{[15]}\), and Nindarwi\(^\text{[16]}\).

Observation of external symptoms was conducted by observing clinical symptoms in external organs and the behavior of grouper seeds to ensure that the of fish seeds mortality was caused by bacterial attacks. The observation result on the clinical symptoms and grouper seeds behavior after the test showed that there was a decline appetite, passive movement, and hemorrhage in the fins. This result was in accordance with a research conducted by Nindarwi\(^\text{[16]}\) which showed that clinical symptoms and fish seeds behavior, that infected by the *Vibrio alginolyticus* batteries, decreased their appetite, unbalanced circling movements, hemorrhagic in the mouth area, and lateral lines at the pina (pectoral, dorsal, and anal).

The intestine of grouper seeds is taken after one hour of feeding which mixed with the vaccine, this time allocation is chosen because the feed has been digested at that time. Based on Kusumawati\(^\text{[17]}\), the speed of the grouper gastric is empty in 2.9%/hour. The results of the SEM test on the treatment of 0.05 mg/5gr BB fish/day
and 0.025 mg/5gr BB fish/day showed that there was an antigen which was caught by the fish intestine cells as shown in Figure 3. In the control treatment (-) and control (+) there are no antigens in the cells in the fish seed intestines.

![image of SEM of grouper seeds intestine in control (-) (a), control (+) (b), a dose of 0.025 mg/5gr BB fish/day (c), and dose of 0.05 mg/5gr BB fish/day (d).]

The alginate gel microcapsules can protect the Whole Cell Vaccine in the digestive system so that the vaccine can be received by intestinal cells. Suprapto[9] said that the alginate gel can subside in acidic conditions, and eroded in alkaline conditions so that it can protect the antigens when exposed to acids in the fish stomach, then it released the antigens in the fish digestion system which has alkaline conditions.

The antigens bounded by macrophages which found in the intestine, will be encoded by a protein and can be recognized by specific immune receptors to produce antibodies. It based on the theory by Jewetz[18], which said that there are many active macrophages in the intestine and these macrophages have a role as antigen presenting cells (APC).

The calculation result of the grouper seeds’ survival rate percentage after being tested with Vibrio alginolyticus showed that the vaccinated seeds’ Survival Rate (%) increased compared to the control.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number of Seed (ekor)</th>
<th>SR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose 0.05 mg/5gr BB fish/day</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Dose 0.025 mg/5gr BB fish/day</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Control (-)</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Control (+)</td>
<td>15</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1: Survival Rate (%) of Cantang Grouper Seeds after it was tested with the Vibrio alginolyticus

Based on Nindarwil[16], grouper seeds, which are given Whole Cell Vaccine, can effectively increase their survival rate.

The observation of water quality as a medium for maintaining the grouper seeds was carried out every day during the vaccination stage and after conducting the test. The average results of water quality can be seen in Table 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Vaccination Stage</th>
<th>Testing Stage</th>
<th>Sumaryam[19]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>27-29</td>
<td>27-29</td>
<td>29-31</td>
</tr>
<tr>
<td>pH</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Salinity (ppt)</td>
<td>33-34</td>
<td>33-34</td>
<td>33-34</td>
</tr>
</tbody>
</table>

Table 2: The average results of water quality as a medium for maintaining the grouper seeds

The results of the Scanning Electron Microscope (SEM) test of grouper seed intestine, in the treatment of 0.05 mg/5gr BB fish/day and treatment of 0.025 mg/5gr BB fish/day, showed that there were antigens which were caught by the fish intestinal macrophages as it was showed in Figure 3, while in the control treatment (-) and control (+) there are no antigens in the intestinal macrophages of the grouper seeds.

The Whole Cell Vaccine vaccination with alginate gel microcapsules can improve the survival rate of cantang grouper seeds by 80% at the doses of 0.05 mg/5gr BB fish/day and 73% at the doses of 0.025 mg/5gr BB fish/day.

Conflict of Interest: The authors declare that there is no conflict of interests.

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Marine Aquaculture Research and Fisheries Extension, Bali.

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Ethical Clearance: Taken from Ethical Clearance Committee Faculty of Veterinary Medicine, Airlangga University, Indonesia.

References


Facilitating and Inhibiting Factor in Clinical Nursing Education: Concept Paper

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Abstract

Clinical nursing education is one of a component in nursing education that conducts in a clinical setting involving real situation, teaching and learning process in the clinical setting.

Objective: The purpose of this article is to discuss about facilitating and inhibiting factor in clinical nursing education. Nursing student expects that through clinical nursing education, their skill and knowledge will improve and finally they will get their competencies. In this article emphasized that many factors that facilitating and inhibit nursing student learning experience during their clinical nursing education. Theory-practice gap is one of inhibiting factors in clinical nursing education. One of facilitating factors in clinical nursing education is supportive clinical learning environment.

Keywords: Inhibiting factor, barrier, facilitating factor, clinical learning, clinical nursing education.

Introduction

The fundamental aim in nursing education is to produce competent and professional nurses who able to apply theoretical knowledge and skill in the health care (1). Clinical Nursing education is one of a component in nursing education that conduct in a clinical setting involving real situation, teaching and learning process in the clinical setting. On clinical nursing education also helping the nursing student achieve their competencies (attitude, skill, and knowledge) in real clinical settings according to nursing education institutional standard (the professional standard) (2). Kpodo, (2) stated that the clinical setting involves hospital setting, clinical, or other settings.

Clinical education provides an opportunity for a nursing student to imply theory and skill that they got from classroom setting in of real environment (clinical setting) (3). Many factors affect nursing student learning experience during the clinical education process (3).

Objective: There are two objectives of this article. First objective is to discuss about facilitating factors in clinical nursing education. The second objective of this article is to discuss about inhibiting factor in clinical nursing education.

Clinical Nursing Education

Clinical education is healthcare education which conducted in a clinical setting, or in the community under supervision registered practitioner (4). Chabeli & Muller 2004; Eta et al. 2011; Nxumalo 2011 in Kpodo (2) stated that clinical nursing education is one of a component in nursing education that conducts in a clinical setting involving real situation, teaching and learning process in a clinical setting. Student understanding that in clinical education, they would be implying the theory that they get from the classroom setting (5). Kpodo, (2) stated that the clinical setting involves hospital setting, clinical, or other settings.

Goal of clinical nursing education for the nursing student is to develop graduate of nursing student competency, who prepared to become professional clinician beginners (6). Clinical nursing education also enable student to develop their clinical skill, give opportunity to student in applying theory to practice and applying problem-solving skill; student also have opportunity to improve their interpersonal skill, and become socialized about professional norms in clinical setting, become socialized about nursing profession professional norms and ethics, and become socialized about social-political healthcare milieu (6).
Allari and Farag (5) found that nursing student expectation about the impact from their clinical learning were improving clinical skill and to achieve competencies. Nursing student expects that through clinical education, they would improve their clinical skill and achieve their competencies(5). Ma et al (7) found that the role of clinical learning is improved professional responsibility ethics student caring ability. There are facilitating factors and inhibiting factors which has an impact for student in their clinical nursing education.

**Facilitating factor in clinical nursing education:**
Elçigil & Sari (8) found that facilitating factor in clinical nursing education are clinical environment, teamwork, mentor, and patient. The meaning of clinical environment are physical condition and new educational environment. The student stated that clinical setting with good condition have good impact on their clinical learning (8). The student also stated that during their clinical education, student always exposed to the new clinical environment. With new and different clinical environment, student have the opportunity to perform the different practice and intervention that can prepare a student when they work after their graduation (8). The second factor that facilitating factor in clinical education are teamwork. The meaning of teamwork is acceptance and communication(8). The student stated that the relationship between student and nurses staff, and nurses staff attitude are important thing that affect student learning on clinical setting. When nursing student involved as a health care team, then the student will more spirited to attending clinical setting and make student feel motivated. For communication part, effective communication from nurses staff will motivate student to get more knowledge and it will help students to become part of the health care team (8).

A third factor that facilitating student in clinical education is a mentor. Good attitude from a mentor will motivate student to learn more. Positive feedback and friendly attitude during giving feedback from a mentor can motivate student (8). A fourth factor that facilitating student learning in clinical practice is ability to teach and nursing competence of mentor (8). The student stated that when mentor perform knowledge and demonstrated new skill, also helping student in performing a new skill, then it will make student feel motivated (8). A fifth factor that facilitating student learning in a clinical setting is patient attitude. The student stated that when patient allow nursing students to take care of them, it can improve student motivation to learning more (8).

Lofmark, (9) found that facilitating factor that contributing in clinical education in nursing is a student allowed to take their own initiative and responsibility during their clinical practice. During their clinical practice, nursing student allowed to report about the patient condition to nurses staff, nursing student allowed to work as a nurse under supervision from clinical supervisor. Lofmark, (9) also stated that a factor that facilitating factor that contributing in clinical practice are student allowed to be independent during their clinical practice. Independent also provide opportunity for nursing student to take decisions related to their clinical practice. Another factor that facilitating clinical practice for nursing student is practicing task and receiving feedback from clinical educator. A Student who practicing different task and receiving feedback from clinical nursing educator, will improve their confidence, and student can learn from mistake that they made during practice clinical task (9).

Shokria Adly Labeeb, RN, Chitra Vellolikalam Rajith, RN, Manal Ahmed Ibrahim, RN, & Nabil Ahmed Kamal, (10) found that there are 5 facilitating factors that contributing in clinical learning. There are clinical practice, clinical supervision, clinical instructor, supportive clinical learning environment, client factor and laboratory practice (10). The student also explains that similarities between the laboratory practice and clinical practice make them more confidence to conduct nursing procedure (10).

Shokria Adly Labeeb, RN, et al., (10) stated that other facilitating factor in nursing student clinical learning is clinical supervision. A student expressed that they very happy when they get continuous supervision from their clinical instructor (10). Continuous supervision is an important part in guiding, teaching, and evaluating clinical skill that performed by student in clinical areas (10).

Another facilitating factor in clinical learning for nursing student is a clinical instructor (10). The student stated that effective communication with the clinical instructor facilitating clinical learning (10). The student also stated that a good attitude and positive behavior from clinical instructor will make student maintain communication with the clinical instructor (10). The student also stated that immediate feedback from clinical instructor will help students to identify their deficiency and their achievement about clinical skill that they performed (10).
Other facilitating factor in clinical learning are supportive clinical learning environment (team related factor) \(^{(10)}\). The student stated that medical team, including doctors, nurses, and other health professional team influence their clinical learning \(^{(10)}\). Good collaboration between student, nurses, doctor, others health team member will enhance their learning \(^{(10)}\). The student also stated that communication between student will help their clinical learning by sharing knowledge and clinical nursing skill \(^{(10)}\). Other facilitating factor in clinical learning for nursing student is client related factor \(^{(10)}\). The student stated that they happy when they able to provide complete care for patients and their family \(^{(10)}\). The student also stated that patient acknowledgement for their care that provide to the patient will make student felt happy \(^{(10)}\).

Another aspect that facilitating for student good learning are student-mentor relationship \(^{(11)}\). Aspect related to student-mentor relationship are mutual respect and trust, an open and inviting communication \(^{(11)}\). Relationship between student-mentor should be constructive, respectful, supportive dialogue and mutual openness \(^{(11)}\).

**Inhibiting factors in clinical nursing education:** Jahanpour et al.\(^{(12)}\) found that barrier in clinical learning were inappropriate communication. Nursing student found inappropriate communication from nurse staff in a clinical setting. Nursing student also reports that nurses staff always blamed nursing student if something bad happened in their ward. Second, Ineffective role model. Nursing student report that although nurses educator and nurses staff were technically skilful, but they did not perform the procedure without upholding standard.

Third, theory-practice gap. Nursing student revealed that there were theory-practice gap in clinical setting. Nursing student revealed that they face up problem such as confusion about how to do a procedure (nursing action procedure) based on theoretical knowledge that they get from classroom or based on the habit of ward in reality situation \(^{(12)}\).

Newton et al.\(^{(13)}\) and Jennifer and Ockerby \(^{(14)}\) found that lack of affordance is barrier for nursing student learning in their clinical education. They found that the meaning lack of affordance is when nurses staff was indifferent to nursing student when nursing student come to the clinical setting and did not give opportunity nursing student to learn in a clinical setting. Other research, as conducted by Killam and Heerschap \(^{(15)}\) founded some barrier in nursing student clinical education. The barrier is large of group \(^{(15)}\). The student felt that large group in their clinical education would contribute to the decrease of feedback. Clinical educator didn’t have enough time to give the feedback one by one in a large group \(^{(15)}\). Another barrier is lack of practice time. They didn’t have the opportunity to learn with appropriate time \(^{(15)}\). Truong \(^{(16)}\) found that barrier in clinical learning for nursing student was limitation in facilities. Also, student report that too many students in clinical wards would be decreasing their opportunity to learn and practice through their experience \(^{(16)}\). In this study also found that patients and their family reject to care by students \(^{(16)}\). Another barrier was that the lack of confidence that felt by students. \(^{(16)}\) They felt less confidence when they provide nursing care for patients, that led them lose the opportunity to learn in their clinical learning \(^{(16)}\).
student also described that theory-practice gap being their barrier during their clinical learning.

Awe and Omolola (17) found in their research that communication as barrier for international nursing student. Student revealed that they got difficult to find appropriate medical terms that they used in clinical settings, for international nursing student only focus translating words during their clinical learning. They also misunderstood about what the patient and nurses staff said, which affect their nursing care that given to the patient (17). Sharif and Masoumi (18) found that barrier that faced up by nursing student during their clinical learning were theory-practice gap. During their clinical education, they got difficult to integrate between what they got from classroom setting into real practice in a clinical setting. The student also felt that what they do in their clinical education is not the real professional work. The student said that what they had learnt during four years in a classroom setting, were different with they had done in their clinical education (18). They think that what they had done during their clinical education can be done by other people without professional education (18).

Lofmark (9) found that student-supervisor relationship deficiency is one of barrier in clinical learning. The student stated that some supervisor in their clinical practice did not rely on about their attendance in the clinical setting. The student spent their time without supervision. Some student also stated that they hadn’t received any feedback from supervisor on their clinical practice. Second, lack of nursing practice guidelines. The student stated that during their clinical practice student experienced difficulties finding guidelines about nursing practice. Third, lack of time. Student stated that they had lack of opportunity to learn, to participate in ward activity. Student only allowed to observe in the care of patients. Fourth, some student stated that sometime student facing unsuccessful in their clinical learning. For example, the student fails on intravenous peripheral insertion, or they unable to answer some question from a patient (9). This experience leads to feelings of inferiority for students. The student also stated that they felt the knowledge insufficiency in their clinical practice. They said that theory that they got from classroom setting was insufficient (9).

**Conclusion**

Clinical nursing education is one of a component in nursing education that conduct in a clinical setting involving real situation, teaching and learning process in the clinical setting. Goal of clinical nursing education for the nursing student is to develop graduate of nursing student competency, who prepared to become professional clinician beginners. Many factors that facilitating and inhibit nursing student learning experience during their clinical nursing education.

**Conflict of Interest:** The authors declare that there is no conflict of interest

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**Ethical Clearance:** There is no ethical review that conducted for this concept paper

**References**

9. Lofmark A. Facilitating and obstructing factors for development of learning in clinical practice: a


Confirmatory Factor Analyze on Education Characters of Teenagers Based on the Character System Theory in Sexual Prevention of Premarital in Jember District

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Abstract
Currently the problem of teenage characters in Indonesia became the spotlight of the public. The problem that arises in the community is premarital sexual behavior. Cases regarding sexual behavior in adolescents from time to time are increasingly alarming. While in the community there is a shift in moral values that are getting farther away so that the problem has become commonplace. Whereas this behavior is something that must be avoided by each individual so that it requires adolescent character education in premarital sexual prevention. The research sample was 229 students in six high schools in Jember Regency. The study used a multistage random sampling technique. Variable characteristics of adolescents include indicators of moral knowledge, moral feelings, and moral actions. Data analysis uses confirmatory factor analyze (CFA) with data estimation parameters using software (analysis of moment structures (AMOS version 21). P-value parameters of adolescent characters to moral knowledge (0.000), p-value parameters of adolescent character to moral feelings (0.000), p-value parameters of adolescent characters to moral actions (0.000). Model fit value in the comparative fit index (CFI) (1.000). Moral knowledge, moral feelings, and moral actions are stated as significant as a measure of the construct of adolescent character. The value of the CFI fit index produced is 1.000, indicating that the model is fit. Means that the character of adolescents can be formed through moral knowledge, moral feelings, and moral actions.

Keywords: Education, adolescent, knowledge, feelings, actions.

Introduction
Indonesia as a developing country has a demographic character with the largest percentage of the population aged young (15-24 years) among other ages. The number of teenagers aged 10-24 years has reached 64 million (27.6%) of the total population of Indonesia. A large number of adolescents is a great potential for the advancement of the nation, but if it is not properly cultivated or left alone it develops in a negative direction and becomes a burden on the state (1).

Adolescence occurs physically and psychologically and often faces various health risks. Physical changes in adolescence are characterized by the emergence of a variety of primary and secondary sexual signs and psychological changes including changes in emotions to be sensitive and behaviors wanting to try new things. Although adolescents have matured in sexual organs emotions and personality are still unstable because they are still looking for identity so that they are vulnerable to various temptations and social environments. So that teenagers are very easily affected by the environment, including various negative influences such as doing various deviant and self-destructive actions and others, namely premarital sexual behavior.

According to 2012 National Population and Family Planning Agency data, out of wedlock pregnancies due to premarital sexual behavior as much as 48.1% occur in adolescents aged 15-19 years and abortion rates reach 2.5 million, namely 800 thousand abortions carried out by teenagers. Sexuality is a complicated problem for adolescents because adolescence is a time when a person is faced with various challenges and problems that come from themselves and the environment. These challenges and problems have an impact on adolescent behavior, especially sexual activity. Cases of sexual behavior in adolescents from time to time are increasingly alarming.
While in society there is a shift in moral values that are getting farther away. So that the problem has become commonplace. Whereas this behavior must be avoided by every individual.

According to study that character education is an effort to shape the human personality through the process of knowing the good, loving the good and acting the good, namely the education process that involves three domains: moral knowledge (moral knowing), moral feeling (moral feeling or moral loving) and moral action (moral acting or moral doing). So that noble deeds can be formed into habits of mind, heart, and hands without involving these three domains character education will not work effectively (2).

According to study that the three domains are character systems. As a character system, these three domains cannot be separated but are interconnected, interact with each other, and influence each other. These three domains were then elaborated by Lickona into various character components. Moral knowledge(moral knowing)consisting of 1) moral consciousness; 2) knowledge of moral values; 3) understanding other points of view; 4) moral reasoning; 5) decision making and 6) self-knowledge. Feelings of moral (moral feeling)consisting of 1) the conscience; 2) self-esteem; 3) empathy; 4) love goodness; 5) self-control; and 6) humble. Moral action (moral action) consists of 1) competence; 2) desire; and 3) habits (3).

The family has two functions. The first function is related to sexual problems. The second function is child care. In addition to physical maintenance, this function also includes the formation of character and behavior of children to be able to live in a wider circle, how children are formed through relationships with both parents. Parents are the main and first person in providing character education at home as an effort to prevent the premarital sexual behavior (4).

### Materials and Method

This research was conducted from January to June 2018 in Jember Regency, Indonesia. This study includes a cross-sectional approach using students in several high schools. The inclusion criteria included: 1) Jember High School 5, Kartika 4 Jember Middle School, Pancasila Ambulu Middle School, Balung State High School, Kasyan Puger Islamic Middle School and Kencong 1 Middle School; 2) students in 6 high schools aged 16-17 years; 3) students in 6 active high schools; 4) students in 6 high schools with male and female sex.

The techniques used are multistage random sampling because the population is limited according to the criteria of a cluster particular(high school). The sample includes students (n = 229) in SMA 5 Jember, SMA Kartika 4 Jember, SMK Pancasila Ambulu, SMA Balung, Islamic High School Kasyan Puger and SMA 1 Kencong. The research instrument used a Likert scale questionnaire to determine education teenage character about moral knowledge, moral feelings, and moral actions. Data collection techniques include filling out the teen character questionnaire format, moral knowledge, moral feelings, and moral actions. Data analysis using confirmatory factor analysis(CFA) with parameter data estimates using analysis of moment structures (AMOS version 21) (15). The CFA test aims to find out how well the measurement indicators measure a latent concept (construct) and to determine the model’s fit value in the comparative fit index (CFI).

### Results

Adolescent character factors (X3) are measured through 3 indicator aspects namely moral knowledge (X3.1), moral feelings (X3.2), and moral actions (X3.3). Descriptive analysis results can be seen in table 1.

#### Table 1. Frequency Distribution of Adolescent Character Factors as Premarital Sexual Prevention Efforts

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Never</th>
<th>Rarely</th>
<th>Often</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>1.</td>
<td>Moral Knowledge Factors</td>
<td>62</td>
<td>27.1</td>
<td>125</td>
<td>54.6</td>
</tr>
<tr>
<td>2.</td>
<td>Feeling Factors Moral</td>
<td>40</td>
<td>17.5</td>
<td>142</td>
<td>62.0</td>
</tr>
<tr>
<td>3.</td>
<td>Factors Actions Moral</td>
<td>73</td>
<td>31.9</td>
<td>108</td>
<td>47.2</td>
</tr>
</tbody>
</table>
Based on the estimated significance of parameters generated by variables juvenile character (X3) to moral knowledge (X3.1), moral feeling (X3.2), and moral action (X3.3). The variables and each indicator are shown in Figure 1.

![Figure 1. Hypothesis Model: Confirmatory Factor Analyzes the Character of Adolescents in Premarital Sexual Prevention](image)

Figure 1 shows that the estimated significance of parameters generated by adolescent characters (X3) to moral knowledge (X3.1) 1.000. Estimation of teenage characters (X3) to moral feelings (X3.2) 0.894. Estimation of teenager characters (X3) to moral actions (X3.3) 1.000.

![Figure 2. Confirmatory Factor Analyzing Adolescent Character Education in Premarital Sexual Prevention](image)

Table 2. Estimation of Significance of Parameters of Adolescent Character, Moral Knowledge, Moral Feelings, and Actions of Moral

<table>
<thead>
<tr>
<th>Variables</th>
<th>Estimate</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3.1 &lt;-- X3</td>
<td>1.000</td>
<td>0.000</td>
</tr>
<tr>
<td>X3.2 &lt;-- X3</td>
<td>0.894</td>
<td>0.000</td>
</tr>
<tr>
<td>X3.3 &lt;-- X3</td>
<td>1.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2 shows that the p-value generated for relation teen character (X3) to moral knowledge (X3.1) is 0.000 this value <0.05 (α = 5%) then moral knowledge (X3.1) is stated as significant as a measure of the construct of adolescent character (X3). The P-value generated for relations teenage character (X3) to moral feelings (X3.2) is 0.000 this value is <0.05 (α = 5%) so the moral feeling (X3.2) is stated as significant as a measure of the construct of adolescent character (X3). The p-value generated for relation the teen character (X3) to moral action (X3.3) is 0.000 this value is <0.05 (α = 5%) then moral action (X3.3) is stated as significant as a measure of the construct of teenage characters (X3).

**Fit Model Value**

Table 3. Value Fit Model Comparative Fit Index (CFI)

<table>
<thead>
<tr>
<th>Model</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 3 shows that the CFI fit index value is 1.000 and CFI value > 0.90 indicates that the model is fit.

**Discussion**

Characters Teens To Knowledge Moral:

Knowledge moral (moral knowing) as the first aspect has six elements, namely the moral conscience (moral awareness), knowledge of moral values (knowing moral values), the determination of the angle of view (perspective taking), the logic of moral (moral reasoning), courage to take an attitude (decision making), and self-knowledge. The six elements are components that must be taught to children to fill their cognitive domain (2).

Parents are often negligent in providing moral knowledge, this is evident from the results of the study (table 1) which describes the indicators of adolescent character factors that most respondents rarely get moral knowledge from parents related to premarital sexual behavior as many as 125 respondents (54.6%). The most dominant statement that is rarely done by parents about moral awareness, namely “having sexual relations before marriage can damage morals, including belonging to immoral acts”.

According to study that the notion of the character contains values such as 1) religion, religious education is expected to foster attitudes of children who are able to stay away from things that are prohibited and carry out religious orders; 2) decency includes values that relate to others such as courtesy, cooperation, tolerance, mutual respect, mutual respect, respect for others, not premarital sex; 3) personality has values related to self-development such as courage, shame, honesty, independence (5).

Moral awareness includes three things, namely: 1) the feeling of compulsion or the obligation to do moral actions; 2) moral awareness can be rational and objective in the form of actions that are generally accepted by society, as objective and universally applicable; 3) moral awareness can take the form of freedom (6).
According to study that moral development is best understood when considering a combination of social and cognitive factors, especially those involving self-control. When developing self-moral (moral self), individuals adopt standards regarding right and wrong that serve as guidelines and prohibitions in behavior. In the process of self-regulation, one can monitor the behaviors and conditions that accompany them, assess between behavior and moral standards, and regulate actions based on consideration of consequences for themselves (7).

**Youth Character to Moral Feelings:** Indicators of moral feeling are strengthening aspects of teenage emotions to become human beings with character. Strengthening is related to the forms of attitudes that must be felt by adolescents, namely awareness of identity, confidence (self-esteem), sensitivity to the pain of others (empathy), love of the truth (loving the good), (self-control self-control) and humility (humility). After these two aspects have been realized, moral acting as an outcome easily appears in adolescents (3).

The results of the research on indicators of moral feelings (table 1) show that most respondents rarely get moral feelings from parents related to premarital sexual behavior as many as 142 respondents (62.0%) about indicators of good love “my parents conveyed not to have sexual relations before married because it can harm yourself and family”. Adolescence is a transition period between childhood and adulthood that often faces various sexual health risks. Encouragement or sexual desire is assumed to have existed in adolescents because during adolescence the reproductive tool begins to function and requires a container to accommodate the aspirations of teenagers related to the transition experienced (6).

According to study that the dimensions of adolescent attitudes toward premarital sexual behavior have four dimensions, namely: 1) the biological dimension is a dimension related to the functioning of reproductive organs including how to maintain or care for reproductive health, optimally functioning knowledge about the dangers of sex free; 2) the psychological dimension associated with one’s feelings; 3) the moral dimension includes the assumption of individuals towards free sex, for example, the assumption that free sex is a normal relationship, not normal, normal, unnatural, permissible, not permissible, or good, not good according to each individual; 4) the social dimension is the dimension that sees how sexuality emerges in relationships between people, how one adjusts to the demands of the role of the social environment, and how the socialization of the role and function of sexuality in human life (8).

**Youth Character To Moral Actions:** Indicators of moral action. The results of the study (table 1) show that most respondents rarely get moral actions from their parents related to premarital sexual behavior as many as 108 respondents (27.2%) regarding the desire that is “my parents invited to discuss how the impact of having a relationship before marriage and the challenges that it will be faced if it is not ready mentally and financially in a family”.

Teenagers act more using emotions and are still lacking in rationality thinking. In these conditions, parents often experience difficulties. Research results that family support that is expected by adolescents during their puberty period is to be considered, the desire for parents to act as friends, to give love, to understand, to inform and to fulfill their needs (9).

According to study that sexual behavior is behavior driven by a sexual desire that is carried out alone, by the opposite sex or same-sex without any marriage ties according to religion (10). While premarital sexual behavior is a sexual behavior that is carried out without going through an official marriage process according to the law and religion and belief (5). The research showed that 29.3% had sexual intercourse, the first age did an average of 16 years and about 38% used condoms during sexual activity (11). The research shows that 41.5% of unmarried adolescents have had premarital sexual intercourse, <10% have high-risk sex (12). There is a significant relationship between attitudes towards premarital sexual behavior because attitude is something that can give a certain tendency to individuals to react in the form of certain behaviors (13). Premarital sexual behavior is related to one’s morality. The moral is a teaching about good and bad deeds or behavior, morals, and obligations (14).

According to study that moral tendencies consist of: 1) awareness of the ability to recognize standards ethics and morals and commitment in doing something good; 2) self-control, namely the ability to control impulses and gratification immediately and replace by doing something good and right; 3) humble namely knowing one’s own limitations and self-rationalization abilities; 4) moral habits, namely the ability to develop good behavior patterns so that they become habits; 5)
willingness, namely the commitment to do something good and right even in difficult situations(3).

Fit Model Value: Table 2 shows that the CFI fit index value is 1.000. The CFI value>0.90 indicates that the model is fit. Means that the character of adolescents can be formed through moral knowledge, moral feelings, and moral actions.

Conclusions

The results of research on adolescent character variables, that is, most parents rarely give importance to moral knowledge, moral feelings, and moral actions to adolescents in premarital sexual prevention. This has an impact on the character of adolescents, so they risk doing irregularities such as premarital sexual behavior.

Conflict of Interest: Authors declare that no conflict of interest within this publication.

Ethical Clearance: Ethical clearance from college committee.

Source of Funding: Scholarship from the Indonesian Ministry of Research and Technology.

References

Is it True that the Child is King?: Qualitative Study of Factors Related to Nutritional Status of Children in West Lombok, Indonesia

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Abstract

Nutritional status in infants and toddlers is a very important indicator to indicate whether the development of health of a region is successful or not. The purpose of the study was to explore factors related to the nutritional status of troubled children in West Lombok Regency, Indonesia. The study was conducted with a qualitative design. Data was taken through interviews and observations on toddler suspected of having nutritional status problems. Data were analyzed by content analysis and thematic analysis method. The results of the interview were showed that the value of children for people living in the West Lombok, “the children is a king”. Although the results of observations were showed a different situation. Poverty makes parents of toddlers have no choice, and ultimately choose to work abroad. Toddlers whose parents work abroad must be entrusted to their relatives or grandmothers. Such conditions make the pattern of parenting, including the pattern of feeding, not optimal. This condition was exacerbated by poverty that surrounds them and the presence of infectious diseases that infect the toddlers. It can be concluded that the value of children is not related to the nutritional status of children. The main factors that were assessed to be related to the nutritional status of children in the West Lombok District were poverty. While other factors are related to family factors, infectious diseases, feeding pattern, and parenting patterns.

Keywords: Toddler nutrition status, qualitative studies, the value of child, poverty, local food.

Introduction

Child growth is an index of nutritional status that shows general well-being in the community¹. Growth failure in children can result in increased morbidity so it can also predict mortality rates². The incidence of growth failure at the age of the toddler has an impact on the growth of the next age. A boy who experiences failure to grow, in adulthood will become a stunted man with all its consequences, work productivity is less so disturbing in achieving family economic status, while a girl who experiences growth failure will become a stunted woman who when will be at risk for having a low birth weight baby³.

A concept of nutrition and child development developed by UNICEF identified causes directly or indirectly towards growth. Nutritional intake and health status are factors that directly influence a child’s growth. Food availability in the household, parenting patterns and environmental health are factors that influence the nutritional status of children indirectly through their influence on nutritional intake and children’s health status. While socio-economic conditions are a big factor covering the factors of food availability, parenting patterns and health of the family environment. So that these socio-economic factors have a strong influence on the nutritional status of children even though indirectly⁴.

West Nusa Tenggara Province (NTB) is one of 20 provinces with a high prevalence of growth failure in toddler in Indonesia. West Lombok Regency which is
one of the Regencies in NTB with the prevalence of growth failure in toddler has increased based on the results of Riskesdas. The prevalence of under-fives with less weight was 27.59% (2007) to 28.47% (2013); the prevalence of stunting toddlers shows 41.74% (2007) to 46.89% (2013) and the prevalence of underweight toddlers from 17.62% (2007) to 26.89% (2013)\(^5\). As one of the regencies in NTB, West Lombok is a health problem area, in the poor category. According to data on socio-economic status data (PSE) in 2011, West Lombok had a PSE figure of 19.7%. While the level of public education, which is characterized by indicators of the average length of school, only 5-6 years, shows that the level of education of the people in West Lombok is still relatively low, with the largest percentage of population>10 years old having elementary school education and below\(^7\). Based on the description of the background, the purpose of this study was to explore factors related to the nutritional status of problematic children in West Lombok.

### Materials and Method

The study was conducted using a qualitative design through semi-structured interview method and observations on individual informants in West Lombok Regency, Indonesia. We collected data on three regions with different topographic characteristics, namely the mountains (Duduk Atas Village), the coast (Melase Village), and the plains (Limbungan Utara villages). Data collection was conducted in February-May 2015. The informants interviewed consisted of nutrition program holders, health workers, community leaders, religious leaders, parents and child caregivers of toddlers with the nutritional disorder. There were 41 people interviewed, consisting of 18 men and 23 women. Observations were made according to the field context in the environmental situation, feeding patterns, and parenting patterns.

Recording of nutritional problems and possible causes was carried out as a life history case study in toddlers who have nutritional status problems. There were 3 nutritional status problems of children under five who were the target of the study, namely underweight, wasting and stunting. Criteria for malnutrition was using standard guidelines from WHO\(^8\).

A qualitative design was very useful when the aim was to explore the value or reason behind a phenomenon\(^9\). Qualitative interviews were very suitable to examine the opinions and personal experiences of informants\(^10\). In this study, the result data of interview and observations were analyzed using content analysis and thematic analysis method\(^11\). Finally, data were presented as information in narrative and matrix form.

### Findings

#### Potential Causes of Problems in Toddler Nutrition Status:
The various topographical conditions of the West Lombok have different consequences. Although there are a number of problems that are considered to be generally applicable, for example, poverty and infectious diseases, there are some things that are typical according to regional characteristics. Specific problems are mainly in mountainous areas related to accessibility and availability of local food.

#### Table 1. Potential Causes of Problematic Nutritional Status in Toddlers in West Lombok District in 2015

<table>
<thead>
<tr>
<th>Topography</th>
<th>Toddler’s initials</th>
<th>Potential Causes</th>
</tr>
</thead>
</table>
| The mountains (Duduk Atas Village) | Jul                | 1. Parents divorce, then stay with grandma. When grandmothers work, toddlers are left by neighbors.  
2. Inadequate breastfeeding complementary foods, often only consume rice mixed with warm water and salt.  
3. Limited external access.  
4. Socio-economic is low. |
|                             | Firm               | 1. Inadequate breastfeeding complementary foods, often only consume rice mixed with warm water and salt.  
2. Toddlers often get sick.  
3. Limited external access.  
4. Socio-economic is low. |
|                             | Nov                | 1. Inadequate breastfeeding complementary foods, often only consume rice mixed with warm water and salt.  
2. The eating habits of the family of instant noodles.  
3. Limited external access.  
4. Socio-economic is low. |
Based on Table 1, several factors related to the nutritional status of children are a family environment, infectious diseases, feeding patterns, parenting patterns, and poverty. Poverty is found predominantly in families of informant toddlers with nutritional problems.

The most common factor in the case of a toddler’s nutritional status in West Lombok is poverty. This factor is considered to have a direct influence on the nutritional status of children. Poverty which includes the family of toddlers greatly affects the ability of the family in an effort to provide quality food as an intake of nutritional resources for toddlers.  

Given the conditions in the target area, the environmental factors in which the family lives are considered to be a factor that influences the nutritional status of the child. Environmental conditions are very influential on the availability of food that can be accessed by the community. The environment is also considered influential in the way and efforts of the community in meeting their nutritional needs.

Another factor that was assessed as influencing the nutritional status of children in West Lombok Regency was the presence of infectious diseases, parenting patterns as well as the knowledge of toddler caregivers. The findings of these causal factors are in accordance with the conclusions of several other studies on nutritional status in toddlers. Good knowledge from mothers or caregivers of toddlers will also influence the pattern of parenting as well as patterns of feeding to toddlers.

“The child is a king”: The Value of Children that Questioned Again

For people who live in the West Lombok Regency, “the child is a king”, children are everything. So, they revealed when interviewed about the value of children for parents and family. However, based on the results of observations showing different situations. Often poverty makes parents of toddlers not have a choice. Poverty makes many parents of toddlers who are forced to choose to work outside the area. Being a labor force abroad is the choice that is finally taken by parents of toddlers. Although according to the family left behind, the results did not also bring economic goodness to the family.

“IT’s hard to find work here, there are many men who go abroad, there are a lot of people in Malaysia, so do in Saudi... “
(Pi, hamlet head, 54 years old)

“If they come home with a lot of debt, they have principles, they are already working exhausted, so to eat by themselves, no one thinks about being saved for the house.”
(Is, 15 years old)

In fact, toddlers who live in villages without biological parents are not kings. Toddlers whose parents become laborers abroad must be entrusted to their relatives or grandmothers. Observations on toddlers with nutritional disorders find the condition of children who are thin and short. Directly proportional to the pattern of parenting toddlers, eating patterns of toddlers entrusted is
also far from the value of “king”. The poverty condition that also applies to families entrusted makes toddler food intake also seems to be modest.

“There were fifteen months given milk, I forgot... when I was given rice... sometimes 10 months, now nothing wants... Al*-al* (instant drink) want, eat rice, eat alone... just rice sometimes given salt,sometimes just rice...”

(Sa, grandmother, 45 years old)

Although claiming that the child is king, the treatment of children shows different conditions. The pattern of care that applies in the target area in West Lombok Regency is the impact of the situation and poverty that includes the people in the region. Economic pressure makes parents have the heart to leave their children. In this situation the value of children is no longer economically valuable as is the value of children in Indonesia and other developing countries in general but it is more like the value of children in developed countries, which considers children to be a burden. For them, the value of children is more an obligation.

Given the situation in the target area in West Lombok Regency, the nutrition program administrators need to identify local food items with high nutritional value. This is an input of learning for the people of West Lombok in general, and mothers of toddlers in particular. Learning about processing local food ingredients to improve the nutritional status of children. The use of local food needs to be recommended to improve the nutritional status of children who are more sustainable.

**Conclusion**

Based on the results of research and discussion it can be concluded that the value of children is not related to the nutritional status of children. The main factor considered most related to the nutritional status of children in West Lombok District is poverty. While other factors that are also considered to be related are a family environment, infectious diseases, feeding pattern, and parenting patterns.

**Conflict of Interest:** None.

**Source of Funding:** The research was part of project “Improving Health Development and Services Monitoring to Address Health Inequities in Indonesia” funded by IDRC (107303).

**Ethic and Consent:** This study has ethical clearance approved by the national ethics committee (ethical number: LB.02.01/5.2/KE.285/2014). Informed consent was used during data collection, which considered the procedural aspects of data collection, voluntary and confidentiality.

**Reference**


The Independence and the Quality of Life of Workers with Disabilities Caused by an Occupational Accident in Gresik and Sidoarjo, Indonesia

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Abstract

Introduction: An occupational accident causes a disability in workers. The disability condition will make the workers experience substantial limitations from every side of their life both in a social context and economic context, the dependence to their family, inability to live independently. The disability can also cause the workers to lose their job. The bad financial condition and the dependence give a negative impact on the quality of life of the workers with disabilities. The aim of this research was to analyze the influence of independence toward the quality of life.

Method: This research used a cross-sectional method. The population of this research was the workers with disabilities caused by an occupational accident in Sidoarjo Regency and Gresik Regency. The number of samples in this research was 182 participants. The sampling technique was done by using simple random sampling technique. The variables that were analyzed were the characteristic of the individual, the independence, and the quality of life. The measurement instrument for independence was done using Lawton-Browdy instrumental activities of daily living scale; the measuring instrument for the quality of life was done using WHOQol100 questionnaire (a standardized questionnaire). The data analysis was done using linear regression test with a significance level (α) of 0.05.

Results: Nearly 78% of participants had independence in the ‘moderate’ category with an average score of 81.51. The 78% of participants also had the quality of life in the ‘moderate’ category. Based on the regression test, it was obtained a result that the independence had a significant impact on the quality of life of workers with disabilities caused by occupational accident (p < 0.05).

Conclusion: The independence has a significant impact on the quality of life of workers with disabilities caused by an occupational accident. The better the worker’s independence is, the better the quality of life of the worker with a disability caused by an occupational accident is.

Keywords: Independence, Quality of Life, Worker with disability, Occupational Accident.

Introduction

The occupational accident rate increased sharply in the last five years. According to ILO, around 270 millions of work-related accident and 2 millions of fatality happen in the world every year. The number of occupational accident cases in East Java was 20,488 cases. The impacts of the occupational accident are as follows: functional disability, partial disability, total disability, and fatality. Based on the data of BPJS for employment in 2016, the 150 workers suffered from the functional disability and 135 workers suffered from the partial disability.

The workers with disabilities would experience...
substantial limitations from every side of their life in the social and economic context. The socio-economic risk suffered by the workers with disabilities is losing a job. The condition judged to be relative to the standard of an individual or group that the workers with disabilities had previously caused a big possibility for them to lose their job. If they get a new job, they will be paid below the standard. Such financial condition will give a bad impact on the quality of life of the workers with disabilities.

The quality of life is a life condition in the context of the system, value, and culture where they live based on the individual perception and related to the goal, expectation, standard, and the interest of each individual's life. According to David Felce and Jonathan Perry in Brown, the quality of life covers five domains i.e. physical well-being, material well-being, social well-being, emotional well-being, and productivity well-being. There are many factors affecting the quality of life; they are the physical, spiritual, and health condition, level of independence, the relationship with the social environment and the like. The decline in the quality of life is a consequence of the accident that results in disability condition.

An independence is an ability of someone for decision-making toward their life and the capacity to execute their tasks with full of responsibilities without relying on other people's help. The condition of workers with disabilities gives an impact on their independence level to do their basic daily activities such as bathing, eating, going to the toilet, preparing meals, shopping, and transferring/walking. The people with disabilities will feel uncomfortable if there is a person helping them to bathe, even in their own house. Sometimes, they will feel uncomfortable if they should wait for other people's helps to do their daily activities.

The research that has been conducted is generally about the influence of independence toward the quality of life of people with disabilities due to disease. However, the number of researches that select workers with disabilities as the research subject is less. The aim of this research was to analyze the influence of independence toward the quality of life of workers with disabilities caused by an occupational accident.

Method

This research was a descriptive research with a cross-sectional design. This research was conducted in Gresik and Sidoarjo. It was conducted from March to April 2018.

The population of this research was the workers with disabilities (diffabilities) due to an occupational accident in Gresik and Sidoarjo. The number of samples used in this research was 182 workers. It was determined using simple random sampling technique.

The data that had been collected was in form of primary and secondary data. The primary data of this research was obtained from an interview with the workers with disabilities caused by an occupational accident in Gresik and Sidoarjo. Meanwhile, the secondary data was collected from the document of the BPJS for employment (Social Security Administration Body for Employment) in Gresik and Sidoarjo. Then, the data that had been collected were analyzed descriptively and it was presented in form of narration that illustrated the variables that had been investigated.

The independent variable of this research was independence while the dependent variable was the quality of life. The measuring instrument used in this research was the standard measuring instrument composed by WHO that had been tested on the validity and the reliability. The measuring instrument for independence was Lawton-Browdy instrumental activities of daily living scale. Meanwhile, the measuring instrument of the quality of life used WHOQol-100 questionnaire (a standardized questionnaire). The data analysis was used for analyzing the regression between two variables using linear regression test.

Results

The result of this research was the sociodemographic characteristics, the independence level, the level of quality of life, and the influence of independence toward the quality of life.

Socio-demographic characteristics: The data of sociodemographic characteristics of the participants can be seen in table 1 below.
The research finding showed that 73.6% of the participants were men. Most of the participants (31.3%) aged around 40 years to 49 years and 84.6% of the participants were married. Most of the participants (86.3%) were still working after suffering from the disability. Nearly 75.8% of the participants suffered from a functional disability and the 61.5% of the participants suffered from disability in their fingers especially in their right fingers.

The Independence of the Participants: From the research finding, it was obtained that the maximum score for independence was 100 and the minimum score was 45.83. The independence covered the independence in self-care tasks (eating, bathing, dressing, and toileting) and independence in using the instruments (calling, washing, shopping, and using transportation), and vocational independence/managing finances. Almost all participants had independence in self-care tasks. They could do the self-care tasks without other people’s help. The average score of independence in self-care tasks was 99.9. The average score of instrument independence was 84.5. Meanwhile, the average score of vocational independence was 78.5. The independence was categorized into three categories i.e. low, moderate, and high. The 78% of the participants were categorized in ‘moderate’ category with an average score of 81.51. The complete data can be seen in table 2.

The Quality of Life of the Participants: From the research finding, it was obtained the maximum score for the quality of life of 100 and the minimum score was 25. The quality of life comprised six domains i.e. physical domain, psychological domain, the domain of the level of independence and productivity, the social relations domain, the environmental domain, and spiritual domain. The average score of physical domain was 53.26; the average score of psychological domain was 53.43; the average score of the domain of the level of independence and productivity was 52.71; the average score of the social relation domain was 68.78; the average score of the environmental domain was 57.5; and the average score of spiritual domain was 66.2. The quality of life was categorized into three categories namely low, moderate, and high. Nearly 78% of the participants were categorized in ‘moderate’ category with the average score of 58.64. The complete data can be seen in table 3 below.

The Influence of Independence toward the Quality of Life of the Participants: The workers with disabilities had low independence and 72.9% of them had a low quality of life. The result from cross tabs can be seen in table 4.
Table 4. The Crosstabs of Independence toward Quality of Life

<table>
<thead>
<tr>
<th>Independence</th>
<th>Quality of Life</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Low</td>
<td>19</td>
<td>79.2</td>
</tr>
<tr>
<td>Moderate</td>
<td>6</td>
<td>4.2</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>13.7</td>
</tr>
</tbody>
</table>

Based on the linear regression test, it was shown that the independence of workers with disabilities caused by occupational accident had a significant impact on the quality of life. The result of the test can be seen in table 5.

Table 5. The Regression Test of Independence toward Quality of Life

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Zero-order</td>
</tr>
<tr>
<td>Independent</td>
<td>0.525</td>
<td>0.45</td>
<td>0.655</td>
<td>11.620</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The score for the influence of independence toward quality of life was \( p < 0.05 \). It means that the lower the independence level of workers with disabilities is, the lower the level of quality of life is.

**Discussion**

An independence is the ability of someone in decision-making and the capacity to execute the tasks for their life with full of responsibility without relying on other people. In a psychological dictionary, independence comes from a word “independent” that can be defined as a condition where someone does not rely on other people in making decisions and he or she has self-confidence character\(^{13} \). The independence of someone in living and working is strongly related to disability\(^{2} \). Disability gives an impact on job, social life, and the ability to be independent\(^{14} \). Most of the participants suffered from disability in their right fingers/hand. Their disability condition enabled them to be independent (the independence in self-care tasks). Some of them were less independent in instrumental independence (using instruments) and in vocational independence (managing financial matters). Most of the participants had independence in the ‘moderate’ category.

The disability condition did not only give an impact on the physical condition but also on the psychological condition. Someone will feel ‘little’, have no potency, and have no ability to live independently\(^{3} \), emotional, feel meaningless, feel useless, experience frustration, and depression\(^{6} \). The disability condition would result in the participation restriction in workers with disabilities in the world of work, and it would indicate an increase in financial burden. It caused the dependence to their family. The dependence on family (being dependent) gave a direct impact on the quality of life.

This research finding revealed that there was a significant impact on the quality of life of the workers with disabilities caused by an occupational accident. This showed that the higher the level of independence of the workers with disabilities was, the higher the quality of life they had and vice versa. Therefore, an attempt to form the independence in workers with disabilities caused by occupational accident was needed.

The quality of life of workers with disabilities caused by an occupational accident that was decreased at the beginning could be increased if they had a good support from their family and the company. The supports were to make them rise to the occasion, to increase their self-confidence for having a social relation, working, developing their potency, and forming their independence\(^{15} \). The workers who had suffered from disability caused by occupational accident would get
compensation/disability compensation from Indonesian Social Security Administration Body for Employment. The amount of compensation/disability compensation depends on the percentage of disability they suffer. The compensation/disability compensation received by the workers with disabilities caused by an occupational accident is very important. The compensation becomes the main requirement to live independently.  

To improve the socio-economic status in workers with disabilities, the strategy for eliminating the physical and social obstacles and promoting health and welfare/well-being/quality of life is needed. It can be inferred that the level of independence of someone gives an impact on the quality of life of the person. Delcourt, et.al stated that the domain of independence was the most influential domain in the quality of life in stroke survivor.

**Conclusion**

The independence of workers with disabilities caused by occupational accident has a significant impact on the quality of life. The lower the level of independence of workers with disabilities is, the higher the quality of life they have.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** Received from the Ethics Committee of Faculty of Public Health, Airlangga University, Indonesia.

**Recommendation**

a. Creating an accessibility to eliminate the physical and social obstacles (being dependent) for the workers with disabilities caused by an occupational accident.

b. Strengthen the regulation and the promotion for the workers with disabilities to be able to maintain their quality of life.

**Reference**


15. Leung L, Lee PS. Multiple determinants of life quality: The roles of Internet activities,
use of new media, social support, and leisure activities. Telematics and Informatics. 2005 Aug 1;22(3):161-80.


Effect of Sleep Duration on Physical Activity among Hypertensive Patients in Bogor, Indonesia

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Abstract

Objectives: Physical inactivity has become a global health concern that is associated with consequences such as premature death. In particular, lack of physical activity may impair blood-pressure control, potentially causing complications in hypertensive patients. The general objective of the present study was to elucidate the effect of sleep duration on physical activity of hypertensive patients of the Puskesmas Tegal Gundil in Bogor City, Indonesia.

Method: This study using a cross-sectional analysis with 97 hypertensive who were treated at the Puskesmas Tegal Gundil in 2017. Physical activity was determined using the Global Physical Activity questionnaire, and items about sleep duration, sleep quality, and stress, from the Pittsburgh Sleep Quality Assessment, and Perceived Stress Scale questionnaires. Results: The results from this study showed that 32% of the respondents had less of physical activity.

Conclusion: Physical activity was found to be unrelated to sleep duration; in contrast, higher age was associated with less physical activity in patients with hypertension.

Keywords: Age, Hypertension, Physical Activity, Lifestyle Induced Illness, Sleep

Introduction

The global prevalence of hypertension has been increasing in recent years, making its control and prevention a matter of growing importance.¹ Physical activity is recommended as a lifestyle modification to prevent and control hypertension. Epidemiological and experimental studies have shown that there is a relationship between physical activity and blood-pressure reduction in patients with hypertension.² ³ Understanding of a lack of activity can be done by way of someone not doing physical activity for at least 30 minutes per week.⁴ The report by World Health Organization has claimed that physical inactivity is responsible for 1% of Disability Adjusted Life Years (DALYs) that are lost globally.⁵

Physical inactivity has become a major global health problem, and it is associated with premature death.⁵ In Nigerian study showed that 31.4% of adults with hypertension engaged in low levels of physical activity.⁶ In North Tomohon, Indonesia, 36.6% of the population with hypertension showed only mild levels of physical activity.⁷

Patients with hypertension who do not engage in physical activity may develop poor blood-pressure control, which may lead to additional complications. Several factors cause hypertensive patients to reduce their routine physical activity, such as reduced duration of sleep⁸, Age⁹, gender¹⁰, occupation¹¹, body mass index.¹², stress¹³, and sleep quality.¹⁴

Limited duration of sleep is an important factor underlying the lack of physical activity in hypertensive patients because can causing of sleep problems, such as obstructive sleep apnea that occur in hypertensive patients.¹⁵,¹⁶

Sleep deprivation may lead to increase in sleepiness and reduction in physical activity during the day.⁸

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Physical inactivity in hypertensive patients can cause several complications. This study aimed to determine whether there is a relationship between sleep duration and physical activity in hypertensive patients.

**Material and Method**

This study was performed on cross-sectional data obtained from a group of hypertension respondents. This research was performed in May until July 2017. Physical activity was chosen as the dependent variable, whereas sleep duration and other potential risk factors including age, gender, occupation, body mass index, stress, and sleep quality were chosen as independent variables. A purposive sampling approach in the study, by which 97 respondents who met the following inclusion criteria were selected: hypertensive patients aged 30–65 years registered as participants in the Program Penanggulangan Penyakit Kronis (Prolanis) or Chronic Disease Program and Pos Pelayanan Terpadu (Posbindu) or an integrated health service programme.

The instruments used in this study: BMI was calculated based on measurements of the patient’s weight and height (categorized as overweight BMI score ≥25 kg/m² or normal BMI score <25 kg/m²). Level of physical activity was measured using the WHO Global Physical Activity Questionnaire (categorized as “less active” <600 MET/min or “active” ≥600 MET/min). Sleep duration and sleep quality were measured using Pittsburgh Sleep Quality Index: sleep duration categorized as “unfulfilled” (<7 h) or “fulfilled” (≥7 h) and sleep quality categorized as “bad” (score, ≥5) or “good” (score, <5). Stress were measured by the Perceived Stress Scale (Categorized as “stress” ratio score ≥13 or “no stress” ratio stress <13). Age categorized as “late-age adult” (45–64 years) or “middle-age adult” (25–44 years). Gender categorized as “female” or “male”. Occupation categorized as “employed” or “unemployed.”

**Findings:** The characteristics of respondents in this study are shown in Table 1. Based on the results of bivariate analysis (Table 2), the incidence of “late adulthood” hypertension has a risk of 3.77 times for physical activity “less active” (value p < 0.05).

**Discussion**

The results showed that 32% of our hypertensive patients had less active. Regular physical activity may reduce the risk of coronary heart disease and stroke, diabetes, hypertension, colon cancer, and depression. In addition, it may reduce the occurrence of complications in patients with hypertension. Physical activity with WHO recommend that individuals are regarded as physically active when their physical activity is at least 600 MET/week.

In this study was found that someone who is less active is found in people who have sufficient sleep by 34.8%. Petterson et al.\textsuperscript{18,19} has said that who found that individuals with a long duration of sleep tend to be lacking in physical activity. This may have something to do with the fact that some people have irregular sleep patterns that can affect their daily sleep.

In this study was found that “less active” levels of physical activity were found more often in “late-aged” hypertensive patients (37.3%). This was supported by a significant relationship between age and physical activity that Late-aged hypertensive patients has a 3.77 times higher chance of having a “less active” physical activity levels. This observation is in line with the outcome of a study by Gómez-Cabello et al.\textsuperscript{20} has said that physical activity decreases substantially with age.

Physical function refers to the strength of muscles that reaches its peak at ages between 25 and 35 years, slightly decreases between 40-49 years, and significantly declines at ages of 50 years and above. Ageing will complicate physical activity due to a declined physical condition and the emergence of illnesses also associated with a decrease in physical capacity as experienced subjectively by individuals, which also tends to decrease physical activity levels.\textsuperscript{21} Sarkisian et al.\textsuperscript{22} has said that there was a relationship was found between age and physical activity because individuals heighten their life expectancy when engaging in regular physical activity.

In this study, no significant difference was found between genders on physical activity. This is consistent with results reported by Finkelstein et al.\textsuperscript{23} and Touvier et al.\textsuperscript{24} have said that there was no relationship between gender and physical activity. Although this was found in the present study, a larger proportion of women were found to engage in mild physical activity (32.9%) than men (25%). This confirms the outcome of the study by Azevedo et al.\textsuperscript{25} has said that women showed lower physical activity than men, that age 20 years and older.

Furthermore, we found that 33.3% of respondents who were unemployed had a “less active” level of physical activity. The reason for this may be that...
individuals who do not work or have retired do no longer engage in physical activities related to work, such as commuting. This is in contrast to observations by both Shaw and Spokane\textsuperscript{26} and Finkelstein et al\textsuperscript{23} have said that there exists a relationship between work and physical activity. Individuals who do not work are more likely to spend time at home performing sedentary activities such as watching television, sitting, lying, playing cards, and reading.

In the results of bivariate analysis using chi-square tests showed no significant relationship between body mass index and physical activity level. In our study, a “less active” physical activity level was found in 35.1\% of individuals belonging to the normal nutritional status group. This confirms the findings of Ingledew and Sullivan\textsuperscript{27} and Jensen and Steele\textsuperscript{28} have said that individuals who consider themselves to be overweight tend to perform physical activities regularly to lose weight compared to individuals who do not.

In this study show that the proportion of respondents with “less active” physical activity levels who were not stressed was 32.1\%. This is not in line with previous studies, indicating that stress can interfere with a person’s capacity to engage in physical activity because of stress-related impact on brain functioning, which may negatively affect the overall physical condition. Short or long sleep duration may have multiple endocrine-related effects, including increases in blood levels of stress hormones such as catecholamines and cortisol. Increased levels of stress hormones may interfere with the brain’s efforts to cope with stressful situations and render individuals less motivated to engage in physical activity.

Although no significant relationships were found between the quality of sleep and physical activity. Less active were found in 33.3\% of respondents with poor sleep quality. This confirms the results from studies by Lee et al\textsuperscript{4} and Chang and Chen\textsuperscript{29} have said that individuals who experience poor sleep quality show decreases in regular physical activity. A possible reason for this finding is that poor sleep quality may cause decreases in limiting physical activity during the day, cumulative effects on energy levels like eating to much food or uncontrolled to eat food, and perturbing emotional regulation.\textsuperscript{30} The discomfort experienced by individuals as a consequence of poor-quality sleep may also cause persons to lose their ability to maintain healthy behavior.\textsuperscript{31}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Amount</th>
<th>Percentage</th>
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<tbody>
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<td>Physical Activity</td>
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<tr>
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<td>47.4</td>
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<td></td>
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<td>Gender</td>
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<td>Good</td>
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Table 1: Characteristics of Respondents for Hypertension in Puskesmas Tegal Gundil in 2017

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Active</th>
<th>Total</th>
<th>OR (95% CI)</th>
<th>p value</th>
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<td>Sleep Duration</td>
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<td></td>
<td></td>
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<tr>
<td>Age</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Late-age adult</td>
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<td>37.3</td>
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<tr>
<td>Middle-age adult</td>
<td>3</td>
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<td>19</td>
<td>86.4</td>
<td>22</td>
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### Table

<table>
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<th>Variable</th>
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<th>OR (95% CI)</th>
<th>p value</th>
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<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
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<td>24</td>
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<td>Stress</td>
<td></td>
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</tr>
<tr>
<td>Stress</td>
<td>22</td>
<td>31.9</td>
<td>47</td>
<td>68.1</td>
<td>69</td>
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<tr>
<td>No stress</td>
<td>9</td>
<td>32.1</td>
<td>19</td>
<td>67.9</td>
<td>28</td>
</tr>
<tr>
<td>Sleep Quality</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bad</td>
<td>15</td>
<td>33.3</td>
<td>30</td>
<td>66.7</td>
<td>45</td>
</tr>
<tr>
<td>Good</td>
<td>16</td>
<td>30.8</td>
<td>36</td>
<td>69.2</td>
<td>52</td>
</tr>
</tbody>
</table>

*Note: *value $p < 0.05

## Conclusion

The observed prevalence of “less active” levels of physical activity in hypertensive patients at Puskesmas Tegal Gundil was observed to be 32%. Hypertensive patients aged between 45 and 64 years showed a lower level of physical activity. This suggests the usefulness of the Puskesmas especially Prolanis and Posbindu to stimulate exercise by 30-minutesessions with gymnastic exercises two to three times per week.

### Conflict of Interest:
Both authors of this manuscript declare that they have no conflicts of interest.

### Source of Funding:
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### Ethical Clearance:
Ethical approval for the study protocol was obtained from the Ethics Commission for Research and Public health Service, Public Health Faculty, Universitas Indonesia (2/3/UN2.F10/PPM.00.02/2017).

## References

The Study of Eat-Fostering Behavior and Nutritional Status of Children Under Five in Cikarawang Village, Bogor

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¹Master Student, ²Department of Community Nutrition, Bogor Agricultural University, ³Department of Community Nutrition, Bogor Agricultural University, ⁴Department of Central of Agro Industry Technology, Indonesia

Abstract

Children are what every family is longing for. All families expect their children to grow up optimally and healthily for both their mental and physical so that they will be able to perform their daily life excellently and become the reliable human resource for the nation. As the nation’s asset, children need to get a proper attention since in the womb until reaching adult age. The objective of this study was to analyze the correlation between parenting (especially eat-fostering behavior) and the children’s nutritional status in Cikarawang Village, Bogor. This was a cross sectional study. The subject of this study was children with the age that ranges between 12-59 months. The data regarding the subject’s characteristic and socio-cultural characteristic were obtained from an interview with the toddler’s mom. Anthropometry data including body weight and body height were obtained by directly measuring the subjects. The data regarding eat-fostering behavior were obtained from interview using questionnaire. The proportion of children with malnutrition and good nutrition was 40% and 50%. There was no correlation between eat-fostering behavior and mother’s education, with p>0.05.

Keywords: Nutritional status, eat-fostering behavior, mother’s education.

Introduction

The advancement of a country is highly related to its human resource quality, while human resource quality of a country is reflected from the country’s health level. The health level describes individual, group, or society’s health condition which is reflected from Life Expectancy Index, mortality, morbidity, and nutritional status of children under five. Children are precious subject for a family. All families expect their children to grow up optimally and healthily for both their physical and mental so that they will be a qualified human resource for the country. As the nation’s asset, children need to receive attention since in the womb until they reach adult age.(¹)

The factors that affect children’s nutritional status are categorized as direct factors and indirect factors. Direct factors include food adequacy and children’s health. Meanwhile, indirect factors include family’s food security, nursing of mother and child, and environment’s sanitation. Generally, a child’s major need is food. Food highly affect children’s growth. Food adequacy is needed for the children to grow up in accordance to their genetic ability. Children’s basic needs to help them grow are categorized into three things, they are asah, asih, asuh (teach, love, care for).(²) Physical growth is often used as a measurement of children’s nutritional status for both individual and population. Parent’s role is an important focus in the effort of nurturing children’s nutritional status.(³)

Based on the data of Riskesdas 2013, the prevalence of underweight, stunting, and wasting in West Java and Bogor regency was considered high. The prevalence of underweight in West Java was 15.7% which consists of 4.4% malnutrition and 11.3% undernutrition, while stunting was 35.3% and wasting was 10.9%. The prevalence number of underweight in Bogor Regency was 14.3% which consists of 1.6% malnutrition and 12.7% undernutrition. From the mentioned data, it can be concluded that the prevalence of undernutrition in Bogor Regency was higher than in West Java. Besides that, the prevalence of stunting in Bogor Regency was 28.3% and wasting was 5%. According to the Riskesdas
in West Java and Bogor Regency, the prevalence of undernutrition and stunting was higher for 12-59 months children than for 0-11 months children.\(^{(4)}\)

Parenting (fostering behavior) is an attitude and behavior of the parents in their interaction with their children. These attitudes and behaviors are able to be observed from parents’ way to discipline their children, to foster their children’s emotion, and to control them. To educate basically means a real effort of the parents to evolve the total potential of their children. The children’s future is highly affected by their experiences, including their parents’ way to foster them.\(^{(5)}\)

The children in rural area tend to have poorer nutritional status compared to the children who live in the urban area. A research regarding eat-fostering behavior for children under five found that 57.1\% children under five in rural and urban area suffered undernutrition. However, according to the other research regarding Positive Deviance of the children’s nutritional status, the children from low-income family that possess a good eat-fostering behavior actually had an ability to optimize their nutritional status.\(^{(6,7)}\)

The role of a mother is considered very important to the growth of the children. According to the previous studies, there were several conclusion regarding this notion. First, there were correlations between mother’s eat-fostering behavior and the children’s nutritional status. Second, eat-fostering behavior held an important role on the children’s growth disorder. Third, parenting affected children’s growth through food adequacy and health condition.\(^{(8)}\) Therefore, this study aims to analyze the correlation between mother’s eat fostering behavior and the children’s nutritional status in Cikarawang Village, Bogor.

**Methodology**

The design of this study was cross sectional study. The subject of the study was children under five (12-59 months). This study was conducted from January 2018 to April 2018. Data processing, analysis, and interpretation were conducted in the Department of Community Nutrition, Faculty of Human Ecology, Bogor Agricultural University. The sampling technique that was used in this study was purposive sampling in accordance to these criteria: a complete family, having a child under five, and willing to be involved in the study as a respondent. The sample number was determined using a particular formula.\(^{(9)}\) The data that were used in this study was primary data. These primary data that were collected consist of the children’s body weight, the children’s body height, the mother’s eat-fostering behavior, the mother’s knowledge regarding nutrition. Anthropometry data which include body weight and body height were obtained from a direct measurement. The data regarding the mother’s eat-fostering behavior were obtained from interview using questionnaires. This research study had passed ethical review number 130/IT3.KEPMSM-IPB/SK/2018.

**Results and Discussion**

<table>
<thead>
<tr>
<th>Children’s Nutritional Status</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undernutrition</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>Good Nutrition</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on Table 1, the percentage of children having ‘good nutrition’ status based on surpassed half the total number and reached 60\%. This result indicated that the nutritional status of children under five in Cikarawang Village was considered good. Body weight is one of the parameters that describe the current or past body mass. The status of ‘good nutrition’ is able to be achieved if someone’s body receives enough essential nutrition substance.\(^{(9)}\) However, the percentage of children with undernutrition in Cikarawang Village was higher than in West Java and Bogor Regency which were 11.3\% and 12.7\%.\(^{(4)}\) This means that the problem of undernutrition is still an important concern for Cikarawang Village, Bogor Regency. The result of this study was consistent with the study that was done by Rona in 2016. The mentioned research study resulted 36\% children with undernutrition. If the data of this study and Rona’s study are merged, the percentage of undernutrition status will be higher.\(^{(10)}\) The study stated a possible correlation between children’s nutritional status and their mother’s education level. When the study was conducted, 62.5\% of children’s mother possessed a low education level. The stages of formal education in Indonesia based on Indonesian Republic Government Act No 66 the year of 2010 are divided into elementary education, middle stage education (middle school and high school) and higher education (college education including diploma, bachelor, master, and doctorate). The result of this
study revealed that most respondents (mother’s child) possess an elementary school certificate only. Their percentage was 28.5%. However, the research study of Fardhiasih stated that there was no correlation between nutritional status and mother’s education level since the information technology is getting advanced nowadays. The advancement of information technology makes it easy for mothers to access information from various media including information regarding nutrition and parenting.\(^{(11)}\)

The next factor that affects children’s nutritional status in this research study was income of the family. All family’s income of the respondents was earned by the fathers. All of the mothers (100%) were housewives. Most of the fathers worked as non-agricultural laborer, the percentage was 57.5 %. However, the research study of Fardhiasih stated that there was no correlation between family’s income and children’s nutritional status since under-standard income families were still considered able to afford normal food that contains nutrition which is needed by the body.\(^{(11)}\) Meanwhile, the other research study stated that there was a correlation between family income and children’s nutritional status.\(^{(12-13)}\) This means, low-income led to the low ability to afford food which contains adequate nutrition. The low quantity of food consumption also led to the risk of infection diseases and eventually caused a low level of nutrition in the body.\(^{(14)}\)

<table>
<thead>
<tr>
<th>Table 2: The Correlation Between Mother’s Education and Eating Behavior of Children Under Five in Cikarawang Village, Bogor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat-Fostering Behavior</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Less good</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Based on Table 2, eat-fostering behavior that was considered good was performed by mothers that did not go to school (32.5%). According to the statistic test, there was no meaningful correlation between eat-fostering behavior and mother’s education with p-value p>0.05. Eat-fostering behavior is the practice of fostering which is applied by a mother to her children regarding children’s dietary and eating behavior in order to give adequate nutrition for the children.\(^{(15)}\) Eat-fostering behavior in Cikarawang Village was considered less good (55%), however, the mothers possess a considerably good knowledge (55%) regarding children’s dietary and nutrition because of the technology advancement that helps them in accessing useful informations. Besides that, the help of kaderposyandu—people that are trained to help families in raising their children according to the government’s program—which diligently shares their knowledge to the mothers regarding children’s dietary and nutrition. Based on the literature, the higher the education level of someone, the easier they understand given information. The easier they understand the information, the easier they implement the concept into their practice. Therefore, a mother’s education level will eventually affect the mother’s behavior and attitude in facing the matter of children’s dietary and nutrition.\(^{(16)}\)

The study that was done by Erny in 2012 stated that statistically there was a significant difference in parent’s education level between normal children and children with stunting p>0.05. Parent’s education level highly affect their parenting behavior since the higher education led to a better understanding on the importance of parents’ role for their children’s growth. The parents which possess a higher education level are expected to have a good knowledge regarding children’s dietary and nutrition, and they will eventually understand the proper way to process foods and to manage the children’s behavior so that the children receive adequate nutrition. The knowledge of nutrition means the ability of mothers to arrange the daily dish, and to process various foods that are needed by their children.

**Conclusion and Recommendation**

Based on the research study that was conducted in Cikarawang Village, Bogor Regency, there was still undernutrition case which took 40% of the total respondents. There was no overnutrition case that was found in the village. Eat-fostering behavior of the parents. Eat-fostering behavior in the Cikarawang Village, Bogor Regency was considered less good (55%), however, the mothers have a considerably good knowledge 55%. There was no correlation between the mother’s education level and eat-fostering behavior (p>0.05). Most of the mothers did not go to school for their formal education, however, they have adequate information regarding children’s dietary and nutrition with the help of technological advancement. A further research study regarding this topic is encouraged to be conducted. For instance, the support of fathers and
psychosocial parenting on the growth monitoring of the children under two, and the research regarding pre-post positive deviance especially the issues of status through the increase of women’s knowledge and women’s empowerment for the optimal growth of children under two by conducting several training events.

Acknowledgement: The research was fully supported by the Bogor Agricultural Institute with the sources of Funding is Indonesian Ministry of Education and Culture.

Conflict of Interest: All authors declared no conflict of interest within this study.

Ethical Clearance: This research has obtained Ethical Approval from the Human Ethics Committee of Bogor Agricultural University 130/IT3.KEPMSM-IPB/SK/2018

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The Correlation IUDs Use Duration and Types of IUDs with Blood Curprum (Cu) Levels in Women with IUD Contraception: A Cross-Sectional Study

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¹Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, Kampus C, Surabaya

Abstract
An increase in population, especially in developing countries can have a negative impact if it is not balanced with the welfare of the population. Therefore, Indonesia provides a policy to use contraceptive devices for the population. One contraception used is an IUDs. The concept of the IUD itself has reportedly had a negative impact, especially increasing colonization by Candida spp. due to the content of Curprum (Cu) from the IUD. The purpose of this study was to analyze the relationship between duration of use and type of IUD at blood Cu levels in female workers using an IUD contraception. This research has never been done in Indonesia. The results showed that the majority of respondents used the Copper T type IUD, having an age range between 36-49 years with an average duration of IUD usage of 7.1-7.5 years with a mean value of Cu levels that exceeded the normal cuprum values allowed in the body. The IUD type variable has a moderate correlation between the levels of cuprum in the blood of workers (p = 0.435). The old variable using the IUD has a strong correlation with the cuprum levels in the blood of the respondents (p = 0.74). Conclusion: The type of IUD and the duration of use of the IUD have a relationship with levels of Cu in the blood. Women who use an IUD are expected to consume foods that have a high content of antioxidants to reduce levels of Cu in the blood.

Keywords: Copper T, Curprum (CU), IUD, Lippesloop.

Introduction
In ten years, Indonesia’s population increased rapidly by 32.5 million from 205.1 million in 2000 to 237.6 million in 2010¹-². In balancing population growth very quickly, the government has always tried to suppress population growth through the Family Planning Program (KB) to play an active role in creating the welfare of the Indonesian population².

An IUD (Intra-Uterine Device) is a small object of flexible plastic, most of which have copper coils (Copper, Curprum, Cu), but some are not metallic, some have hormones³. The actual mechanism of this IUD tool is unknown. One theory says that the device can increase the fallopian tube peristalsis which makes the fertilized ovum enter the uterus in a condition that is not sufficiently developed so that it cannot properly implant.⁴

Side effects from the use of injectable hormonal birth control method are erratic bleeding, the occurrence of amenorrhea, increased body weight, headache, pregnancy may still occur by 0.7%, sporting, metrorrhagia, vaginal discharge and hematoma. Based on another research, a history of mothers using a combination of progesterone estrogen contraception has a risk of cervical cancer 17,875 times compared to women who do not use progesterone estrogen combination contraception⁵. The results of Sipra Bagchi’s research showed that
33% of users of IUDs with 33.7% Cu were abnormal in cervical cytology. Another results of research show colonization by Candida spp. and mycoplasmic infection was diagnosed significantly more frequently after one year of use of Cu-IUD than at the start. During the study period, women who used Cu-IUD complained significantly more often experienced vaginal discharge, pelvic pain, and increased menstrual flow.

This research has never existed before in Indonesia. Therefore, it is necessary to conduct a study on the correlation of the use of IUDs with Cu levels in the blood of female workers in the University of X’s Public Health Faculty as the main form of preventive prevention of effects on IUD use.

Materials and Method

The population subjects were all 10 Intra Uterine Device acceptors at the University X Faculty of Public Health. Samples are objects that are studied and are considered to represent the entire population. The sampling technique in this study is a total population of 10 people.

This study used an observational type with cross-sectional design. This research was conducted at the Faculty of Public Health, University of X. The research was conducted in December 2017 until April 2018. Prior to the study, respondents were given informed consent and guidance on the procedures for the study was conducted for 10 minutes before the study began. After the respondent gets an explanation of the research that will be conducted, respondents who agree to be involved in this research are expected to fill in the consent sheet to be the research respondent who was signed by the respondent. Next, the respondent is registered and takes the measurement queue number. This research has received ethical approval from the Ethics Committee of the Public Health Faculty of Airlangga University with ethics number 136-KEPK.

Subjects will be conducted the in-depth interview by using structured interviews with questions in the form of age, type of IUD, duration of IUD usage. The subjects will also be measured Cu levels in the blood by taking blood samples. Initially, blood veins were taken in one cubic vein of 2-3 cc using a syringe, then blood mixed with anti-coagulant so as not to thicken, after blood enters the tube until the desired volume, the needle is ready to be extracted and the blood sample is then examined using tool photometry.

Data analysis was performed using the Spearman correlation test and Pearson correlation test with SPSS Inc version 21. The classification of the correlation coefficient interpretation is as follows.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Coefficient</th>
<th>Interpretasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation (r)</td>
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<td>Very Weak</td>
</tr>
<tr>
<td></td>
<td>0.20-0.399</td>
<td>Weak</td>
</tr>
<tr>
<td></td>
<td>0.40-0.599</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>0.60-0.799</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>0.80-1.00</td>
<td>Very strong</td>
</tr>
</tbody>
</table>

Source: Sugiyono (2010)

Result

Figure 1. Distribution of Mean, Standard Deviation, Minimum-Maximum Value at Age, Duration of Use and Cu Level based on Types of IUDs

Source: Primary Data, 2018
Most of the respondents (80%) used Copper T IUDs. Respondents who used Copper-T type IUDs were 38 years old on average, respondents who used the Lippesloop type IUD were 39 years on average. The average respondent who used a Copper T IUD had an IUD usage period of 7.1 years and 7.5 years for a Lippesloop type IUD. All Cuprum blood serum levels in the respondents are in the abnormal category (normal = 0.7-0.12 g/dl).

The correlation coefficient between age and Cu content of 0.178. This can be interpreted that age has a very weak correlation with the blood cuprum levels of workers. The average respondents using Copper T IUDs have a cuprum content of 3.54 g/dl. While the average respondent using the Lippesloop type IUD has a cuprum level of 2.952 g/dl. The type of IUD also has a moderate correlation with the blood serum levels of workers (p = 0.435). The average respondents who used an IUD for 1-4 years had a cuprum level of 3.693 g/dl. The average respondent who uses an IUD for 5-8 years has a cuprum level of 3.187 g/dl. The average respondent who uses an IUD for 9-12 years has a cuprum level of 3.116 g/dl. The duration of use of the IUD has a strong correlation with the blood serum levels of workers (p = 0.74).

**Discussion**

Most of the respondents (80%) used an IUD with the type of Copper T. Copper T type IUDs are made of polyethylene and in the vertical part are given fine copper wire windings. Lippes Loop is made of polyethylene, the shape is like a spiral or a continuous S letter. The results showed that the highest Cuprum levels in the respondent’s blood were found in respondents who used Copper T IUDs of 4.298 g/dl. The results of the examination showed that Cuprum levels in the blood were above normal. This shows that all types of IUDs, either Copper T or Lippesloop, have the same risk for exposure to Cuprum metal, even though the Lippesloop IUD does not contain copper. Metal toxicity in humans is influenced by several factors, namely the dose/metal content that enters, length of exposure, age, gender, eating habits of certain foods, physical conditions, the ability of body tissues to accumulate metals. The presence of Cuprum levels in respondents who use the
Lippesloop IUD is possible from eating certain foods containing cuprum.

The average age of respondents using IUD copper T is 38.12 years, with the youngest age 29 years while the oldest age is 49 years. The average age of respondents using the Lippesloop IUD was 39.5 years with the youngest age 36 years and the oldest age 43 years. Based on the table data shows that cuprum exposure can occur in all age groups. At a younger age, it is more risky because it is seen from the results of the study showing that the increasing age of the respondent, the percentage of the cuprum in the blood above normal, the smaller This can be caused by increasing age the resistance of certain organs is reduced to the effects of cuprum. The older a person is, the higher the concentration of the cuprum accumulates in the body tissues, because increasing age means that the cuprum toxicokinetics decreases.

The average length of use of copper T IUD is 7.1 years with the largest usage time is 12 years and the smallest is 1 year. The average use of the Lippesloop IUD is 7.5 years with the largest duration of use which is 11 years and the smallest is 4 years. Metal toxicity in humans is influenced by several factors, namely the dose/metal content that enters, length of exposure, age, gender, eating habits of certain foods, physical conditions, the ability of body tissues to accumulate metals\textsuperscript{10}. Copper plays an important role in the homeostatic mechanism in the human body, but excessive exposure can cause harmful effects on health. Copper exposure to the body can cause damage to fat, DNA and protein\textsuperscript{11}. Levels of Cuprum of blood for all workers exceed the standard levels of cuprum allowed. The duration of IUD use has a strong correlation with the blood levels of the cuprum in the respondent's negative direction. Therefore, it is recommended for respondents, especially with the average IUD usage of 7.1-7.5 years to increase consumption of foods containing high glutathione and low levels of copper (antioxidants), for example asparagus, broccoli, tomatoes, grapes, peas, especially in initial installation of Copper T type IUDs that can reduce the risk of negative effects on the IUD.

Ethical Clearance: Taken from Ethics Committee of the Public Health Faculty of Airlangga University with ethics number 136-KEPK.

Source of Funding: This is an article “The Correlation IUDs Use Duration and Types of IUDs with Blood Cuprum (Cu) Levels in Women with IUD Contraception: A Cross-Sectional Study” was supported by Faculty of Public Health, Airlangga University, Indonesia, 2018.

Acknowledgment: Appreciation and thanks to Wulan Meidikayanti and Fathimatul Tualeka for editing this article.

Conflict of Interest: All authors have no conflicts of interest to declare.

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Feasibility Study Development of Hemodialysis Services in Sidoarjo Hospital

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Abstract

Hemodialysis services must be owned by hospitals to handle cases of patients with increasing kidney disease. This study aims to conduct a feasibility study on the development of hemodialysis services in Sidoarjo hospital. This study assesses the feasibility of developing hemodialysis services based on aspects of needs, feasibility of development and financing. We took demographic data and internal data from hospital management and Hemodialysis Installation. The study found that from the aspect of need, hemodialysis services are needed in Sidoarjo hospital, and from the feasibility aspects of development based on the needs of building land, facilities, human resources and equipment, Sidoarjo hospital can fulfill these needs. But from the aspect of financing, considering the highest number of patients are Board of Health Insurance, so the income for Sidoarjo hospital is very small and very difficult to achieve profits.

Keywords: Hemodialysis Services, Needs, Feasibility, Financing.

Introduction

Kidney disease is a degenerative disease and has various types such as Glomerulonephritis, Kidney Amyloidosis, Diabetic Kidney Disease, Renal Vascularity, Urinary Tract Stones, Tubulointerstitial Diseases, Urinary Tract Infection, Chronic Kidney Disease, Acute Kidney Failure and many more. Kidney failure is grouped into two broad categories: (1) acute kidney failure, where the whole or almost the entire work of the kidney is suddenly interrupted but eventually can improve again as usual, and (2) chronic kidney failure, also known as CKD (Chronic Kidney Disease), where the kidney progressively loses its nephron function one by one gradually until all of its kidney function decreases/is damaged.

Handling of kidney disease can be done in various ways, starting from controlling blood pressure, diet regulation, pharmacological therapy, fluid and electrolyte restriction, to kidney replacement therapy (Renal Replacement Therapy) which can be in the form of hemodialysis, peritoneal dialysis or kidney transplantation. Patients with stage 5/ESRD (End Stage Renal Disease)/terminal stage kidney disease/terminal renal failure (GGT) require kidney replacement therapy (Renal Replacement Therapy), one of which is hemodialysis (HD), where the number of patients currently in need Hemodialysis is increasingly increasing in number and of course requires a lot of medical expenses.

Based on data from the World Health, it is said that worldwide the number of people receiving renal replacement therapy is estimated at more than 1.4 million, with an incidence of about 8% per year. Indonesia is one of the countries with high rates of kidney failure, according to the Indonesian Nephrology Association (PERNEFRI) in the Report of the Indonesian Renal Registry, in 2012 there were 16,040 patients with kidney failure. Reported in 2012 only 9,161 patients were active in hemodialysis activities. In Jakarta alone, there were 1,192 hemodialysis patients with various diagnoses of major diseases.

Hospital is a health service institution for the community with its own characteristics that are influenced by the development of health science, technological advances, and the socio-economic life of the people who are still able to improve services that are more quality and affordable by the community in order to realize high health. Sidoarjo hospital is a type B education hospital which is a hospital owned by the Sidoarjo government. Increasing competition in the service sector at this time, makes Sidoarjo hospital must be able to maintain its
existence in this era of competition, without neglecting the quality and safety of patients in the hospital.8,9

One of the areas in the hospital that is a priority in the effort to improve the quality of service in the hospital is hemodialysis services that have increased the number of patients in recent years10. The number of kidney failure patients each year has increased by about 15%. Cases of kidney failure in patients who seek treatment and require the most hemodialysis due to diabetes cases are around 33%, and increase from year to year. The availability of hemodialysis machines in Sidoarjo hospital as many as 19 machines was felt to be still lacking, so that a number of hemodialysis machines had been added up to now reaching 23 hemodialysis machines. However, the availability of hemodialysis machines is still insufficient11.

In Sidoarjo, there are 4 hospitals that have hemodialysis services, namely Sidoarjo hospital with 23 units, Mitra Waru hospital with 4 units, Delta Surya hospital with 4 units, Siti Khodijah hospital with 4 units and Siti Hajar Sidoarjo hospital with 10 units. According to data at Siti Hajar Sidoarjo hospital, every month there are 3-5 additional cases for dialysis. While in Sidoarjo Hospital, there are still many patients who cannot be served for hemodialysis, one of them because of the limited number of HD units. More than 400 patients with Chronic Kidney Disease undergo hemodialysis at the Sidoarjo hospital at present. Because of the excessive number of patients with Chronic Kidney Disease, they are forced to queue to get hemodialysis services. Because, the number of hemodialysis machines in Sidoarjo Hospital is very limited to only 23 machines. Therefore, hemodialysis services at the hospital are divided into three shifts. In the morning shift, service starts at 6:30 a.m. to 11:00 p.m. The afternoon shift starts at 12:00 until 16:00 and the afternoon shift starts at 17:00 to 20:00. Within a day, the average number of dialysis patients reaches 69-70 people. Seeing these conditions, Sidoarjo hospital was moved to plan the construction of buildings for hemodialysis, with the addition of hemodialysis units reaching 50 units in 2018 and 100 units in 201912,13.

In accordance with the need to develop a Hemodialysis unit with the planning of adding a hemodialysis machine in Sidoarjo hospital, a comprehensive analysis of all matters related to the feasibility study or Feasibility Study is needed. This study aims to conduct a feasibility study on the development of hemodialysis services at Sidoarjo hospital.

Method

Starting from general data collection including geographic data, demographic data and morbidity data in Sidoarjo, the team also began taking internal hospital data and the productivity of hemodialysis services. From the general data and internal data, then an analysis is conducted to find out the need for the development of hemodialysis services at Sidoarjo hospital through forecasting calculations. Forecasting calculations are carried out based on the normative needs of hemodialysis. The team also collected special data on hemodialysis installations covering data on land, buildings, infrastructure, human resources and equipment. Furthermore, the special data is carried out a feasibility analysis by comparing the hemodialysis service standards with real conditions. The team also conducted an analysis of internal factors, especially regarding the quality of hemodialysis installation services at the Sidoarjo hospital at present. From the analysis data, the team can analyze the feasibility of developing hemodialysis services at Sidoarjo hospital.

Result and Discussion

Hemodialysis Service Needs in Hospital: Based on the geographic data description that Sidoarjo hospital is in the center of Sidoarjo area. Sidoarjo hospital is a place of reference for hospitals and health centers in the surrounding area. Among other things is the Krian, Mojokerto, Pasuruan, Bangil area. As well as based on demographic data from Sidoarjo population which is associated with an estimated prevalence of chronic kidney failure of 0.2%, the increasing number of patients who need hemodialysis will also increase. Besides that, the higher the awareness of the population towards health and the high number of patients who use facilities of national health insurance, there are data on the increasing number of hemodialysis patients with facilities of Board of Health Insurance.

Data in 2014 showed that end stage Renal Disease (ESRD) was in 4th place out of the top 10 diseases in Sidoarjo District Hospital. In the following year, 2015 and 2016 stated that End Stage Renal Disease (ESRD) disease had increased so that it was ranked 3rd in the 10 most diagnosed inpatients in Sidoarjo Hospital. This shows the higher cases of kidney failure treated in Sidoarjo hospital. With the description of the increasing number of kidney failure patients in Sidoarjo Hospital comparable to the increasing number of patients who require hemodialysis services.
Data on mortality of kidney failure patients in Sidoarjo hospital from 2014 to 2016 has decreased. This shows the success of the national health insurance program so that people can perform hemodialysis services regularly to maintain their health. This is in accordance with the description of the increasing number of active patients who need hemodialysis services\(^1\).

Based on the analysis of hemodialysis service needs according to geography, demography, socio-economic, mortality and morbidity in Sidoarjo, Sidoarjo hospital is feasible to develop hemodialysis services.

Based on forecasting calculations, it was found that up to 2027 it is estimated that the number of regular hemodialysis patients is 574 patients with a normative assumption so it is predicted that hemodialysis in 2027 with the highest estimate of 59,727 actions. Thus, a machine and bed are needed with the highest estimate of 103 in 2027. This includes the need for infectious patients as much as 3 machines.

Based on the hours of hemodialysis services at Sidoarjo hospital currently divided into 3 sessions a day, the need for hemodialysis services is very high. In accordance with the organizational consensus to ensure maximum or adequate results, the duration of hemodialysis is 5 hours. For the final results that are in line with expectations, a number of hemodialysis machines are needed. By using aspects of internal needs, it can be concluded that Sidoarjo hospital is feasible to develop hemodialysis services for 103 machines and bed.

Feasibility of Hemodialysis Service Needs at Sidoarjo Hospital: Based on the analysis of the feasibility of building land, it can be concluded that in general the building land for current services with a capacity of 23 machines and TT is still considered to be less in accordance with the standards. To meet national standards, Sidoarjo hospital needs to add land and buildings. In accordance with the management plan of Sidoarjo hospital, it has prepared a land area of 1700 m\(^2\), it can be stated that the Sidoarjo hospital is feasible to carry out development to meet the current normative needs, even the land area is feasible to develop up to 103 HD, bed, and machines.

Based on the analysis of infrastructure feasibility, it can be concluded that in general the infrastructure for hemodialysis services currently with a capacity of 23 machines and bed still has some that do not meet the standards. To fulfill the national standards, Sidoarjo hospital needs to add additional infrastructure, including integrated management information system, communication system for external telephone. In addition, it is also necessary to improve the quality of hemodialysis services through assessment of quality indicators. There are several quality indicators in hemodialysis installation, but there are still some indicators that have not reached the standard. Sidoarjo hospital management is committed to improving service quality in the development of hemodialysis services, in this case Sidoarjo hospital can develop hemodialysis services up to 103 machines\(^1\).

Based on the analysis of the feasibility of human resources, it can be concluded that in general for hemodialysis services at present with a capacity of 23 machines and bed is in accordance with national standards. Thus if the human resource needs have met the requirements according to current normative needs, Sidoarjo hospital is worthy of developing hemodialysis services for up to 103 machines.

Based on the analysis of equipment and medicine feasibility, it can be concluded that in general for hemodialysis services at present with a capacity of 23 machines and bed is in accordance with national standards. There is still a need to add some emergency equipment and emergency medicine. Thus if the equipment and drug needs have met the requirements according to the current normative needs, the Sidoarjo hospital is feasible to develop hemodialysis services for up to 103 machines.

Based on some of the above analysis it can be said that Sidoarjo hospital is currently in accordance with national standards. And it can be concluded that Sidoarjo hospital is feasible to develop hemodialysis services for 103 machines and bed.

Feasibility of Financial Capabilities or Financing: The financing needed for the development of hemodialysis services as investment costs for building land, infrastructure, human resources and equipment amounting to IDR 38,838,158,520. The pure costs derived from the Board of District Public Services will be very difficult with the income value calculated based on INA CBG’s rates, because the majority of hemodialysis patients are patients of Board of Health Insurance.

The financing needed for the development of hemodialysis services as investment costs for building
land, infrastructure, human resources and equipment amounting to Rp. 38,838,158,520. The pure costs derived from the Board of District Public Services will be very difficult with the income value calculated based on INA CBG’s rates, because the majority of hemodialysis patients are patients of Board of Health Insurance.

To achieve financial feasibility, several alternative scenarios are needed to finance hemodialysis services. The amount of investment costs, and the amount of direct and indirect costs in the operation of hemodialysis services are very heavy when compared with the estimated income. Several scenarios for alternative development feasibility calculations are carried out. Starting from calculating building land to calculating direct and indirect costs, such as the cost of distributing medical services, purchasing equipment, and so on. Intensive discussion is needed to obtain efficiency solutions in order to achieve financing feasibility16.

The calculation scenario in this alternative financing scenario 4, seeks to reduce HD services to 10% of HD tariffs, and reduce consumable costs by 10%. From the calculation, there is an NPV of (-) Rp. 16,132,666,320. From these results it can be concluded that the assessment of the development of hemodialysis installation of Sidoarjo Regional Hospital from the financial aspect with an alternative scenario of Financing 4 is still not feasible.

The results of the calculation of alternative financing scenarios can be used to be one of the considerations and evaluations, are current HD rates too low?, or Unit costs, investment costs, and a disproportionate rate of medical services? So that later it is expected that the results of better calculations can generate benefits for the hemodialysis installation of Sidoarjo hospital.

**Conclusion**

The feasibility level can be concluded based on the feasibility analysis and assessment process. Based on the description of the feasibility analysis above illustrates that in terms of the need for hemodialysis services there is clearly a need for, and in terms of the feasibility of development in terms of the needs of building land, facilities, human resources and equipment, it can be concluded that Sidoarjo hospital can meet these needs. But in terms of financing, given the highest number of patients is Board of Health Insurance, so that the income for Sidoarjo hospital is very small and it is very difficult to achieve profits.

**Conflict of Interest:** The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

**Source of Funding:** All sources of funding from author.

**Ethical Clearance:** This study get the ethical approval from ethical committee in Faculty of Public Health, Universitas Airlangga.

**References**

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Prescription Pattern of Antibiotics for Upper Respiratory Tract Infection in Shah Alam, Malaysia

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Abstract

Background: Upper respiratory infection (URTI) is a contagious infection of the upper respiratory tract which includes the nose, pharynx and larynx. Most of these infections are viral in origin yet treated often with antibiotics. Overuse of antibiotics is a worldwide problem. The aim of this study is to evaluate the prescribing pattern of antibiotics in management of URTI among doctors in Shah Alam and to determine the antibiotics most often prescribed for URTI.

Material & Method: A cross sectional study was conducted at two private hospitals and seven clinics in Shah Alam. A total number of 128 doctors participated in this study. The data was collected through well-structured questionnaires. Analysis of data was done by using descriptive statistics.

Result: This study showed few prescriptions for antibiotics in treatment of URTI as most of doctors (89%) did not recommend it. Although the number of cases of URTI diagnosed weekly was high, yet most of them were non-bacterial and did not require any drugs. However, most of the doctors interviewed had not attended clinical antibiotic training though they were well aware of the latest Malaysian Antibiotics Guidelines. Amoxycillin was the most prescribed antibiotic in certain cases of URTI which needed antibiotic prescription.

Conclusion: Most of URTI cases do not require antibiotics for treatment. The prescription pattern of antibiotics in Upper Respiratory Tract Infection showed no difference between the doctors involved in hospitals and clinics.

Keywords: Antibiotics, Upper respiratory tract infection, doctors.

Introduction

Upper Respiratory Tract Infection (URTI) is a contagious infection of our upper respiratory tract which includes the nose, pharynx, larynx, and bronchi. It may manifest as common cold, pharyngitis, laryngitis, epiglottitis, laryngotracheobronchitis (Croup), otitis media and sinusitis. Most of these cases are caused by viruses like rhinovirus, adenovirus, parainfluenza virus, herpes simplex virus, respiratory syncytial virus, Epstein-Barr (EB) virus, influenza virus, Coxackie A virus, coronavirus and cytomegalovirus. Only 10% of these cases are caused by bacteria and warrant antibiotics. The common bacteria causing URTI are Beta-hemolytic streptococci, Pneumococci, Staphylococci, H. influenza, Corynebacterium diphtheria, and Chlamydia trachomatis. Overuse of antibiotics is a worldwide problem. Hence, WHO has used antibiotic prescription for URTI as an indicator for assessing the optimum or overuse of antibiotics. According to WHO report on prescription pattern of antibiotics in developing countries, over the period of 1982-2006, had shown increase in the rate of antibiotic prescription by 71%⁴ and 57%⁵. Antibiotic use in URTI was 85-90% in developing countries like China, India, Thailand and South Africa⁶. This can cause adverse effects, increase healthcare cost and may result in increased resistance to antibiotics. This study was conducted with the aim to evaluate the current trend in prescribing of antibiotics for URTI in Shah Alam, Malaysia.
Material and Method

This is a cross sectional study, conducted on 128 doctors working in two private hospitals and seven clinics in Shah Alamevaluating the prescription pattern concerned with the use of antibiotics in the management of URTI. The convenient sampling technique was used. Medical officers in general medicine, otorhinolaryngology, pediatrics and emergency departments were included in this study. Houseman officer and other hospital staff who are not involved in drug prescription were excluded. Permission was taken from the heads of department of all the hospitals and clinics to conduct the study. Ethical clearance was obtained from the institutional ethical board.

Study tool: A questionnaire was developed after extensive literature search. It was pilot tested on a small group of 10 doctors and revised for ambiguity. The questionnaire included questions on their educational status, experience, status of their training on their antibiotic use, the frequency of treating patients with URTI and attitude towards prescribing antibiotics. A written informed consent was attached to each survey form that was answered by the respondents. A random selection of prescriptions from URTI patients treated in these healthcare institutions were collected to verify the actual prescribing behaviors and compared with the answered questionnaire.

Statistical Analysis: All the data collected was statistically analyzed by using SPSS version.

Result and Analysis

In this study, a total of 128 doctors participated from 2 hospitals and 7 clinics in and around Shah Alam, Malaysia. 62.5% had >5 years of experience in clinical practice while 37.5% had 3-5 years of experience. Most of them (82%) had no special training on use of antibiotics. 114 of the 128 doctors were aware of the latest Malaysian antibiotic guidelines (Table 1).

Table 1: Shows the number of doctors with their experience, clinical training on antibiotic use and familiarity with latest Malaysian Antibiotic Guidelines

<table>
<thead>
<tr>
<th>Working experience</th>
<th>Number of doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–5 years</td>
<td>48 (37.5%)</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>80 (62.5%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have clinical antibiotic training</th>
<th>number of doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>23 (18%)</td>
</tr>
<tr>
<td>No</td>
<td>105 (82%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Familiar with latest Malaysian antibiotics guidelines</th>
<th>number of doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>114 (89%)</td>
</tr>
<tr>
<td>No</td>
<td>14 (11%)</td>
</tr>
</tbody>
</table>

URTI was encountered frequently by our study population. The number of cases of URTI treated by the doctors per day is shown in Figure 1. Fifty-five doctors claimed to see more than 10 cases of URTI per day, while 59 said they saw about >5-10 cases per day. Eight doctors dealt with 1-5 cases while twenty-three treated less than 1 patient of URTI per day.

![Figure 1: No. of URTI cases seen by the study population per day.](image)
**Recommendation for antibiotic use:** In our study, only 14 out of 128 doctors (11%) recommended antibiotics for URTI treatment while the vast majority 114(89%) did not prescribe it. The diagnosis for which antibiotics prescribed were acute tonsillitis, acute sinusitis and otitis media. Among the antibiotics prescribed, the most common drug was of penicillin group (amoxicillin), followed by cephalosporin and macrolides (Figure 2).

![Figure 2: Antibiotics prescribed by the study group.](image)

**Alternative treatment method used in the treatment of URTI:** The doctors in our study group used alternative options to provide symptomatic relief to patients with URTI. Seventeen recommended high dose of vitamin C, forty-three prescribed antihistamines, twenty-five suggested hydration therapy, fifteen traditional remedies while twenty-five recommended rest and allowing self-recovery (Figure 3).

![Figure 3: Alternative treatment method used to treat URTI by study population.](image)
Discussion

In this study, a total of 128 doctors participated. Most of them were expert in the treatment of URTI with 80 having 5 years or more experience, while 48 had about 3-5 years of clinical experience. Due to their vast experience, they were aware of the latest Malaysian National Antibiotics Guidelines (NAG). However, majority of them had never attended any workshop/training on antibiotic use. It is a challenge for clinicians to identify between viral and bacterial infection. Most of the drugs given are aimed to minimize the symptoms and promote effective recovery. In our study, most of the doctors (89%) did not recommend antibiotics for URTI cases with only 11% preferring to use antibiotics in treatment of URTI. An earlier study in primary care settings in Malaysia by Teng et al reported use of antibiotics in 33.8% of URTI cases. In a similar study in India, Kotwani and Holla way reported use of antibiotic in 45% and 57% of uncomplicated URTI cases in public and private hospitals respectively. Similar data was presented in a systematic review from China where 83.7% of patients with URTI were prescribed antibiotics. An alarming 18.4% were prescribed 2 antibiotics while 1.1% got 3 antibiotics. The authors however mentioned about the downward trend in antibiotic prescription in recent years. Mohitosh et.al in Bangladesh too reported URTI to be a common cause for antibiotic prescription. Even in a developed country like France a study on antibiotic use in paediatric age group between 2008-2012 reported an unacceptable higher use of antibiotics.

We have observed a decrease in the prescriptions for antibiotics in our study. This may be attributed to the study being conducted in an urban area with availability of specialist care and the doctors being aware of the antibiotic guidelines. The reasons cited by the respondents for not prescribing antibiotics were to prevent antibiotic resistance among patients, to prevent side effects especially to infants and young children, the type of causative microorganism and the level of severity of the case. Instead of antibiotics, some of the doctors in our study preferred to use alternative method to treat URTI and provide symptomatic relief. Prescription of anti-histamines was the commonest among them. Others included giving high doses of Vitamin C to help boost the immune system, hydration treatment or fluid replacement, anti-inflammatory drugs or suggesting rest as they believed in self-recovery. Similar observation was made by Reshmi et al who also reported the use of symptomatic treatment for patients with URTI.

In our study, there were 14 cases of URTIs where antibiotics were used. In some cases of tonsillitis, laryngitis and sinusitis antibiotic coverage was needed to prevent complications in immunocompromised individuals or when virulent organism was suspected.

The most prescribed drug was of Penicillin group (amoxicillin), followed by cephalosporin and macrolides. Similar prescription pattern has been described by Teng et al. The choice of antibiotics given maybe due to the commonest causative organisms being gram-positive type of bacteria such as Streptococcus. In Bangladesh, Mohitosh reported cephalosporins to be the commonest antibiotic prescribed. In a similar study in Kerala by Reshmi et al, azithromycin was the commonest antibiotic prescribe.

This is in contrast to the observations of Shamsuddin et al who in 2013 reported inappropriate use of antibiotics in 18% for URTI.

Conclusion

This study reveals that most doctors in Shah Alam are familiar with Malaysian Antibiotic Guidelines, which is reflected in fewer prescriptions for antibiotics in the treatment of URTI cases. When dealing with URTI, alternative symptomatic treatment like vitamin C, antihistamines, good hydration were advocated by our study group. However, a similar study in future on a larger population including both urban and rural healthcare settings as well as both private and public hospitals would be able to substantiate the changing trend in the prescription pattern of antibiotics among doctors for URTI in Malaysia.

Limitation of the study: This study was conducted on a small population of doctors. All the doctors were working in urban, private health care settings. Hence the findings of this study do not reflect on the rural and public healthcare settings.

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Conflict of Interest: Nil.

Source of Funding: Self
References


Effect of Adding Different Levels of Green Tea Powder Camellia Sinensis to Diet on Some Physiological Traits in Broiler

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Abstract

This study was conducted at the Poultry Researches Station/Department of Animal Resource/Directorate of Agricultural Researches/Ministry of Agriculture, during the period from 15/5/2018 to 21/7/2018 to study the effect of adding green tea powder in broiler diet on some physiological traits.

In this study 300 (Ross 308) broilers at age of one day has been used, these birds has randomly distributed to 5 dietary treatments, each treatment has three replicated (20 birds/replicates) T1 control treatment without adding green tea powder while T2 was used (0.5 %) of green tea powder, T3 used (1%) green tea powder, wherever T4 used (1.5%) of green tea powder and T5 used (2%) green tea powder. The birds had been fed with one diet during the experiment period and the diets content were calculated as (16), the results of this study showed:

There was a high significant difference (P<0.01) in plasma total protein for adding treatment and reached the best average in T5 treatment and a minimum average in T1 treatment, observed a highly decreased (P<0.01) in plasma albumin levels for T4 treatment compared with other treatments, and there is a highly increased (P<0.01) in plasma globulin levels in T5 and T4 treatment compared with T1, T2 and T3 treatments, there was a highly decreased (P<0.01) in cholesterol levels in T5 compared it with control and other treatments, in the same time the results showed a high significant decreased (P<0.01) in high density lipoprotein (HDL) for T5, T4 and T1 treatments compared to T3 and T2 treatments, and there was a high significant decreased (P<0.01) in low density lipoprotein (LDL) in T2, T3, T4 and T5 compared to control, there was a highly decreased (P<0.01) in very low lipoprotein (VLDL) levels in T5 compared with other treatments. For the triglyceride the results showed a high significant decreased (P<0.01) in blood plasma for T2, T3, T4 and T5 treatments compared with control treatment.

This study recorded a highly decreased (P<0.01) in ALT level for T5 compared to T4, T3, T2 and T1, in the other hand there was a highly significance (P<0.01) in same trait for T3, T4 and T5 compared with T2, wherever the results showed a highly decreased (P<0.01) in AST level in T5 and T4 treatment compared with T1, T2 and T3 treatments.

Keywords: Green tea powder, Camellia sinensis, physiological trait, broiler.

Introduction

Due to the development presents in poultry and the infection of poultry with infectious diseases lead to decrease in reproductive performance and this leads to increase in veterinary costs and therefore high production costs so the researchers interested in herbals for the purpose of improving the productive and physiological performance of animals, including domestic poultry, and their use as an alternative to preservatives for the production of healthy and functional foods (1), for avoiding the negative effects of the use of medicinal drugs with the chemical origin of the birds, and to maintain consumer health and enhance the immunity of the body by stimulating the immune system (2).

Green tea has many purposes such as antitoxin, anticancer, antivirus, antibacterial and anti-obesity...
and others purpose which belong that green tea contains catechins compound (GTCs) \(^3\), and contains phytochemicals, such as polyphenols and caffeine. Polyphenols found in green tea include epigallocatechin gallate (EGCG), epicatechin gallate, epicatechins and flavonols \(^4\), these flavonoids contains a substance called catechins, the major catechins present in green tea are epicatechins (EC), epigallocatechins gallate (EGCG), epicatecholamines (EC) and epicatechins gallate (ECG)\(^5\), which have antioxidant, anticarcinogen, anti-inflammatory, and anti-radiation biochemical effects in vitro \(^6\). Other components include three kinds of flavonoids, known as kaempferol, quercetin, and myricetin \(^7\).

Green tea is a rich of minerals elements which are essential for health like zinc, Iron, silver, manganese, magnesium, sodium, potassium, titanium, copper, bromium, aluminum, nickel and phosphorus \(^8, 9, 10\), these metal ions promote the antioxidant property of green tea \(^11\).

Green tea is reported to contain 4000 bioactive compounds, The active constituents in green tea are powerful antioxidants call polyphenols, and this polyphenols belong to flavonoids family \(^12\), and it’s consider as basic phenolic compounds in green tea responsible for antioxidant activities that are form in the process of metabolism \(^13, 5\).

The aim of this study was to investigate the effect of adding different levels of green tea powder to broiler and its effect on the physiological performance and the.

Materials and Method

**Birds and Dietary treatment:** This study was carried out at the poultry research/office of the agricultural research/ministry of agriculture for 15/5/2018 to 21/6/2018 on 300 (Ross 308) broilers at one day age and randomly distributed to five dietary treatments with three replicated (20 birds/replicates), T1 control treatment without adding green tea powder, while T2 used 0.5 % green tea powder, T3 used 1% green tea powder, T4 used 1.5% green tea powder and T5 used 2% green tea powder. All the treatments gave ad libitum diet and water in all the experiment period, the diet contents chosen as \(^14\) which showed in (table 1).

**Table 1. Percentage composition of the experimental diets**

<table>
<thead>
<tr>
<th>Ingredients %</th>
<th>Starter 1-13D.</th>
<th>Grower14-27d.</th>
<th>Finisher28-42d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>47.5</td>
<td>50.85</td>
<td>54.84</td>
</tr>
<tr>
<td>Wheat</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Soybean Meal 1</td>
<td>32</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>Protein 2</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hydrogenated Vegetable Fat</td>
<td>3</td>
<td>4.15</td>
<td>4.3</td>
</tr>
<tr>
<td>Dicalcium Phosphate</td>
<td>0.7</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>NaCl</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Limestone</td>
<td>1.2</td>
<td>1.14</td>
<td>1.1</td>
</tr>
<tr>
<td>Methionine</td>
<td>0.25</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Lysine</td>
<td>0.25</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Calculated Values3**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M.E. Kcal/Kg Diet</td>
<td>3059</td>
<td>3177</td>
<td>3277</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>22.5</td>
<td>20.9</td>
<td>19.3</td>
</tr>
<tr>
<td>Crude Fiber %</td>
<td>3.5</td>
<td>3.4</td>
<td>gt3.2</td>
</tr>
<tr>
<td>Lysine %</td>
<td>1.38</td>
<td>1.19</td>
<td>1.09</td>
</tr>
<tr>
<td>Methionine Plus Cysteine %</td>
<td>1.08</td>
<td>0.92</td>
<td>0.88</td>
</tr>
<tr>
<td>Ca %</td>
<td>1.02</td>
<td>0.95</td>
<td>0.9</td>
</tr>
<tr>
<td>Available P %</td>
<td>0.45</td>
<td>0.41</td>
<td>0.38</td>
</tr>
</tbody>
</table>
Statistical Analysis: Completely randomized design (CRD) was used to study the effect of different treatment in all traits, and multiple range tests was used to compare the significant differences between means. Data were analyzed by using statistical analysis system.

Results and Discussion

 Noticed from table (2) a high significant different ($P<0.01$) in total protein in T5 compared with other treatments, and a high significant decreased ($P<0.01$) in T4 compared to T1, T2 and T3, and a high significant decreased ($P<0.01$) in T4 compared to T1, T2 and T3 treatments.

 Also observed from table (2) a highly decreased ($P<0.01$) in plasma albumin levels in T4 compared with T1, T2, T3 and T5 treatments, while there was a highly increased ($P<0.01$) in globulin levels in T5 and T4 compared with T1, T2 and T3 treatments.

 Table 2. Effect of using green tea in broiler diet on total protein, albumin and globulin levels in blood plasma

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total protein (g/dl)</th>
<th>Albumin (g/dl)</th>
<th>Globulin (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>3.500 ± 0.816 d</td>
<td>1.733 ± 0.76 a</td>
<td>1.76 ± 0.095 c</td>
</tr>
<tr>
<td>T2</td>
<td>4.433 ± 0.091 c</td>
<td>1.716 ± 0.144 a</td>
<td>2.616 ± 0.130 b</td>
</tr>
<tr>
<td>T3</td>
<td>4.616 ± 0.079 c</td>
<td>1.383 ± 0.107 ab</td>
<td>3.233 ± 0.117 b</td>
</tr>
<tr>
<td>T4</td>
<td>5.416 ± 0.144 b</td>
<td>1.283 ± 0.070 b</td>
<td>4.133 ± 0.147 a</td>
</tr>
<tr>
<td>T5</td>
<td>6.150 ± 0.095 a</td>
<td>1.633 ± 0.088 ab</td>
<td>4.516 ± 0.162 a</td>
</tr>
</tbody>
</table>

The means with different letters within the same column are significantly between them, ($P < 0.01$) **

 Table (3) showed a highly decreased ($P<0.01$) in cholesterol levels in serum in T5 compared with T1 and other treatments, in the same time the results showed a high significant decreased ($P<0.01$) in high density lipoprotein (HDL) for T5, T4 and T1 treatments compared to T3 and T2 treatments, a high significant decreased ($P<0.01$) in low density lipoprotein (LDL) in T2, T3, T4 and T5 treatments compared to T1 treatment, while there is a highly decreased ($P<0.01$) in very low lipoprotein (VLDL) levels for T5 treatment compared with other treatments, results obtained from table (3) a high significant decreased ($P<0.01$) in triglyceride in T5 compared with other treatments, may be due to supplementing of green tea in diet may prevent an excessive accumulation of lipids in the liver and other tissues as a result of green tea content from caffeine and catechin which may have an inhibitor effect on intestinal absorption of lipids, and may be due to the caffeine and catechin content of green tea may have an inhibitor effect on intestinal absorption of lipids (24), and this may be due to the contain of green tea on the compounds epigallocatechins gallate (EGCG) that works to reduce from differentiation and proliferation of lipid cells and the manufacture of fat and the birth of new fat cells and fat block and thus reduce body weight and reduce the oxidation of fat and the level of triclipers in plasma blood and free fatty acids and cholesterol source, as well as the factor effect on cholesterol it’s same effect on triglyceride (25).

 The reasons for moral improvement can be explained in the lipid of plasma in the green tea supplementation coefficients so green tea is currently used in the fight against obesity as it is used in lowering fat level and preventing excess weight (26).
Table 3. Effect of using green tea in broiler diet on cholesterol, HDL, LDL, VLDL and Triglyceride levels in blood plasma

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cholesterol (mg/dl)</th>
<th>HDL (mg/dl)</th>
<th>LDL (mg/dl)</th>
<th>VLDL (mg/dl)</th>
<th>Triglyceride (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>115.24 ± 3.77 a</td>
<td>36.666 ± 3.272 c</td>
<td>25.0.001 ± 1.71 a</td>
<td>53.514 ± 2.11 a</td>
<td>125.305 ± 8.57 a</td>
</tr>
<tr>
<td>T2</td>
<td>96.53 ± 1.30 b</td>
<td>63..0016 ± 0.909 a</td>
<td>16.839 ± 0.17 b</td>
<td>16.674 ± 1.83 b</td>
<td>84.196 ± 0.98 b</td>
</tr>
<tr>
<td>T3</td>
<td>78.106 ± 1.11 c</td>
<td>46.200 ± 0.590 b</td>
<td>14.868 ± 0.18 b</td>
<td>17.038 ± 1.40 b</td>
<td>74.341 ± 0.93 b</td>
</tr>
<tr>
<td>T4</td>
<td>74.495 ± 0.62 c</td>
<td>41.833 ± 0.792 b</td>
<td>15.019 ± 0.08 b</td>
<td>17.642 ± 0.83 b</td>
<td>75.098 ± 0.42 b</td>
</tr>
<tr>
<td>T5</td>
<td>55.708 ± 1.74 d</td>
<td>35.500 ± 2.432 c</td>
<td>14.775 ± 0.27 b</td>
<td>5.432 ± 1.87 c</td>
<td>73.878 ± 1.36 b</td>
</tr>
</tbody>
</table>

Significantly **,** **,** **,** **,**

The means with different letters within the same column are significantly between them, (P<0.01) **

Observed from table (4) a highly decreased (P<0.01) in plasma ALT levels in T5 compared to T4,T3,T2 and control, a highly significant (P<0.01) in same trait for T3,T4 and T5 treatments compared with T2, however the results showed a highly decreased (P<0.01) in plasma AST levels in T5 and T4 compared with T1,T2 and T3, (27) found that green tea in the laying hen diets significantly improved liver function by reducing concentration due to improvement moral in both ALT and AST, and this may be attributed that green tea reduced activity of ALT and AST and this improvement of ALT and AST due to green tea contain a high levels from antioxidant called polyphenols which has high antioxidant energy and which mainly works to inhibit free radical activity, inhibit disease and promote immune function, these materials possess high antioxidant energy which mainly works to inhibit free radicals and inhibition of cancer and heart disease and enhance immune function (5), it has been found that consumption of green tea reduces plasma and LDL sensitivity to the oxidation process and regulates cholesterol metabolism(28).

Table 4. Effect of using green tea in broiler diet on ALT and AST enzyme levels in blood plasma

<table>
<thead>
<tr>
<th>Treatment</th>
<th>ALT (IU/L)</th>
<th>AST (IU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>125.650 ± 2.362 a</td>
<td>12.666 ± 0.881 a</td>
</tr>
<tr>
<td>T2</td>
<td>114.116 ± 1.221 b</td>
<td>7.333 ± 0.494 b</td>
</tr>
<tr>
<td>T3</td>
<td>99.800 ± 1.321 c</td>
<td>6.000 ± 0.258 cb</td>
</tr>
<tr>
<td>T4</td>
<td>94.666 ± 1.364 c</td>
<td>4.183 ± 0.079 cd</td>
</tr>
<tr>
<td>T5</td>
<td>83.600 ± 1.279 d</td>
<td>3.550 ± 0.243 d</td>
</tr>
</tbody>
</table>

Significantly **,** **,**

The means with different letters within the same column are significantly between them, (P<0.01) **

Conclusion

From the results of this study we conclude that use green tea improvement in total protein, albumin, cholesterol, HDL, LDL, VLDL, Triglyceride, ALT and AST traits because it contain a high level of antioxidant compound.

Conflict of Interest: None of the authors have any conflicts of interest to declare.

Source of Funding: The research was performed independently, there is no funding, influence over study design, analyses, manuscript preparation, or scientific publication.

Ethical Clearance: The project was approved by the local ethical committee (College of Agriculture engineering science/Baghdad University).

References


In Vitro Study of Bronchial Relaxation Mechanism of Coptosapelta Flavescens Korth Root’s Methanol Extract On Receptors

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Abstract

Objective: To evaluate the bronchorelaxation effect of methanol extract of Coptosapelta flavescens Korth. root (MECFR) on cholinergic, histamine receptors and beta2-adrenoceptors, in vitro.

Method: The research design was experimental in which a 4-mm long guinea pig’s bronchus was kept in an isolated organ bath containing Kreb’s-Henseleit solution at 37°C, pH 7.4 and flooded with carbogen gas. The study was divided into 3 groups: in Group 1 and 2, the bronchial rings were incubated in 3 concentrations of MECFR, and then contracted with cumulative doses of methacholine and histamine, respectively; in Group 3, the bronchial ring was incubated in 3 concentrations of propranolol, contracted with a single dose of methacholine, and then the MECFR was administered in cumulative doses.

Results: In both Group 1 and Group 2, the dose-response curves of all 3 doses of MECFR shifted to the right with lower E_max (P<0.05) as compared to the negative control. In Group 3, the dose-response curves showed MECFR has bronchorelaxation effect on bronchial rings both in the presence of propranolol and without, with similar E_max (P>0.05).

Conclusion: MECFR exhibits bronchorelaxation effects by acting as non-competitive antagonist at the cholinergic and histamine1 receptors, and also by acting as beta2-adrenoceptor agonist.

Keywords: Beta2-adrenoceptor, cholinergic receptor, Coptosapelta flavescens Korth root, histamine receptor.

Introduction

Coptosapelta flavescens Korthis a liana plant of the Rubiaceae family. In East Kalimantan, the root is used traditionally as a potion to cure cough and shortness of breath.1 It’s pharmacological activities such as bronchorelaxation is yet to be scientifically proven.

The autonomic nerves mediate both contraction and relaxation of airway smooth muscles. The parasympathetic cholinergic nerves dominate the airway and mediate contraction, whereas the adrenergic-sympathetic nerves mediate relaxation. Acetylcholine (ACh), the main neurotransmitter of the parasympathetic nervous system, activates M_3 cholinerger receptors responsible for the contraction. Unlike cholinergic stimulation, adrenergic stimulation relaxes the airways.2

Beside the autonomic nervous system, there are several types of cells, such as epithelial cells; inflammatory cells; and myocytes that can release various mediators such as histamine, endothelin and arachidonic acid metabolites, which can modulate airway contractions.3

Asthma treatment with bronchodilators aims to relax the
airway smooth muscles by antagonizing cholinergic and histamine receptors and stimulating beta₂-adrenoceptors.

This study evaluated the effect of the MECFR on cholinergic receptors, histamine receptors and beta₂-adrenoceptors and in inducing bronchorelaxation in vitro, using the guinea pig’s isolated bronchial rings. Isometric force transducers were used to measure the parasympathetic tone of the smooth muscle in the airway of guinea pigs.²

**Materials and Method**

**Materials:** Coptosapelta flavescens Korth roots (CFR) were collected from Paser Regency of East Kalimantan Province. Identification was done by the taxonomist of Forestry Faculty of Mulawarman University. Proanalytic methanol and the ingredients to make Kreb’s-Henseleit solution were purchased from Sigma-Aldrich distributor in Surabaya. Carbogen gas (95% O₂ gas and 5% CO₂ gas) was purchased from PT Murni Gas Rayain Samarinda.

Test animals were 3-4 mo old male guinea pigs weighing 300-400 g obtained from Pharmacology Laboratory, Faculty of Medicine of Mulawarman University Samarinda.

Tools for bronchorelaxation test were six-chamber isolated organ bath, octal bridge amplifier, Power Lab/16SP digital recorder, isometric transducer, pH meter, tweezers and surgical scissors.

**Preparation of MECFR:** Dried and ground simplicia of CFR (300 g) were macerated in 1.5 l of proanalytic methanol solution and shaken continuously for 3 days. All the collected filtrates were then evaporated using a 50°C vacuum rotavapor.

**Guinea pig’s bronchial preparation:** Guinea pigs (Cavia porcellus), were fasted for 12 h and subsequently anesthetized and sacrificed. Surgery was done by opening the abdomen and thorax. The lungs and trachea were then dissected and put in a Petri dish containing Kreb’s-Henseleit solution. The bronchial segments were then cut into a length of 4 mm and put into an organ bath filled with 10 ml Kreb’s-Henseleit solution. The bronchial ring was arranged following the procedure described by Albuquerque.⁴

**Bronchorelaxation activity test on cholinergic receptors:** Prior to treatment, bronchial rings were equilibrated in Kreb’s-Henseleit solution for 60 min, and every 15 min the solutions were replaced with a new Kreb’s-Henseleit solution. After equilibration, 200 μl each of MECFR solution dose 10%, 20% and 30% were added into the organ baths. After 10 min, they were then contracted with cumulative doses of methacholine. Atropine 2nM was used as positive control and 10% Dimethyl Sulfoxide (DMSO)-ethanol solvent was used as negative control (NC)

**Broncho relaxation activity test on histamine receptors:** After the bronchial rings in the Kreb’s-Henseleit solutions reached equilibration, 200 μl each of MECFR solution at 10%, 15% and 20% were administered to the bronchial ring for 10 min followed by cumulative doses of histamine to induce contraction. Chlorpheniramine Maleate (CTM) 1μM was used as positive control.

**Broncho relaxation activity test on beta₂ adrenoceptors:** After the bronchial ring in the Kreb’s-Henseleit solution reached equilibration. The bronchial rings were incubated with three doses of Propranolol 1,0.5μM, 1μM and 1.5 μM for 10 minutes. Afterwards, they were contracted with a single dose of Methacholine 10⁻³M. Finally, the MECFR solutions were added in cumulative doses. Aquabidest and 10% DMSO-ethanol solvent were used as NC.

**Calculation of percentage contraction/relaxation:** Percent of bronchial contractility was calculated using the following equation:

\[
\% \text{ contractility} = \frac{\text{Contraction or Relaxation response (g) – response of NC (g)}}{\text{Max precontraction response (g)}} \times 100
\]

The dose-response curve (DRC) was then plotted, which is a curve of log concentration vs percent of bronchial contractility for each treatment. After Eₘₐₓ was determined, EC₅₀ was obtained from the calculation of linear regression equations (20-80% Eₘₐₓ) of DRC. To determine the receptor potential against test material, pD₂ which is equal to -log EC₅₀ were calculated.

**Statistical Analysis:** Data were presented as mean ± s.e.m. Bronchial contraction or relaxation response was presented as DRC, Eₘₐₓ and pD₂ values of each treatment. All were analyzed with SigmaPlot 12.5. Significant differences were determined using one-way analysis of variance (ANOVA), followed by the Tukey test. P values of 0.05 or less were considered to be statistically significant.
Results

MECFR activity on cholinergic receptors: Figure 1 shows the contractile effects on bronchial rings contracted with methacholine after being incubated with MECFR of 10%, 20%, and 30% dose. They were represented as DRC labeled as methacholine (met)-MECFR10, met-MECFR20 and met-MECFR30 respectively. All three DRCs shifted to the right with lower E_{max} (P < 0.05) than DRC of NC (met-NC) (Table 1). This showed the effect of MECFR in inhibiting methacholine-induced contractions of bronchial ring, indicating that the extract antagonized cholinergic receptors in a non-competitive manner. In contrast, the DRC of Atropine sulfate labeled as met-As in Figure 1, shifted to the right with E_{max} (P > 0.05) that is not significantly different from met-NC (Table 1). Therefore, Atropine as positive control had a competitive antagonist effect on cholinergic receptors.

The potency of MECFR to inhibit bronchial ring contraction is indicated by the values of pD_{2} in Table 1 which show that the increase of MECFR dosages from 10, 20 to 30% resulting in a decrease in pD_{2} (p < 0.05) as compared to control. As the extract’s concentration became higher, there was less potential for agonist to induce bronchial smooth muscle contraction. These results showed that the inhibitory effect of MECFR was dose-dependent.

MECFR activity on histamine receptors: Figure 2 shows the contractile effects on the bronchial rings given cumulative doses of histamine after being incubated with MECFR at 10%, 15%, 20% dose and CTM. They were presented as DRCs labeled as His-MECFR10, His-MECFR15, His-MECFR20 and His-CTM respectively. All DRCs shifted to the right compared to the DRC of NC (His-NC). This suggested that all doses of MECFR and CTM had histamine receptor antagonist activity. E_{max} data on Table 2 shows that, CTM 1 μM has competitive antihistamine activity as the E_{max} is not significantly different (p>0.05) than E_{max} of His-NC, whereas MECFR10, MECFR15 and MECFR20 have noncompetitive antihistamine activity because their E_{max} are significantly different (p<0.05) than E_{max} of His-NC. As the extract’s concentration increased, the antihistamine activity became more noncompetitive. Table 2 also shows that as the extract’s concentration increases the pD_{2} value gets smaller, indicating that the potency of histamine receptors towards histamine became weaker as they were occupied by MECFR.

MECFR activity on beta_{2}-adrenoceptor: Figure 3 shows the relaxation effect on bronchial rings which were given cumulative doses of MECFR after being incubated with 0.5 μM, 1.0 μM, 1.5 μM propranolol and without propranolol, then contracted with a single dose of Methacholine 10^{-5}M. They were presented as DRCs labeled as Pro0.5MECFR, Pro1.0MECFR, Pro1.5MECFR and MECFR, respectively. The higher the MECFR concentration, the greater the increase in relaxation which is marked by the negative sign. When the relaxation response of bronchial rings incubated with and without propranolol are compared, pD_{2} in Table 3 shows that the affinity of propranolol-occupied beta_{2}-adrenergic receptor towards MECFR is smaller and significantly different (p < 0.05) than the receptor not occupied with propranolol. This shows that MECFR has activities that are less potent in beta_{2}-adrenergic receptor because it was inhibited by propranolol. Table 3 also shows that there is no significant difference (P > 0.05) between the E_{max} of propranolol-incubated and non-incubated bronchial rings. This shows that MECFR competes with propranolol to occupy beta_{2}-adrenergic receptor, and it can remove propranolol to such extent that the maximum response reached (E_{max}), was not significantly different than the E_{max} on beta_{2}-adrenergic receptors that was not occupied with propranolol. This result indicates that MECFR is a beta_{2}-adrenergic receptors agonist.

Discussion

This study showed the effect of MECFR as cholinergic M_{3} receptors non-competitive antagonist in the airway smooth muscles. The right-shifted DRCs showed that larger amount of methacholine were needed to produce the same contraction effect as they had been inhibited by the extract. This inhibition suppressed E_{max} as MECFR occupied M_{3} cholinergic receptors at different sites than the agonists, such that the methacholine was unable to increase its maximum contraction. The potency of agonist to contract the bronchial smooth muscles was weakened as the dose of MECFR that occupied cholinergic M_{3} receptor increased. This indicates the presence of chemical components in CFR which can act as cholinergic M_{3} receptor antagonist. The chemical blocks the released ACh ligands from interacting with the cholinergic M_{3} receptor, resulting in the relaxation of the airway smooth muscles. Other plant extracts that also act as cholinergic M_{3} receptors antagonist are the ethanol extract of Curanga fel-terrae leaves and water extract of Nigella sativa.
This study also showed the effect of MECFR as H₁ receptors non-competitive antagonist in the airway smooth muscle. The potency of histamine agonist to contract airway smooth muscle decreased as the dose of MECFR that occupied the histamine receptors increased. The effects of MECFR in this study resulted in the inhibition of H₁ receptors, causing histamine mediators released by mast cells unable to be bound to H₁ receptors, resulting in no contraction. Other plant extracts that can inhibit H₁ receptors are the ethanol extract of Nyctanthes arbor-tristis leaves ⁸ and the water extract of Bunium persicum. ⁹

This study also showed that MECFR has effects on beta₂-adrenoceptor as it could shift propranolol (competitive beta-blocker) aside; and indicated that there are active ingredient in MECFR that stimulates beta₂-adrenergic receptor. Beta₂-adrenergic receptor activation induces stimulation on adenylate cyclase through trimeric Gs protein with alpha subunit. Stimulation of adenylate cyclase catalyze the conversion of Adenosine Tri phosphate (ATP) to cyclic adenosine mono phosphate (cAMP), which leads to the relaxation of airway smooth muscle. ¹⁰ Other plants that were reported having bronchorelaxation effect through beta₂-adrenoceptor such as Nigella sativa water extract with Thymoquinone as its active ingredient, ¹¹ the methanol extract of Myxopyrumserratulum leaves. ¹²

The bronchodilatory activities of MECFR are influenced by its secondary metabolites contents, e.g. saponins, polyphenols, terpenoids, steroids, and anthraquinones, contained within it. ¹³ Terpenoids in the MECFR can have effects like thymoquinone, widely contained in the essential oil of *Nigella sativa*, which inhibits methacholine-induced contraction of airway smooth muscles and stimulates beta₂-adrenoceptor which leads to the relaxation of airway smooth muscles. ¹⁴ Polyphenol in MECFR could have similar effects as quercetin, which is found in abundance in fruits and vegetables, in relaxing bronchus by inhibiting ACh-and histamine-induced contraction and increasing cAMP through beta₂-adrenoceptor stimulation. ¹⁵

Analogous with secondary metabolites from other plants, the active ingredient contents in MECFR which are responsible for guinea pig bronchial ring relaxation therefore are polyphenol, terpenoid and steroid.

| Table 1. Eₘₐₓ and pD₂ of bronchial rings contracted with cumulative doses of methacholine after incubation with MECFR and Atropine sulfate |
|-----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                | met-NC | met-AS 2 nM | met-MECFR10 | met-MECFR20 | met-MECFR30 |
| Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m |
| Eₘₐₓ (%) | 163.61 ± 1.42 | 164.36 ± 1.77 | 152.22* ± 2.31 | 118.23* ± 1.94 | 57.18* ± 1.83 |
| pD₂ | 5.77 ± 0.02 | 5.03* ± 0.02 | 5.30* ± 0.01 | 4.72* ± 0.01 | 4.62* ± 0.02 |

n = 6 guinea pigs; analyzed with ANOVA and Tukey’s test with p< 0.05 as significantly different (*) compared to met-NC

| Table 2. Eₘₐₓ and pD₂ of bronchial rings contracted with cumulative doses of histamine after incubation with MECFR and CTM. |
|-----------------------------------------------|----------------|----------------|----------------|----------------|----------------|
|                                | His-NC | His-CTM 1 µM | His-MECFR10 | His-MECFR15 | His-MECFR 20 |
| Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m | Mean ± s.e.m |
| Eₘₐₓ (%) | 119.36 ± 1.57 | 117.92 ± 1.62 | 98.22* ± 1.43 | 86.68* ± 1.24 | 57.44* ± 1.79 |
| pD₂ | 4.39 ± 0.01 | 4.07* ± 0.01 | 4.19* ± 0.01 | 4.16* ± 0.01 | 4.12* ± 0.01 |

n = 6 guinea pigs; analyzed with ANOVA and Tukey’s test with p< 0.05 as significantly different (*) compared to His-NC.
Table 3. $E_{\text{max}}$ and $pD_2$ of bronchial rings given with cumulative doses of MECFR in the presence or absence of propranolol

<table>
<thead>
<tr>
<th></th>
<th>MECFR</th>
<th>Pro 0.5 MECFR</th>
<th>Pro 1.0 MECFR</th>
<th>Pro 1.5 MECFR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± s.e.m</td>
<td>Mean ± s.e.m</td>
<td>Mean ± s.e.m</td>
<td>Mean ± s.e.m</td>
</tr>
<tr>
<td>$E_{\text{max}}$ (%)</td>
<td>-146.48 ± 21.03</td>
<td>-146.79 ± 11.14</td>
<td>-131.76 ± 1.06</td>
<td>-125.41 ± 1.17</td>
</tr>
<tr>
<td>$pD_2$</td>
<td>-0.13 ± 0.033</td>
<td>-0.30* ± 0.0073</td>
<td>-0.35* ± 0.0066</td>
<td>-0.28* ± 0.0053</td>
</tr>
</tbody>
</table>

$n = 6$ guinea pigs; analyzed with ANOVA and Tukey’s test with $p<0.05$, * shows data that is significantly different compared to MECFR.

Figure 1: The DRC of bronchial rings contracted with cumulative doses of methacholine after incubation with MECFR and Atropine sulfate.

$n = 6$ guinea pigs; analyzed with ANOVA and Tukey’s test with $p<0.05$ as significantly different.

Figure 2: The DRC of bronchial rings contracted with cumulative doses of histamine after incubation with MECFR and CTM.

$n = 6$ guinea pigs; analyzed with ANOVA and Tukey’s test with $p<0.05$ as significantly different.
n=6 guinea pigs, analyzed with ANOVA, p<0.05 as significantly different.

Figure 3: The DRC of bronchial rings given with cumulative doses of MECFR in the presence and absence of propranolol.

Conclusion

Coptosapelta flavescens Korth root extract relaxes guinea pig bronchial ring through non-competitive antagonism of cholinergic and histaminergic receptors, and agonism of beta2-adrenoceptor, therefore it could be exploited for therapeutic use in asthma and upper respiratory disease.

Ethical Clearance: This study has been approved by the Health Research Ethical Committee of the Medical Faculty of Mulawarman University.

Source of Funding: This research was funded by the Provincial Government of East Kalimantan.

Conflict of Interest: We declare that we have no conflict of interest.

References

Insulin Resistance in Obese and Non Obese Pre-Pubertal Children: Cross Sectional Study in Indonesia

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Abstract

High prevalence of childhood obesity increases risk of insulin resistance in pre-pubertal children. The purpose of this study is to identify the presence of insulin resistance in pre-pubertal obese children and compare with children who had normal nutritional status. Observational analytic study with a cross sectional design is used for this research. There are 60 elementary school students aged 6-9 years involved in this study, 30 obese students and 30 students with normal nutritional status based on BMI for Age. Fasting insulin, fasting blood glucose and HOMA IR index were carried out in Parahita Laboratory at Sidoarjo. Statistical analysis using independent t-test was used to determine differences in fasting blood glucose, fasting insulin and HOMA IR between two groups and linear regression to analyze the effect of obesity on insulin resistance with a significance value < 0.05. The results showed mean scores of BMI obese and non-obese group were 25.6 and 15.96 respectively, the mean value of BMI z score among obese group and non-obese was 3.7 and-0.6 respectively; the abdominal circumference value of obese and non obese group consist of 84.95 and 59.48 cm. Statistical analysis showed no significant difference in fasting blood glucose levels, but fasting insulin levels and HOMA IR between 2 groups differed significantly. Obesity (BMI and abdominal circumference) influenced incidence of insulin resistance. Furthermore, obese and non-obese groups have different sensitivity of insulin response but had the same blood glucose level; obese group had higher HOMAIR than non-obese group. So, there needs an intervention to reduce obesity at an early age to reduce the risk of insulin resistance in pre-pubertal age.

Keywords: Insulin Resistance, Obesity, Pubertal Pre.

Introduction

Insulin resistance is a state of impaired metabolic response insulin sensitivity in the target cell so that more insulin levels are needed than ‘normal’ to maintain a normoglycemic state1,2. Obesity is a low-level chronic inflammation caused by excess energy intake, as a major factor in decreasing insulin sensitivity, which makes obesity a major risk factor for insulin resistance3. Zeitler et al (2008) said that several large-scale and retrospective studies on a large scale showed a correlation between adiposity and insulin resistance and metabolic syndrome4.

Childhood is a critical period as the onset or continuation of the incidence of obesity5. Childhood obesity is associated with an increase in several complications of metabolic syndromes, such as insulin resistance, glucose intolerance and type 2 diabetes in the future6.

Obesity develops into insulin resistance through the cellular mechanism of insulin which is characterized by impaired insulin ability to inhibit glucose output from the liver and increase glucose absorption in adipose tissue and muscles7. Insulin cannot fulfill its role in stimulating GLUT 4 translocation from the cytosol to the plasma membrane which will facilitate the transport of glucose to the target cell8. Disruption of stimulation of GLUT 4 translocation is due to the inhibition of the IRS 1 phosphorylation process of tyrosine kinase that occurs at the post-receptor. Decreasing GLUT 4 causes an increase in stimulation of greater insulin production to maintain normal blood glucose (normoglycemic) conditions.
Puberty gives an important role in the development of diabetes mellitus which begins with a condition of insulin resistance. During puberty, there is an increased resistance to the work of insulin which causes hyperinsulinemia. Increased growth hormones (estrogen and progesterone) during puberty give a role in increasing insulin resistance. After puberty and entering adulthood, the basal stimulation of insulin response decreases.

Determination of pre-pubertal age as the target of the study also has purposeto identifying earlier potential risk of degenerative diseases in the future as indicated by the HOMA IRindex. Until now, there has been no normal threshold of the HOMAIR index for children (<18 years). However, as a reference we use the results of the review of Izabel et al (2016) on 7 selected articles, recommending cut-off for HOMA IR 2.5 for both boys and girls\(^9\). The purpose of this study is to identify the presence of insulin resistance in pre-pubertal obese children and to compare the control group, namely children who had normal nutritional status (non-obese).

**Materials and Method**

Sixty children (30 obese and 30 normal)were randomly recruited during March to October 2018. Subject recruitment was using simple random sampling with inclusion criteria: age 6-9 years, at pre pubertal stage and BMI screening. Obesity and normal nutritional status was defined according to WHO 2005 standard in children. Obese children were defined when BMI > + 3 standard deviationand normal children were defined when BMI +/-2 standard deviation for age and sex. Pubertal staging was defined according to Tanner and Whitehouse. (child growth foundation, 2017).Exclusion criteria included Tanner stage 1 or more. The research was done in 3 elementary school in Sidoarjo, East Java, Indonesia: Madrasah Ibtidaiyah Muslimat NU Pucang Sidoarjo, SDN Pucang 1 dan 2 Sidoarjo.

**Anthropometry assessment** using WHO Procedure standard. Weight assessment was using digital scale (GEA type eb 9350) to the nearest 0.01 kg, wearing light clothing and without shoes. Standing height was measured without shoes, to the nearest 0.1 cm, using Microtoice. (GEA). Abdominal circumferences were measured using a flexible tape to the nearest 0.1 cm. Abdominal was measured at the end of expiration midway between the lower rib margin and the iliac crest\(^{10}\) BMI was calculated using the formula kg/m\(^2\).All measurements were taken twice.

**Laboratory assessment.** After 8 hours overnight fast, all participants were gotten venous blood sample 5 cc in Parahita Laboratory Sidoarjo, East Java. Fasting blood sample was withdrawn for estimation of fasting plasma insulin and fasting blood glucose.

Fasting insulin assessment was using ECLIA (Electro Chemiluminiscence Immuno Assay) method (µU/mL). Fasting glucose was assessed by Hexokinase (mg/dL). Cut off level for diagnosing insulin resistance/impaired insulin sensitivity with HOMA-IR was >2.5.

\[
\text{HOMA IR} = \frac{\text{fasting insulin (mU/mL)} \times \text{fasting glucose (mmol/L)}}{22.5}
\]

All participants and their guardians or parents signed an informed consent for participation in the study. The study protocol was approved by the local ethics committee of Public Health Faculty, Airlangga University. This work has been carried out in accordance with the code of ethics of the WHO-CIOMS 2016 for experiments involving human.

**Statistical analysis.** The data were analyzed by SPSS statistical software. Independent test was performed for comparison between the mean valuesof the different groups for parametric data. Linier regression correlationwas used for correlation between different variables. For all tests a probability (p) less than 0.05 was considered significant.

**Results**

**Anthropometric Parameters:** Anthropometric parameters was a standard to determine an individual nutritional status. Anthropometric parameters that are often used to determine obesity is Body Mass Index (BMI).

<table>
<thead>
<tr>
<th>Parameter Antropometri</th>
<th>Obese</th>
<th>Non Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>26,05</td>
<td>3,2</td>
</tr>
<tr>
<td>Abdominal Circumference (cm)</td>
<td>63,73</td>
<td>7,6</td>
</tr>
</tbody>
</table>
The results of the average anthropometric measurements showed a considerable difference between obese and non-obese groups. The results of the average measurement of the obese group BMI values showed a very high BMI rate of 26.05 with minimum value 20.2 and a maximum reaching 31.8, while the non-obese group mean of BMI value was 16.03, with minimum value 12.8 and maximum 19.8. The results of measurements of the abdominal circumference also showed significant differences between the obese and non-obese groups. The average abdominal circumference of the obese group is 83.73 with a maximum value reaching 101 cm, while the non-obese group is 58.07 cm and the maximum value is only up to 70 cm.

The difference in anthropometric values between the 2 groups was strengthened by the results of the independent t-test which showed significant differences in the values of BMI and abdominal circumference. The difference in anthropometric values between obese children and non-obese children showed a considerable difference, i.e. 2.45 for the obese group and 1.06 for non-obese children. Even in the obese group, there were children with HOMA index values above 4 (the normal limit of the HOMA index for adults). The high value of the HOMA index in obese group compared to non-obese group was also supported by the results of independent t-test which showed a significant difference between obese and non-obese groups with a value of $p = 0.000$. Independent t-test results showed that there were differences in fasting insulin levels between obese and non-obese groups ($p = 0.000$), where fasting blood glucose levels between obese and non-obese groups were the same or no significant difference ($p = 0.484$). This means that between the obese and non-obese groups have different abilities in the insulin response at the same blood glucose level, with a higher HOMA index value in the obese group.

### Table 2: Fasting Glucose, Fasting Insulin and HOMA IR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obese</th>
<th>Non Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Fasting Glucose</td>
<td>86.36</td>
<td>6.3</td>
</tr>
<tr>
<td>Fasting Insulin</td>
<td>13</td>
<td>6.29</td>
</tr>
<tr>
<td>HOMA IR</td>
<td>2.75</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Descriptively the measurement results of the average HOMAIR index between obese children and non-obese showed a considerable difference, i.e. 2.45 for the obese group and 1.06 for non-obese children. Even in the obese group, there were children with HOMA index values above 4 (the normal limit of the HOMA index for adults). The high value of the HOMA index in obese group compared to non-obese group was also supported by the results of independent t-test which showed a significant difference between obese and non-obese groups with a value of $p = 0.000$. Independent t-test results showed that there were differences in fasting insulin levels between obese and non-obese groups ($p = 0.000$), where fasting blood glucose levels between obese and non-obese groups were the same or no significant difference ($p = 0.484$). This means that between the obese and non-obese groups have different abilities in the insulin response at the same blood glucose level, with a higher HOMA index value in the obese group.

### Discussion

**Anthropometric Parameters:** Obesity is an excessive body weight as a result of excessive fat accumulation with BMI for age thresholds > 2 Standard Deviations. The International Obesity Task Force (IOTF) recommends several method for determining obesity in children. The recommended measurement method is based on data from 6 developed and developing countries, such as: the United States, Britain, the Netherlands, Hongkong, Singapore, and Brazil. The IOTF recommends indigo z-score BB/TB to determine obesity in children. Other anthropometric measurements use waist/abdominal circumference, skinfold thickness, and percentage of body fat using a multi-frequency bioelectrical impedance analysis (BIA) technique underwater weighing (densitometry), and magnetic resonance imaging (MRI).

This study used 2 simple anthropometric parameters to measure and assess the obesity status of the subject.
The parameters used are BMI and waist circumference. Both of these parameters were chosen in addition to being simple in the implementation procedure and also not requiring expensive costs in the implementation. This procedure can be done by anyone who is trained before. Anthropometric assessment BMI and waist circumference showed that there were significant differences between obese and non-obese groups. Obese groups have higher ratio values of body weight and height compared to non-obese groups.

**Insulin Resistance:** Insulin resistance in early childhood is increasing along with the increasing prevalence of obesity in the world. Insulin resistance is a complication of obesity that is often found in children and adolescents who are obese\(^6\). Indonesia does not yet have a database of screening for insulin resistance incident. The incidence of insulin resistance was reported by several separate studies with different research subjects, ranging from risky adult groups to the child age. The results of this study specialize in certain age groups namely prepubertal age, where the risk factors for insulin resistance tend to be lower compared to the puberty age.

The evaluation of IR HOMA values as a parameter of insulin resistance shows that the average obese HOMA value of the group as a risk group shows 2.75 with the highest score of 5.4. There is no international standard for limiting IR HOMA values for pre-puberty children. Izabel et al (2016) mentioned in a review of 7 selected articles, recommending cut off for HOMA IR 2.5 for both boys and girls\(^9\). The average value of HOMA IR 2.75 shows that most obese children in the study had experienced insulin resistance. Prolonged insulin resistance will cause metabolic disorders that correlate with several metabolic syndromes which in the future (20 years) may develop into diabetes and cardiovascular disease\(^11\).

**Obesity and Insulin Resistance in Prepubertal Children:** Obesity develop insulin resistance, characterized by impaired insulin ability to inhibit liver glucose output and encourage glucose storage in fat and muscle\(^7\). Increased plasma fatty acids are commonly found in obese conditions. Fatty acids are secreted from adipocyte cells to provide energy to the body and tissues. Obesity correlated with insulin resistance can be explained by competition between the increased circulation of fatty acids and glucose in oxidative metabolism related to insulin sensitivity of cells. Fatty acids and potential metabolites such as acyl-CoAs, ceramides and diacylglycerol function as molecules that activate protein kinases such as protein kinase C (PKC), Jun kinase (JNK) and nuclear factor-κB (NFκB) and kinase-β (IKKβ) inhibitors. These kinases will interfere with insulin signals by increasing the resistance of serine phosphorylation from the IRS, the key mediator of insulin receptor signals.

Obesity represented by anthropometric parameter values of BMI, abdominal circumference has an important influence in the process of early detection of simple insulin resistance events characterized by high HOMA IR values. The results indicate that there is a significant effect BMI, abdominal circumference value on HOMA IR. (\(p = 0.000; p = 0.000\))

Childhood is a critical period in the development of obesity and its complications are divided into several periods, including prenatal and perinatal periods, and periods of obesity rebound during children (periods of 5-7 years and adult periods)\(^12\). The adiposity rebound period is the age between 5-7 years showing a critical period of development of adipose buildup. A time when adiposity rebound has significant implications for obesity in the future. Critical period as the onset or continuation of the incidence of obesity\(^5\). Childhood obesity is associated with an increase in several complications of metabolic syndromes, such as insulin resistance, glucose intolerance, and type 2 diabetes and other metabolic syndrome diseases such as increased cholesterol, blood pressure, coronary heart disease, cancer and osteoarthritis\(^6\)

**Conclusions**

Pre-pubertal age obesity increases the risk of insulin resistance. Obese and non-obese groups have different abilities in the insulin response at the same blood glucose level, with a higher HOMA IR in the obese group. So, there needs an intervention to reduce obesity at an early age to reduce the risk of insulin resistance in pre-pubertal age.

**Source of Funding:** We gratefully acknowledge Indonesian Ministry of Research, Technology and Higher Education for funding support to complete our research.

**Conflit of Interest:** Nil

**Ethical Clearence:** The study protocol was approved by the local ethics committee of Public Health Faculty, Airlangga University. No 531/EK/KEPK/2018.
References

Stay Home Management on Improving Health Status of Children Tuberculosis Patients in Banjarbaru City

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Abstract

Tuberculosis (TB) in the world continues to increase, Indonesia ranks 4th after India (2.0 million-2.5 million), China (0.9 million-1.1 million), South Africa (0.40 million-0.6 million) and Indonesia at 0.4 million-0.5 million cases, 155-222 cases/100,000 population/year (WHO, 2012). The prevalence of childhood TB in Indonesia in 2011 was reported to be 8.8% of the total TB cases and 2-16% at the provincial level (WHO, 2012). Child TB case data from Public Health Offices is 8.8% of 3,153 cases, the incidence of TB in South Kalimantan Province is 241 cases/year. Data on child TB in South Kalimantan Province from 2009-2011 found as many as 28 cases with AFB + age 0-14 years. In 2014 and 2015, the proportion of pediatric TB patients found in Banjarbaru City was 10.84% and 8.5% compared to all TB patients.

Housing Health is a matter that must be considered to reduce the risk of TB cases in children because it involves the characteristics of the conditions of the home environment that affect the degree of public health. This study was an intervention study with a cross sectional approach. The study population was children with TB who were recorded and reported to the TB program responsible/executor of the Banjarbaru City Health Office. The sample of this study were all children with TB in the Health care in the Banjarbaru City area in January-December 2018. The results showed that there was no significant correlation between the health of the home environment in the incidence of pulmonary TB in Banjarbaru City children (p-value = 0.883) and there was no significant relationship between houses to increase the health status of children with tuberculosis in Banjarbaru (p-value = 0.419).

Keywords: Tuberculosis children, Management of homes, homes, neighborhoods.

Introduction

Tuberculosis (TB) in the world continues to increase, especially countries that are grouped in 22 countries with large burden of TB (high burden countries) and most have wetland areas so that in 1993 WHO declared TB one of the world’s emergencies (global emergency) and as an emergency disease diseases. Indonesia ranks 4th after India (2.0 million-2.5 million), China (0.9 million-1.1 million), South Africa (0.40 million-0.6 million) and Indonesia at 0, 4 million-0.5 million cases, 155,222 cases/100,000 population/year¹.

The prevalence of TB in children aged less than 15 years from the UK and Wales national survey in 1983 was 452 cases, in the United States based on a survey of 11 years (1983-1993) 171 cases of child TB were obtained. Child TB is 15% of all TB cases, while in developed countries it is 5-7%. The prevalence of childhood TB in Indonesia in 2011 was reported to be 8.8% of the total TB cases and 2-16% at the provincial level¹.

Child TB case data from Ministry of Health is 8.8% of 3,153 cases, the incidence of TB in South Kalimantan Province is 241 cases/year. Data on child TB in South Kalimantan Province from 2009-2011 found as many as 28 cases with AFB + age 0-14 years. In 2014 and 2015, the proportion of pediatric TB patients found in Banjarbaru City was 10.84% and 8.5% compared to all TB patients².

Integrated efforts to overcome or break the chain of transmission of TB disease have been carried out but the results are still not maximal and this must consider
the risk factors for TB disease. Risk factors for TB in children closely related to the incidence/incidence of TB are population factors which include the source of transmission, patient contact history, socioeconomic level, level of exposure, bacillus virulence, low endurance related to genetics, nutritional conditions, physiological factors, age, nutrition, immunization, and environmental factors which include the state of the physical environment of the housing (temperature in the house, ventilation, lighting in the house, humidity of the house, density of occupants and the environment around the house) and work.

Housing health is a matter that must be considered to reduce the risk of TB cases in children because it involves the characteristics of residential conditions that affect the health status of the community. The healthy condition of the home also contributes to achieving public health goals which according to Winslow is prevention disease, prolongation of life, and improvement of mental and physical health and efficiency through improvements to the physical environment of housing (temperature in the house, ventilation, home lighting, house humidity, occupant density and type of house floor) with an integrated management system for residential management.

The results of the study to prevent TB transmission include giving BCG immunization to children according to the schedule, providing nutritious food to maintain children’s immunity, giving babies exclusive breastfeeding for a minimum of six months, maintaining cleanliness of the home environment by cleaning the house floor every day, clean the toilet and bathroom, keep air circulation in the house, try to open the windows and doors at home every day so that the room in the house is exposed to sunlight (TB bacteria will die when exposed to the sun), do Clean and Healthy behavior, try children do not come into direct contact with people affected by TB to minimize TB transmission.

Occupancy density is one of the risk factors for TB infection which is more commonly found in groups of subjects who have more than one source of transmission. If housing becomes more crowded, the transfer of infectious diseases through the air will be easier and faster, especially in one house there are family members who are affected by TB, children will be very vulnerable to direct exposure. The number of sources of transmission in one house will increase the risk of TB infection in children. The results of the study in the City of Brebes showed that there was a relationship between the condition of the home environment (occupancy density) and the incidence of TB with a value of p value = 0.000 and OR = 5,168.27 According to Rusnoto et al. (2005) that there was a significant relationship between humidity and pulmonary tuberculosis incidence (OR = 6.3; 95% CI = 2.651-14,971). The results of the Jelalu (2008) study showed that 73.7% of cases of pulmonary tuberculosis in adults in the District Kupang is influenced by 4 variables, one of which is the humidity of the house.

According to Rusnoto et al. (2005) that there is a significant relationship between the extent of ventilation and the incidence of pulmonary tuberculosis, the results of the odds ratio (OR) of 16.9 with 95% Confidence Interval (CI) 2,121-134,641, with a value of p = 0.001.

Dahlan’s (2001) study showed that home ventilation is the most contributing variable that regulates room temperature for the incidence of pulmonary tuberculosis, statistically showing a significant relationship p <0.05 with OR = 8.8 (p = 0.000).

According to Susiloawati (2012), the incidence of smear positive tuberculosis has a chance or greater risk for people living in a house with positive smear tuberculosis, a house with zinc roofs, extensive ventilation <10% of floor area compared to people who do not live in a house with positive smear tuberculosis, home no zinc roof, ventilation area ≥10% of floor area in the upland area was statistically significant.

According to Rusnoto et al. (2005) that there are a significant relationship between home lighting and the incidence of pulmonary tuberculosis with an odds ratio (OR) of 7.926 with 95% Confidence Interval (CI) (3,129–20,080). The housing condition is not sufficiently light and has a ground floor/cracked cement also has a large proportion of pulmonary tuberculosis.

This type of soil floor has a role in the process of pulmonary tuberculosis, through indoor humidity. Ground floor tends to cause moisture, in the summer the floor becomes dry so that it can cause dust which is harmful to its occupants. This is supported by the results of a study by Mahfudin (2006) that the condition of houses with soil floors has a significant relationship with the incidence of pulmonary tuberculosis with OR 2.2 (1,135; 4,269). This is also supported by the results of research by Ruslan et al. (2017), there is a relationship between BCG immunization with pulmonary tuberculosis.
immunization status and the incidence of pulmonary tuberculosis in Banjarbaru City (0,000), there is a relationship between house floor area and incidence of pulmonary TB in Banjarbaru City (0,006), there is a relationship between house occupant density and incidence of pulmonary TB in children in Banjarbaru City (0,0006)⁹.

Efforts to get a high TB control work result requires integration from planning to prioritizing financing¹⁰. One of the measurable control systems for infectious disease control is residential management. Residential management is an intervention model to provide an understanding of management of the formation of habitable healthy homes based on the Decree of the Minister of Health of the Republic of Indonesia NO. 829/Menkes/SK/VII/1999 which consists of requirements for building materials, components and arrangement, lighting, air quality, ventilation, transmitting diseases, water, means of food storage, waste and occupancy density of bedrooms¹¹.

Materials and Method

This study was an intervention study with a cross sectional approach. The study population was children with TB who were recorded and reported to the TB program responsible/executor of the Banjarbaru City Health Office.

The sample of this study was all children with TB in the Puskesmas in the Banjarbaru City area from January to December 2018.

Findings

Table 1: Results of univariate analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of Family Members</td>
<td>&lt;4</td>
<td>10</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;4</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>2</td>
<td>Work</td>
<td>Cool/odd</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Farmers/fishermen</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trader</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employees/Civil Servants</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Housewife</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>3</td>
<td>Long suffering from TB</td>
<td>&gt; 3 weeks</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 1 month</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>4</td>
<td>Housing Environmental Health Requirements</td>
<td>Less well</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td>80.0</td>
</tr>
<tr>
<td>5</td>
<td>Healthy House</td>
<td>Un Compatible</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compatible</td>
<td>23</td>
<td>76.7</td>
</tr>
<tr>
<td>6</td>
<td>Suffering from pulmonary TB</td>
<td>Yes</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>24</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that the number of family members <4 is 10 (33.3%) and the number of family members > 4 is 20 (66.7%). While the most work from TB research in Banjarbaru City is Employees/PNS with a total of 13 (43.3%). While the smallest spelling is farmers/fishermen with number 1 (3.3%). the length of time the child has the most TB is > 1 month with 5 people with a percentage (16.7%) and the length of time the child has TB at least > 3 weeks there is 1 person with a percentage (3.3%). respondents who experienced pulmonary TB were found in an environment that did not meet the housing environmental health requirements, namely 6 (20%) respondents. While respondents who did not experience pulmonary TB were found in an environment that fulfilled the housing environmental health requirements, namely 24 (80%) respondents. Based on the table above, it can be seen that of the 30 (100%) respondents who met the criteria for a healthy home of 23 (76.7%) respondents. While those who did not meet the criteria for a healthy home were 7 (23.3%) respondents.

Based on the table it can be seen there are 6 (20%) respondents who suffer from pulmonary TB. While there were 24 (80%) respondents who were known not to have pulmonary TB.
Table 2: Analysis Bivariate

<table>
<thead>
<tr>
<th>Variable</th>
<th>TB incidence</th>
<th>P-Value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suffering from TB</td>
<td>Not suffering from TB</td>
<td></td>
</tr>
<tr>
<td>Residential home</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Qualify</td>
<td>4</td>
<td>17.4</td>
<td>19</td>
</tr>
<tr>
<td>Not Qualify</td>
<td>2</td>
<td>28.6</td>
<td>5</td>
</tr>
<tr>
<td>Home Environmental Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>2</td>
<td>33.3</td>
<td>4</td>
</tr>
<tr>
<td>Well</td>
<td>4</td>
<td>16.7</td>
<td>20</td>
</tr>
</tbody>
</table>

Based on the findings in the field, out of 24 (100%) respondents with good Environmental Health, there were 4 (16.7%) respondents who suffered from pulmonary pulmonary TB. This can occur because a good Home Health Environment does not guarantee that it is far from all aspects of the disease, especially pulmonary TB.

Chi Square test results with a confidence level of 95% to see a relationship between Home Environmental Health on the incidence of pulmonary TB in children in Banjarbaru City found that the p-value = 0.883. From the p-value value in the results of the statistical test, Ho’s decision was accepted (p > 0.05), which means that there was no significant relationship between Home Environmental Health and the incidence of pulmonary TB in children in Banjarbaru City.

Based on the table above, respondents who suffer from pulmonary TB are more prevalent in respondents who have houses that meet the requirements, namely as many as 4 (17.4%) respondents compared to those whose houses do not meet the requirements, namely as many as 2 (28.6%) respondents.

Chi Square test results with a confidence level of 95% to see the existence of residential relationships to an increase in health status of children with TB in Banjarbaru city showed that the p-value = 0.419. From the p-value values in the results of the statistical test, Ho’s decision was accepted (p > 0.05) which means that there was no significant relationship between houses to improve the health status of children with TB in the city of Banjarbaru. This research is in line with Asfiradyati’s research (2016) there is no relationship between the physical environment factors of the house which include natural lighting (p-value 0.102), house walls (p value 0.137), ventilation area (p value 0.805), and house floor (p value 0.700) with the incidence of pulmonary TB in infants/children12.

Discussion

Chi Square test results with a confidence level of 95% to see the existence of residential relationships to an increase in health status of children with TB in Banjarbaru city showed that the p-value = 0.419. From the p-value values in the results of the statistical test, Ho’s decision was accepted (p > 0.05) which means that there was no significant relationship between houses to improve the health status of children with TB in Banjarbaru City.

Conclusion

1. There is no significant relationship between Home Environmental Health on the incidence of pulmonary TB in children in Banjarbaru City (p-value = 0.883)
2. There was no significant relationship between houses to improve the health status of children with TB in Banjarbaru (p-value = 0.419)

Ethical Clearance: this study approved and received ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia. In this study we followed the guidelines from the Committee of Public Health Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia for ethical clearance and informed consent. The informed consent included the

Source Funding: This study done by self funding from the authors.

Conflict of Interest: The authors declare that they have no conflict interest.
References


Relationship of Environmental Factors, Sanitation Means and Sanitation Behavior with Fly Density Level (Review of Food Stalls in Banjarbaru City)

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Abstract

Many food stalls lack the cleanliness of the surrounding environment so that it becomes a supporting factor for the development of disease vectors. Based on a preliminary study conducted in December 2017, it was seen a collection of flies on five food stalls around the city of Banjarbaru. The purpose of this study was to analyze the relationship between environmental factors, sanitation facilities, and sanitation behavior with the level of density of flies in food stalls in Banjarbaru City. This study was an observational analytic study with a cross sectional design. The results showed that the density of flies with high, medium and low categories were found in 3 stalls (6%), 18 stalls (36%) and 29 stalls (58%). There is no correlation between temperature, humidity, light intensity, clean water supply, waste management, and sanitation behavior with the level of fly density (p value> 0.05). There is a relationship between toilet facilities and sewerage with the level of fly density (p value <0.05).

Keywords: Flies density, environmental factors, sanitation facilities, sanitation behavior.

Introduction

A food stall or canteen is a simple business that usually sells traditional food or home-cooked food, which is relatively affordable for consumers. In general, food stalls provide a simple place to enjoy food sold. The requirements for sanitation of canteens/food stalls have been explained in the Decree of the Minister of Health of the Republic of Indonesia Number 109/Ministry of Health/SK/VII/2003 concerning the feasibility of sanitation hygiene in restaurants and restaurants. Hygiene requirements for canteen/stall sanitation must meet the stipulated conditions, one of which is basic sanitation facilities1.

The existence of food stalls in a settlement is a supporting requirement for city residents if they want to immediately enjoy a meal in a place or taken home in terms of practicality. However, many of them lack the cleanliness of the surrounding environment so that it becomes a supporting factor for vector development2. Therefore, food stalls require basic sanitation that must be kept clean in order to prevent the arrival of disease vectors, such as flies. Flies that perch on food have the potential to carry contaminants and reduce food quality3.

Flies are insects from the diphtheria order that have a pair of membrane-shaped blue wings. All body parts of a house fly can act as an infectious agent (body, feathers on hands and feet, feces and vomit)4. Dirty and smelly environmental conditions can be an excellent place for growth and breeding for house flies. The presence of flies in food can be a serious threat to human health. Flies become mechanical vectors of agents for viruses, bacteria, protozoa, and worm eggs from trash into human food5.

With varied educational backgrounds and insights, food sellers need to get the attention of various parties in order to maintain the safety of food sold from disease transmission. Based on a preliminary study conducted at several food stalls around the city of Banjarbaru in December 2017 there were visible flies in five food stalls. This is because the seller does not take precautions in the form of a serving lid to protect food from flies. Besides that, it was seen that there were still food debris scattered...
Fly populations increase depending on season and climate conditions, and the availability of suitable breeding sites. Environmental temperature, air humidity and rainfall are fly populations increase depending on season and climatic conditions, and the availability of suitable breeding sites. Environmental temperature, air humidity and rainfall are components of weather that affect the quality and quantity of flies in nature. The population of many house flies will cause disruption to humans and can be a vector that carries diseases to humans such as dysentery, diarrhea, typhoid, cholera and other digestive disorders. Weather components that affect the quality and quantity of flies in nature The population of many house flies will cause disruption to humans and can be a vector carrying diseases to humans such as Decentri, Diarrhea, Typhoid, Cholera and other digestive disorders.

Flies are more active in places that are protected from light than places that are directly exposed to sunlight. The density and spread of flies in an area is influenced by its reaction to light, temperature, humidity, texture and surface color that are favored for rest. The density of flies will be high if the temperature is between 20-25°C. The population decreases if the temperature is >45°C and <10°C. Flies are generally active in low air humidity. At temperatures above 20 °C the fly will be outside the house, in a place close to free air. When not eating, flies will rest on horizontal surfaces or on cables that stretch or vertical places and on the roof in the house especially at night.

Based on the above background, research is needed on the relationship between environmental factors (temperature, humidity, light intensity), sanitation facilities (provision of clean water, latrine availability, waste management and sewerage) and sanitation behavior with fly density at food stalls in around the city of Banjarbaru.

**Material and Method**

This type of research is an analytic observational study with a cross sectional study design. The population in this study were all food stalls managers around the city of Banjarbaru. The minimum sample used for correlational research is 50 samples.

<table>
<thead>
<tr>
<th>No</th>
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<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>42</td>
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<tr>
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<td></td>
<td>Low</td>
<td>29</td>
<td>58</td>
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<tr>
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<td>Support</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not support</td>
<td>46</td>
<td>92</td>
</tr>
<tr>
<td>3</td>
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<td>Support</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not support</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td>4</td>
<td>Light intensity</td>
<td>Support</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not support</td>
<td>34</td>
<td>68</td>
</tr>
<tr>
<td>5</td>
<td>Clean water supply</td>
<td>Less</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well</td>
<td>39</td>
<td>78</td>
</tr>
<tr>
<td>6</td>
<td>Latrine Facility</td>
<td>Less</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>Waste management</td>
<td>Less</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>Waste water drains</td>
<td>Less</td>
<td>22</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>Sanitation Behavior</td>
<td>Less</td>
<td>31</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well</td>
<td>19</td>
<td>38</td>
</tr>
</tbody>
</table>

Based on table 1 above, there are 29 food stalls (58%) that have a low category of fly density, there are 21 food stalls (42%) with medium fly density categories. The density level of flies has a moderate category standard if there are 3-5 tail/grill blocks and low if there are 0-2 tail/grill blocks. The most common fly is the type of house fly (Musca domestica). Other types of flies are large flies (Sarcophagacalcitrans) and green flies (Chrysomyamegacephala).

The table also shows that the temperature that does not support fly density is dominant in 46 food stalls (92%). The moisture factor that does not support the development of flies is in 29 stalls (58%).

Based on the table, most of the light intensity supports the density of flies in food stalls as many as 34 food stalls (68%). The provision of good clean water has mostly been applied by food stalls in the city of Banjarbaru with a total of 39 fruits (78%). Based on the table above, it is known that for latrine facilities, most have implemented 40 food stalls (80%) well.

A food stall that implements good and poor waste management is balanced with 25 food stalls each. In the table above, it can be seen that there are only 28 food stalls (56%) in the waste water drainage category.
Table 2: Bivariat Analysis

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Flies density</th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medium</td>
<td>Low</td>
<td>n</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>2</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>Does not support</td>
<td>19</td>
<td>27</td>
<td>58,7</td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>9</td>
<td>12</td>
<td>42,9</td>
</tr>
<tr>
<td>Does not support</td>
<td>12</td>
<td>17</td>
<td>58,6</td>
</tr>
<tr>
<td>Light intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>5</td>
<td>11</td>
<td>31,2</td>
</tr>
<tr>
<td>Does not support</td>
<td>16</td>
<td>18</td>
<td>52,9</td>
</tr>
<tr>
<td>Clean water supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>14</td>
<td>25</td>
<td>35,9</td>
</tr>
<tr>
<td>Well</td>
<td>7</td>
<td>4</td>
<td>63,6</td>
</tr>
<tr>
<td>Latrine Facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>4</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Well</td>
<td>17</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>Waste management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>6</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Well</td>
<td>15</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Waste water drains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>8</td>
<td>9</td>
<td>28,6</td>
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<td>Less</td>
<td>5</td>
<td>15</td>
<td>26,3</td>
</tr>
<tr>
<td>Well</td>
<td>16</td>
<td>14</td>
<td>51,6</td>
</tr>
</tbody>
</table>

Based on table 2 above shows that at a supportive temperature, the moderate density of fly flies is less than the temperature that does not support. Whereas in the low category density of flies more in temperature conditions that do not support compared to the temperature that supports. From the table above, it can be seen that the results of the chi square statistical test show a p-value of 1,000 which means there is no relationship between temperature and the density of flies. The results of Erza NA and Bambang W (2017) research also show that there is no significant relationship between temperature and fly density inside and outside the home.

Based on the table above shows that in the supporting humidity, the medium density level of flies is less than that which does not support moisture. Whereas in the low category fly density level more in conditions of humidity that do not support compared to the supporting humidity. From the table above, it can be seen that the results of the chi square statistical test show a p-value of 1,000, which means there is no correlation between humidity and the density of flies in food stalls in the city of Banjarbaru.

Table 2 above shows that in the light intensity that supports, the moderate density of fly flies is less than the light intensity that does not support. Whereas the low category of fly density is more in the condition of light intensity that does not support compared to the light intensity that supports it. The results of the chi square statistical test showed a p-value of 0.454 where there was no correlation between light intensity and the density of flies in food stalls in the city of Banjarbaru.

The table above shows that in the supply of clean water that is lacking, the level of density of flies in the medium category is less than the provision of good clean water. The results of the chi square statistical test showed a p-value of 0.193 where the value of p> 0.05 means that there is no relationship between the supply of
clean water and the density of flies in food stalls in the city of Banjarbaru.

The table above shows that in the waste management that is lacking, the level of density of flies with the medium category is more than that of good waste management. The results of the chi square statistical test showed a p-value of 0.05 where the value of p < 0.05 means that there is a relationship between waste management and the level of density of flies in food stalls in the city of Banjarbaru.

The table above shows that in the wastewater drainage that is lacking, the level of density of flies with the medium category is more than that of good waste management. The results of the chi square statistical test showed a p-value of 0.030 where the value of p < 0.05 means that there is a relationship between sewerage and the density of flies in food stalls in the city of Banjarbaru.

The table above shows that in poor sanitation behavior, the level of fly density in the medium category is more than that of good sanitation behavior. Whereas the low category of fly density is more in terms of good sanitation compared to poor sanitation behavior. The results of the chi square statistical test showed a p-value of 0.079 where the value of p > 0.05 means that there is no correlation between sanitation behavior and the level of density of flies in food stalls in the city of Banjarbaru.

Discussion

The flies around the settlements are Musca domestica house flies and Chrysomya megacephala green flies, and the Blirik fly Sarcophaga sp. These flies breed in habitats in piles of dirt, garbage that has decayed and is full of bacteria and other pathogenic organisms. High or abundant fly populations can interfere with human peace because they cause discomfort around and can transmit various types of digestive disorders due to various types of bacteria that are transmitted.

Fly populations increase depending on the season and climate conditions, and the availability of suitable breeding sites. Environmental temperature, air humidity and rainfall are components of weather that affect the quality and quantity of flies in nature. Fly larvae are very vulnerable to air humidity, deviating air temperatures and excessive rainfall.

Musca domestica and Chrysomya megacephala are cosmopolitan and synanthropic flies which means that these flies have a high dependency relationship with humans because the nutrients needed by flies are mostly in human food. Depending on the season and temperature: Adult flies live 2-4 weeks in summer and are longer in winter, which can reach 3 months, they are most active at 32.5°C and will die at 45°C.

The level of knowledge and how to behave adequately regarding the hygiene and sanitation of food stalls are other factors that may also influence the spread of flies around it. In addition, based on the facts in the field, another factor also is not applying the sorting of organic and non-organic waste in these places.

Ways to prevent flies from dirt containing germs can be sought by making construction of latrines that meet the requirements. Good waste management, such as collecting, transporting and disposing of waste, will be better sequentially because it can eliminate fly media. Garbage bins that meet the requirements, among others, are made of waterproof material, are not easily corroded, strong, closed and easy to clean so as not to become a nest of disease vectors. In addition, the waste is transported at least 1 x 24 hours.

To protect food, equipment and people in contact with flies can be done by: 1) food and eating utensils used must be anti-fly; 2) food stored in the larder; 3) food needs to be wrapped; 4) windows and open places wire screens; 5) other electric appliance fans can be installed to prevent incoming flies; and 6) attaching sticks to trap flies.

Conclusion

1. There is no relationship between temperature and density of flies in food stalls in Banjarbaru city with a p-value of 1,000.
2. There is no correlation between humidity and the density of flies in food stalls in Banjarbaru with a p-value of 1,000.
3. There is no correlation between light intensity and the density of flies in food stalls in Banjarbaru with a p-value of 0.454.
4. There is no relationship between the supply of clean water and the density of flies in food stalls in Banjarbaru city with a p-value of 0.193....
5. There is a relationship between waste management and the level of density of flies in food stalls in Banjarbaru city with a p-value of 0.05

6. There is a relationship between sewerage channels and the density of flies in food stalls in Banjarbaru city with a p-value of 0.030

7. There is no correlation between sanitation behavior and the density of flies in food stalls in Banjarbaru city with a p-value of 0.079.

**Ethical Clearance:** This study approved and received ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia. In this study we followed the guidelines from the Committee of Public Health Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia for ethical clearance and informed consent. The informed consent included the research title, purpose, participants’s right, confidentiality and signature.

**Source Funding:** This study done by self funding from the authors.

**Conflict of Interest:** The authors declare that they have no conflict interest.

**References**

1. Decree of the Minister of Health of the Republic of Indonesia Number 1098/Menkes/SK/VII/2003 concerning the feasibility of sanitation hygiene in restaurants and restaurants, 2003


6. Rudianto, Heru, Azizah. Study of differences in the distance of housing to open dumping landfill waste with indicators of the density of flies and the incidence of diarrhea (Study in Kenep Village, Beji District, Pasuruan Regency) Journal of Airlangga, 2009

Children’s unwanted pregnancy and early marriage is still quite high in Indonesia. Parents’ role have important factor on Children’s unwanted pregnancy and early marriage. The objective of this study were to determine parents’ role which affecting unwanted pregnancies and early marriage aged 13-18 years. A cross-sectional study was conducted on 60 families who had children 13-18 years who were married. A guided self-administered questionnaire, which included the characteristics respondents, parental permissiveness, reproductive function, education function, socioculture function, and religion function, were used. Approximately 61.7% permissive parents, 68.3% of family had supporting religious function, 25.0% less supporting the reproductive function, which were significantly ($p < 0.05$) associated with unwanted pregnancies. Permissive parents had 2.18 times greater unwanted pregnancy (PR = 2,18, 95% CI 1.21, 3.92, $p < 0.05$) compared to less permissive parents when adjusted for other variables. This study highlights a high unwanted pregnancies and early marriage that is associated with parental permissiveness, religious function, and reproductive function of families.

**Keywords:** Parental permissiveness; Reproductive function; Religious function; Unwanted pregnancies; Early marriage.

**Introduction**

Unwanted pregnancy and early marriage means premarital pregnancy in a woman aged 10–19 years\(^1\). Premarital unwanted pregnancies and early marriage in children (less than 18 years) are important public health issues in developing countries, including in Indonesia\(^2\). This is related to the impact caused by both mother and child. Baby born by a girl who married at the age of a child have more risk of death high, and possibly two times bigger to die before the age of 1 year compared to children born of a mother who is twenty annual. Babies born by the child’s bride also has higher probability for premature birth, with weight low birth body, and malnutrition\(^3\).

Child’s Unwanted pregnancies are the dominant factor in the occurrence of child marriage in Indonesia\(^4,5\). The number of child marriage in Indonesia is still relatively high in the East Asia and Pacific region. National Social and Economic Survey showed approximately 25% women marry under the age of 18\(^6\). Supported by the Indonesian Demographic and Health Survey (2012), 17% of women were married before the age of 18\(^7\).

Likewise in West Kalimantan Province, Indonesia, there is still a high age of child marriage due to unwanted pregnancies. In 2015 year, Age Specific Fertility Rate (ASFR) in West Kalimantan’s was the highest in Indonesia, as many as 104 per 1000 births\(^8\). One of the initiation factors the child’s age marriage is premarital sexual behavior that affects pregnancy\(^5,9,10\).

Sintang District is one of disadvantaged, frontier, and outermost regions which are still very limited in terms of access to information, facilities and infrastructure. There are still many public health problems in the area, including early marriage and unwanted pregnancy in children\(^11\). The results of the preliminary survey indicate that children who live in border areas tend to be more likely to do early marriage (unwanted pregnancy is the main factor). Evidenced by ASFR in Sintang District with the highest age of 15-19 years in West Kalimantan, 62 per 1000 births. The dominant cause is free sex\(^12\).

Multiple studies have examined the level of education, families’ role\(^13\), early sexual debut\(^14\), low self-esteem, low educational\(^15\). Research on pregnancy in adolescents has been done a lot, but research that addresses the focus on parenting parents, especially
parental permissiveness and the application of family functions is still limited, and the focus on children who live at border areas has not been widely studied.

Based on ecological factors among children’s environment, including parental relationships with their children was related by risky behavior. A positive family environment is an important place in good development for adolescents. Family is a protective and prevention factor of risky behavior.

It is needed a research to determine the influence factors of unwanted pregnancy in children, especially in border areas, so that it can be used as a basis for intervening as a preventive and protective unwanted pregnancy. The purpose of this study was to determine the relationship between parental permissiveness and the application of family functions with children’s unwanted pregnancies in the border area, Sintang District.

**Method**

**Subject:** This research was conducted on all families with children who experienced pregnancy in the Mensiku Health Center Work Area, which was obtained from a cohort of pregnant women from January 2016 to June 2017 as many as 60 families. This study was an observational study with a cross sectional approach. The sampling technique using total sampling.

**Instruments:** Data were collected through a structured interview questionnaire that was adopted and given to all participants. The questionnaire covered matters parental permissiveness, reproductive, socio-cultural, environmental, education, economy, religious, love, and protection function. Closed-ended questions were included with two answering options.

Parental permissiveness was measured to determine whether parents are permissive to dating behavior in children, and free dating behavior in children as long as they do not get pregnant.

The reproductive function measures whether giving sexual education or reproductive health to their children.

The function of religion measures whether running religious activities and participating in religious activities. The education function measures whether families encourage their children to continue to further education. The environmental function measures whether the environment around the case of an unwanted pregnancy is normal. The love function measures whether the family gives attention and affection to children. The Economic Function measures the family’s economic status based on the Regional Minimum Wage.

The socio-cultural function measures the socio-cultural conditions that are more permissive in unwanted pregnancies.

**Data analysis:** Data analysis used univariate and bivariate analysis, with X2 test (Chi Square) and 95% confidence level (α-0.05). In the cross sectional study, the value of Prevelen Ratio (PR) is used to determine the closeness of the relationship.

**Results and Discussion**

Approximately 93.3% of participants are aged 16-18 years, senior high school (48.3%), pregnancy delivery age was 29-41 weeks (98.3%), and unhealthy dating (96.7%).

<p>| Table 1. Characteristic of parental permissiveness, religious and reproductive function on unwanted pregnancy |
|------------------------------------------|----------------|----------------|--------|-----------|---------|---------|</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>Unwanted Pregnancy</th>
<th>p Value</th>
<th>PR (95% CI)</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>Less supporting</td>
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<td>75.7</td>
<td>9</td>
</tr>
<tr>
<td>Supporting</td>
<td>8</td>
<td>34.8</td>
<td>15</td>
</tr>
<tr>
<td>Religious functions</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>Supporting</td>
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<td>48.8</td>
<td>21</td>
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<tr>
<td>Reproductive functions</td>
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<td></td>
</tr>
<tr>
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<td>2</td>
</tr>
<tr>
<td>Supporting</td>
<td>23</td>
<td>51.1</td>
<td>22</td>
</tr>
</tbody>
</table>

*Statistically significant (<0.05)
This study showed that parental permissiveness of dating behavior was significantly associated with unwanted pregnancy ($p = 0.004; 95\%\ CI = 2.176$) (See table 1). Participants who had permisive parents were 2,176 times and less supporting of reproductive function were 1,696 times more likely to get unwanted pregnancy.

Table 2: Characteristics of socio-culture, love, protection, education, economy, and environmental function on unwanted pregnancy

<table>
<thead>
<tr>
<th>Family Function</th>
<th>Unwanted Pregnancy</th>
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<th>PR (95% CI)</th>
</tr>
</thead>
<tbody>
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<td>Yes</td>
<td>No</td>
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<td>70.6</td>
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<td></td>
<td>24</td>
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</tr>
<tr>
<td></td>
<td>21</td>
<td>51.2</td>
<td>20</td>
</tr>
<tr>
<td>Protection function</td>
<td>9</td>
<td>64.3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>27</td>
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<td>19</td>
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<td>Education function</td>
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<td>33.3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>61.4</td>
<td>22</td>
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<tr>
<td>Economy functions</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>59.6</td>
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</tr>
<tr>
<td>Enviroment function</td>
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<td>65.4</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>55.9</td>
<td>15</td>
</tr>
</tbody>
</table>

Less supporting of family function could increase the likelihood of unwanted children. Statistically, social, love, frequency, education, economy, and environment function didn’t have a significant relationship, but it showed a positive trend. It is a family that functions better than an unwanted school.

Pregnancy under 20 years has a negative impact on the condition of the fetus and maternal health (premature babies, bleeding, disabled babies, and even death). This finding shows all participants had unhealthy dating behavior. It indicates the sexual initiation earlier amongst border children. Earlier sexual initiation could be a trigger the premarital sexual intercourse$^{23,24,25,26}$. As a finding this study that approximately 60.0% of participants gets unwanted pregnancies. Low education in children’s pregnancy were worse the condition. It is because of the lack of information about pregnancy and health$^{27}$. Especially the children who live in the border area (including disadvantaged, underdeveloped and outermost), which lack access to information, and educational facilities. This is one of factor that contributes the increasing in Age Specific Fertility Rate in West Kalimantan particulary, and Indonesia generally.

Parental education level of participants was low. Its had affects the style of parenting to their children, including in carrying out family functions and providing sexuality. Education and parental marital status are one of the determinants that do not directly affect unwanted pregnancies in children$^{28}$. 

Parental permissiveness is significantly associated with unwanted pregnancies in children. The findings of this study indicate that most parents are permissive towards dating (81.7%), allowing a child’s relationship with a girlfriend/boyfriend (65.0%) and freeing the child’s relationship with a girlfriend/boyfriend provided they are not pregnant (58.3%). It will increase risky sexual behavior on children$^{29}$. Supported by the lack of knowledge about sexuality would increase the risky sexual behavior, that impacts on unwanted pregnancy. Children in the border area are very limited information, facilities and infrastructure (disadvantaged, underdeveloped, and outermost). This are supported by the permissiveness of parents to dating, which increases the chances children’s unwanted pregnancy. Research shows that children living in border areas are vulnerable to human trafficking (including child prostitution)$^{30}$.

In line with research conducted by Kincaid et al. (2012) states that the role of parents greatly influences adolescent sexual behavior. Parents who are more permissive to adolescent sexual behavior, then the tendency will increase the risk of adolescents involved in risky sexual behavior$^{31}$. Parents are one of the primary protective factors in the behavior of risky adolescents$^{29,32}$.

This study also shows that religious functions that support significance are related to unwanted pregnancies on children who live in border areas. The application of religious values in family life can prevent and protect children that are prohibited by religion, including premarital sexual behavior which impacts on unwanted pregnancies. This study focuses on religious life that is applied in families, which includes carrying out religious worship (76.7%), attending religious activities (96.7%), and families informing that having a relationship before marriage is a violation of religious and sinful norms.
(75, 5%). This research indicates that the application of religious functions in the family can prevent and protect children from unwanted pregnancies.

Reproductive function in the family has a significantly association with unwanted pregnancy on children who live in border area. The focus of this study is communication about reproductive health properly. Based on the results of this study, internal communication as a form of reproductive function can prevent and protect children from unwanted pregnancies. The focus of this study shows that most families do not discuss with children about sexually irregularities (71.7%), not provide pubertas information (56.7%). This is in line with previous research, sexuality communication conducted as a preventive factor for risky sexual behavior and unwanted pregnancy in children.

The results of the study found that there was no significant relationship between socio-cultural, environmental, economic, protection, and love functions with an unwanted pregnancy (p value > 0.05). Although not significantly related, indicates a positive relationship trend. This means that the social, cultural, environmental, economic, protection, and non-supportive functions have a greater chance of unwanted pregnancy than those who support. The family is the first and foremost educator for adolescents. Parents play an important role in socializing the norms that exist in society.

Effective and efficient intervention is needed in involving the role of the family in applying family functions, so it could be a primary prevention and protection of risky behavior of children, including unwanted pregnancy. This finding has implications for program development of culturally grounded prevention and intervention techniques based on family approach. The results suggest that programs that emphasize parental involvement in applying family function and regarding parental permissiveness might be most effective in preventing risky sexual behavior that affects unwanted pregnancy. The study’s limitation is the number size of this research still small. Future, the researcher should add the sample size.

Conclusions

This cross-sectional study could be considered to be a preliminary study identifying factors related unwanted pregnancies amongst border child aged 13-18 years. Parental permissiveness and family function among border children should be improved.

Conflict of Interest: The author declares that there is no conflict of interest.

Acknowledgements: We would like to thank all of the participants in the study for the time and help given throughout. Without their participation, this research would not have been possible.

Ethical Clearance: All procedures performed in studies involving human participants were in accordance with the ethical standards and have been approved by the appropriate institutional research ethics committee.

Source of Funding: Independently.

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Efficacy of Proprioceptive Neuromuscular Facilitation and Closed Kinetic Chain Exercises on Quadriceps and Plantar Flexors Among Geriatrics

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Abstract

Elderly population’s quality of life decline at a faster rate and hence there is an increase in mortality rates. Anti-aging process can be emphasised by scheduled exercise programs which enhances beneficiary adaptations in vascular physiology and neurovascular coupling. The mobility function is disturbed due to reduced muscle strength, inappropriate activation of motor units, insufficiency to maintain balance which leads to higher risk offall in the elderly people. Closed kinetic chain exercises control the musculoskeletal system against gravity at rest and in motion thereby protecting the postural stability. PNF has a positive effect on balance and functionality in older adults.

Materials and Method: A Quasi experimental study was done for 50 community dwelling elderly people from “Vishranthi Charitable Trust” with mean age of 73±4 years who were selected based on the inclusion criteria. Closed kinetic chain exercises for quadriceps and plantar flexors along with PNF technique such as anterior elevation and posterior depression were given and followed up for 3 weeks. The pretest and post test values were obtained using 6-min walk test, the knee extensor strength measurement and fall risk questionnaire.

Result: There was a significant difference in 6-min walk test, fall risk questionnaire p<0.05 in improving the strength of quadriceps and plantar flexors, and there was non-significant difference in the knee extensor strength.

Conclusion: Hence the study concludes that there is an impact on PNF and Closed kinetic chain exercise on quadriceps and plantar flexors to enhance balance among geriatrics.

Keywords: Geriatrics, closed kinetic chain exercise, PNF, quadriceps and plantar flexors.

Introduction

Anti-aging process can be emphasised by scheduled exercise programs which enhances beneficiary adaptations in vascular physiology and neurovascular coupling. In today’s era exercises have shown higher growth than accommodating to secondary lifestyle.

In most individuals just the euphoria of exercise has drastically delayed the aging process.

Elderly population’s quality of life decline at a faster rate and hence there is an increase in mortality rates. The main cause of aging is due to morphological, functional and biochemical changes in the body that makes the person more susceptible to deformities as it is a natural, progressive and dynamic process.(1) The essential element for the performance of purposeful activities such as postural maintenance during gait is postural balance which decreases with age.

Reduction in muscle strength and maintenance of muscle properties for daily activities leads to increase in dependency level and reduced self confidence. The
mobility function is disturbed due to reduced muscle strength, inappropriate activation of motor units, insufficiency to maintain balance leads to higher risk of fall in the elderly people. Balance is essential for controlled and co-ordinated movements. It plays a major role in the sensory input such as vision, vestibular system and proprioception.

The foot and ankle plays a major role in balance and postural control. As aging progresses, there is alteration in the gait pattern characterised by reduced speed, cadance and increased variability of step duration and length.

The function of muscle strength decreases about 25% after the age of 65 which results in decreased size of muscle fibres, the contraction and relaxation of the muscle is also decreased. In elderly the capacity to generate strength of the muscle is reduced and due to this there is decrease in physical and functional independence.

Closed kinetic chain exercises control the musculoskeletal system against gravity at rest and in motion and the postural stability is also protected. Joint stability is enhanced by reducing the shear strength and compressive forces adding to the joints. There is also an increase in the co-contraction of muscle and eccentric contraction. (3)

Proprioceptive neuromuscular facilitation has a positive effect on the balance and functionality of older adults. (1) It reduces fall risk in the population and is presented as an interesting exercise program which enhances balance on elderly including co-ordination and proprioceptive activities also. (4)

**Materials and Method**

A Quasi Experimental study was done for community dwelling elderly population from Vishranthi Charitable Trust. 50 participants were taken and the study was conducted for duration of 3 weeks. Patients included for the study were: Old aged people in between the age of 65-85 years; Both male and female are included; Mini Mental State Examination > 24; Fall Risk Questionnaire with the total of 4 and above were included. The exclusion criteria for the study was–Recent orthopaedic surgeries in the lower limb; Patients with neurological disturbance, cardiovascular disease, vestibular disorder, mentally unstable and non co-operative patients were excluded from the study.

**Procedure:** The participants were explained about the study and the procedure. The pretest was done based on the outcome measures such as Fall Risk Questionnaire; The knee extensor strength (THIGH GIRTH) was measured for the right and left leg; 6 min walk test was done and the time duration was noted. After the pretest the participants were made to do the concerned exercises.

**Closed Kinetic Chain Exercises**

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double leg heel raises (3sets 12 reps)</td>
<td>Single leg heel raises (3 sets 12 reps)</td>
<td>Single leg heel raises with weight (3 sets 12 reps)</td>
</tr>
<tr>
<td>Double leg squat (3 sets 12 reps)</td>
<td>Single leg squat (3 sets 12 reps)</td>
<td>Single leg squat with weight (3 sets 12 reps)</td>
</tr>
</tbody>
</table>

The patient was asked to raise both their heel and stand with their toes for 12 counts and 3 sets, then the patient was asked to squat using both their legs. This was done for a week. The next set of exercises was done on 2nd week such as single leg heel raise and single leg squat for 3 sets and 12 repetitions. The 3rd week exercise was progressed using 2 kg weight which is administered on the lower part leg above the ankle and the patient was asked to do single leg heel raise and single leg squat with the weight for 3 sets and 12 repetitions.

**Proprioceptive Neuromuscular Facilitation:** The treatment in the study consisted of the pelvis in anterior elevation and posterior depression. Anterior Elevation was done by asking the patient in left side half lying position with knee slightly flexed. The therapist was stood in a diagonal position behind facing the patient. One hand of the therapist was on the patients right ASIS and the left hand was reinforced over the right and the patient was commanded to pull their pelvis up and forward. The same method was administered for the right side also. Posterior Depression was done by asking the patient in left side half lying position. The therapist left hand was placed over the patients right ischial tuberosity and the right hand is reinforced over the other. The patient was commanded to” Sit back over my hands” till the patient completes the end range. This technique was done for 3 weeks for every session. The total duration of the exercise was 30 minutes. After the 3 week of exercise post test was done using the outcome measures such as fall risk questionnaire; The knee extensor strength.
Stastical Analysis:

Table 1: Reveals that the Fall risk Questionnaire, 6 minute Walk test, Thigh Girth of Left & Right leg of Geriatric Population.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Standard deviation</th>
<th>Standard Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Risk Questionnaire</td>
<td>1.488</td>
<td>0.210</td>
<td>22.31</td>
<td>0.005</td>
</tr>
<tr>
<td>6 minute walk test</td>
<td>1.263</td>
<td>0.178</td>
<td>25.63</td>
<td>0.005</td>
</tr>
<tr>
<td>Thigh girth (right)</td>
<td>6.519</td>
<td>0.922</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Thigh girth (left)</td>
<td>6.403</td>
<td>0.905</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Result

The study shows that there is a significant difference between the knee extensor strength and fall risk questionnaire and the 6 min walk test with p<0.05 in improving the strength of the quadriceps and plantar flexors. The study shows that there is no difference between the thigh girth measurement in both legs.

Discussion

The present study was aimed to find the effect of PNF and Closed kinetic chain exercise on quadriceps and plantar flexors among geriatric patients for 3 weeks, for subjects with high fall risk and balance problem due to weak quadriceps and plantar flexors. Lanza et al found that the older adults showed significant increase in time required to attain target velocity indorsiflexors. This age related delayed progression of contraction velocity might be due to number of changes in muscle morphology and function subordinating with age, including a selective loss of type II muscle fibres for which an impaired ability to generate high motor unit discharges at greater rate. Teasdale et al and colleagues reported that attention demanded during normal walking was higher in older adults than younger adults regardless of their phases during gait cycle. After the improvement of balance in the present study the subjects were able to cross any obstacle without any difficulty.

Closed kinetic chain exercises played a major role in improving the strength of the muscles along with functional performances in older adults thereby reducing the fall risk prevalence.

Limitations:

- Small size was small.
- Long term follow-up can been done.
- This study can be compared with other geriatric population with any pathophysiological conditions to know the efficacy of closed kinetic chain exercises.
- Efficacy of other muscle group can be evaluated to examine the hip, knee and ankle strategy.

Conflict of Interest: Nil

Sources of Funding: Self

Ethical Clearance: Taken from the ethical committee SOPT, VISTAS.

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The Development of an Integrative Holistic Program in Early Childhood Care and Education: A Policy in the Indonesian Context

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Abstract
Policies on early childhood care and education in Indonesia continue to grow. One interesting policy to discuss is integrative holistic early childhood development. The HI-ECD program is considered effective in ensuring the fulfillment of early childhood development rights. HI-ECD in early childhood education unit includes education, health and nutrition services, care, and protection. The aim of HI-ECD is to fulfill the essential needs of early childhood, both physically and psychologically so that they can become healthy, intelligent, and noble persons, and ready to enter the next level of education. In addition, the long-term goal is to prepare and succeed the Indonesian gold target by 2045. This study was based on an analysis of government-issued HI-ECD documents as well as various relevant literature.

Keywords: Integrative holistic programs, education, health and nutrition, care, protection, early childhood.

Introduction
Early childhood is the next generation of the nation that will bring change in the future. They have very rapid growth and development, both physically and intellectually. It is estimated that when a child enters kindergarten, his brain weighs almost 90% of the brain of an adult. Various studies show that the first five years of children’s life are the most valuable period where the child’s brain and intellectual development occurs very rapidly. Bloom explained that 50% of children’s intellectual development occurs at the age of four and reaches 80% at the age of eight. Therefore, early age-from birth to eight years-is called the golden age. Care, education and practice of the environment greatly influence the next development of the child.

This priceless early age attracts the attention of various parties around the world, including Indonesia. Various policies and programs are offered to optimize the development of early childhood. Early childhood care and education (ECCE) has been studied by researchers in recent years. ECCE is not only for preparation to elementary school level, but also to fulfill and develop children’s needs holistically in terms of social, emotional, cognitive and physical needs. ECCE helps children obtain optimal language, math, and social-emotional skills. In addition, ECCE can be used as a means to reach and meet the needs of children who are less fortune. The ECCE program must continue to be developed and improved in order to provide the best service for early childhood. ECCE is one of the best investments a nation can make to prepare for better human resource development.

In Indonesia, ECCE is one of the strategic programs in preparing Indonesia’s golden targets in 2045. The Directorate General of Early Childhood, Non-formal and Informal Education (Dirjen PAUDNI) asserts that starting from 2012 each village must have at least one early childhood education (ECE). This shows the government’s seriousness in paying attention to ECCE. Although the role in ECCE is still far from what is expected. This is because most of the implementation of ECCE still relies on and is dominated by private parties. As a result, facilities and infrastructure supporting the ECCE are very limited, even the welfare of teachers is very alarming. This condition does not only occur in Indonesia but it is also experienced by other countries. Another problem is that only around 7.3 million children out of approximately 26.2 million children aged 0-6 years received ECCE services through various program.

As a form of government’s attention and support in ECCE, a policy on integrative holistic early childhood
development (HI-ECD) was issued. This policy is very much needed as a law shelter for an integrated holistic program for early childhood, as well as standardization in implementing the program at school and in the community. HI-ECD policy is set forth in the Presidential Regulation of the Republic of Indonesia (Perpres RI) Number 60 of 2013. This policy is intended to guarantee the fulfillment of the right to early childhood development. With this policy, the HI-ECD program must be implemented in ECE unit. Unfortunately, the policy of implementing HI-ECD in ECE unit has not been much analyzed. How is the development of the HI-ECD program in ECE unit? How is the technical implementation? and What are the obstacles to HI-ECD in ECE unit? This article aimed to examine and analyze HI-ECD policies in ECE unit.

Method

Type of research: Qualitative explorative method was used in this study. The researcher wanted to understand and review the policies and implementation of HI-ECD development programs in ECE unit. The exploration method was used to reveal new knowledge about HI-ECD policies issued by the government. Jacobsen explains that exploratory research questions aim to reveal new knowledge about a phenomenon that occurs. With this method, the researcher could find out how far HI-ECD was applied in ECE unit, including development concepts, implementation techniques, and constraints found in ECE unit.

Data Collection: In order to gain an understanding of the integrated holistic development program in ECCE, the researchers documented the data. The data that have been documented were then understood, reviewed, and analyzed using the hermeneutic approach. Hermeneutics is an approach to theory and practice of interpretation. That is, this approach is intended to interpret how people understand the construction and practice of a particular policy. Skjaeveland explains that a hermeneutic approach can be used to analyze certain documents and policies. In this study, hermeneutic approach was used to study ECCE policies. The documents that Perpres RI Number 60 of 2013 concerning HI-ECD; technical instructions for implementing HI-ECD in ECE unit; Minister of Education and Culture Regulation(Permendikbud) Number 137 of 2014 concerning National Standards for Early Childhood Education; and Permendikbud Number 146 of 2014 concerning ECD Curriculum 2013.

Results and Discussion

HI-ECD is a strategic policy of the Indonesian government in improving the quality of ECCE services. In addition, its purpose is to meet the essential needs of children so that they can achieve optimal growth and development. These essential needs include health and nutrition, educational stimuli, moral-emotional fostering and nurturing.

This step is a breakthrough for the government to prepare smart, healthy, and noble human resources as we know that the government has a golden target for Indonesia in 2045. Darman mentions that the target of golden Indonesia 2045 can only be achieved through quality education. With quality education, it will produce quality human resources. Mulyani reveals that there are four conditions to manifest golden Indonesia in 2045, one of which is to improve human quality. Indicators of the progress of a nation are highly determined based on the quality of its human resources. Perpres RI Number 60 of 2013 was issued by the government as a form of attention and encouragement so that children as the next generation of the nation can be well served and guaranteed their needs.

Model of HI-ECD Program in ECE Unit: HI-ECD program in ECE unit is an early childhood education plan that contains comprehensive and integrated services on all aspects of children development. The development essences are physical and non-physical which include health, nutrition, psycho-social, and mental fulfillment. HI-ECD is also meant as a form of early childhood development that is diverse and interrelated simultaneously, systematically, and integrated. HI-ECD program includes education, health and nutrition services, care, and protection. All services must be carried out in an integrated manner in ECE unit. That is, every ECE unit is required to organize HI-ECD program. HI-ECD model in ECE unit can be seen in Figure 1.

Figure 1: Model of HI-ECD program in ECE unit
Since the issuance of the Perpres RI Number 60 of 2013 concerning HI-ECD, legally the policy must be applied in various ECCE programs. In the ECE unit, the HI-ECD program is implemented and developed in an integrated manner with reference to the Permendikbud Number 137 of 2014 concerning national standards for early childhood education, Regulation of the Permendikbud Number 146 concerning 2013 ECE Curriculum, and technical guidelines for the implementation of HI-ECD in ECE unit.

Implementation of HI-ECD Program in ECE Unit: HI-ECD is applied in ECE unit through four forms of services, namely: education, health and nutrition, care and protection. All of these services must be obtained by each child simultaneously. ECE unit must be able to provide programs for services education, health and nutrition, care, and protection to ensure that all children live well. Programs and forms of HI-ECD activities in ECE unit can be seen in table 1.

HI-ECD in the form of educational services can be implemented by providing educational stimuli to stimulate various children’s developments, both physically and spiritually. Six spheres of child development that need to be optimized are religious and moral, physical-motoric, cognitive, linguistic, social-emotional, and artistic. With this education service, it is expected that children will be better prepared to enter further education.

HI-ECD in the form of health and nutrition services is carried out by giving children nutritious food and conducting regular health checks, as well as inviting children to behave in a healthy life. Mulyani said that 25% of Indonesian children experience malnutrition. Health and nutrition are essential factors for children’s growth and development, but the nutritional status of preschool-aged children in Indonesia is still worrying. Even though health and nutrition are one of determinants in preparing high-quality human resources. For this reason, health and nutrition services are inseparable programs in HI-ECD.

Parenting services in HI-ECD are collaborative activities between schools, teachers, and parents. This parenting program is intended to provide information on each child’s needs and development, both from parents to school and from the school to the parents. In addition, to maintain good relations between schools, teachers, parents, and children. As explained by Olson, DeFrais, Skogrand the role of educators in parenting is ideally done together, because parents and children have different roles.

HI-ECD in the form of protection services is carried out to provide a sense of security and comfort for children in participating in ECD activities. This protection covers two things, physical and psychological. Maslow in the theory of human needs hierarchy explains that there is a need for security or comfort that must be obtained by children in order to achieve further needs. Protection services also prevent children from bullying and discrimination from teachers and peers. If children feel safe and comfortable, they can learn to the fullest. Programs and forms of HI-ECD activities in ECE unit is described below:

HI-ECD program in the form of educational services includes: learning of religious and moral values, physical-motor learning, cognitive learning, language learning, social emotional learning, and art learning. The activity model of religious and moral values at the ECE Unit, among others: doing worship, being honest, maintaining personal hygiene and the environment, respecting other, and knowing religious holidays. Physical-motor learning for example: doing coordinated body movements, doing physical games, drawing, cutting, and sticking. Kognitif learning in the ECE unit includes: getting to know shapes and textures, know letters and numbers, knowing big and small sizes, and getting to know more and less number. Language learning can be either communicating verbally, arranging simple sentences, reading and listening to stories, and reading and writing your own name. Social emotional learning includes playing with peers, sharing with peers, and respecting the rights of others. Finally, the activity model of art learning for example: humming and singing, playing a musical instrument, drawing and painting objects, and making various works/crafts.

HI-ECD in the form of health and nutrition services can be either early detection of children’s development, having meals together, and clean living behavior. Early detection activities of child development include weighing the body, measuring height and head circumference, examining eyes, ears, and teeth, getting periodic immunization. Eating together can be done with getting nutritious food every morning, drinking milk every morning, and getting vitamins. As for, clean life behavior activities include getting used to wash hands and throwing garbage in its place.
HI-ECD in the form of parenting services can be either forming a group of parents and parenting seminar. The activity model of forming a group of parent for example: holding consultations and activities with parents, and involving parents in the school program. While parenting seminars are done by way conducting counseling and socialization of child development.

Finally, HI-ECD in the form of protection services can be done in a way safeguarding the school environment, for example making a guardrail and providing tools and materials to play based on the age of the children and free of chemicals. As for, the activity model of supervision of learning activities include being friendly to children and monitoring children while playing.

The form of HI-ECD programs and activities in each ECE unit can vary according to the ability. This is because in designing a HI-ECD program, it must be in accordance with the needs of the children. In addition, the facilities and quality of human resources also affect programs and forms of activities. According to Unicef, the barriers to HI-ECD that are often experienced are the problems of low cost, quality and motivation of teachers, ECE programs that have not led to integrative holistic, as well as the lack of community participation.\(^{(23)}\)

To realize a HI-ECD program that is of high quality and can reach all early childhood, collaboration from various parties is needed. Parents, schools, community leaders, and the government must be fully involved in the HI-ECD program. Parents have the role of implementing HI-ECD in the family through parenting activities. Schools can play a role in providing stimulation of education, guidance, supervision and carrying out cooperation with relevant parties to support HI-ECD. Community leaders can play a role by providing assistance, guidance, and work partners for ECE unit, and if possible they can provide facilitation, advocacy and counseling related to HI-ECD. The government can provide various assistance through related agencies, such as the education office, health services, and social services. These offices can be partners to meet the needs of ECE unit in implementing HI-ECD programs. Through strong collaboration from various parties in the HI-ECD program, the government has been able to run optimally.

### Conclusion

Integrative holistic early childhood development policy issued by the government through the Republic of Indonesia Presidential Regulation Number 60 of 2013 has made a major contribution to ECCE in Indonesia. The implementation of HI-ECD in ECE unit is realized through education, health and nutrition services, care, and protection. Through the HI-ECD program, the essential needs of children can be fulfilled so that children can grow and develop optimally, smart, healthy, cheerful, and noble.

### Additional Informations:

**Conflict of Interest:** No

**Ethical Clearance:** Yes

**Source of Funding:** Author

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The Analysis of Hospital Service to Patients Covered by National Social Insurance Program in Indonesia

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Abstract

This study intends to reveal public service degree performed by hospitals in providing services with Social Insurance Administrator Healthcare Program (SIAHP) in Indonesia. This research was conducted at six hospitals in Indonesia. A series of in-depth interviews were conducted to explore all forms of individual or collective perception of hospital services include responsiveness, assurance, tangibles, accessibility, empathy, reliability, personal attention, convenience, measuring perception services and customer service expectations, improving services and lowering costs, valuing customers, and clarity. The interviews were conducted with ten key persons, consisted of patient (P), patient’s family (F), nurse (N), doctor (D), resident doctor (R) and employee (E). The result showed that health services for SIAHP patients was less satisfying particularly the level on registration services, polyclinic services, pharmacy services, payment services, laboratory services, and outpatient and inpatient services. The patient’s dissatisfaction occurred because of the time of service, the availability of prescribed medicines. Therefore, hospital management needs to pay special attention to the service process to ensure the patients obtain optimal service.

Keywords: Public service, health services, SIAHP patients, public hospital services, private hospital services.

Introduction

Indonesia has implemented new schemes on national health insurance. One of the scheme known as a Social Insurance Administrator Healthcare Program (SIAHP) which is intended for all Indonesian people with the aim to maintain good health. The SIAHP cooperates with health institutions such as public and private hospitals. Starting at 2014, Askes Indonesia Company changed its name to SIA. Since its foundation, the program has conducted various efforts to achieve better service level. It is hoped to provide patient satisfaction. This research was conducted considering SIAHP becomes an important part of public health development in Indonesia.

The focus of the study is related to SIAHP services which include registration, polyclinic, pharmacy, payment, laboratory, outpatient and inpatient services. Health institutions providing SIAHP services are the locus of this research. In theory, SIAHP is a public service as it involves the community. Public services provide services to the community possessing an interest in the organization in accordance with the established basic rules.

Public service fulfills society needs in state implementation. Public services must be continually improved to provide satisfaction to service users. Therefore, the apparatus always innovates to ensure service qualities that appropriate for usage, “quality is a special standard where availability, performance, reliability, maintainability, and characteristics can be measured” 1.

Public hospitals and private hospitals should understand the service dimensions that lead to customer satisfaction. Public services experiencing problems were caused by a bureaucratic culture which tends burden the community. Therefore, it is necessary to build a
bureaucratic culture where the bureaucrats as servants of the state providing services to the community. The changing culture is a long and expensive process, and requires a high commitment from all members of the organization to generate profit for themselves and the organization. Organizational culture can be formed by bureaucrats and all members of the organization should have a purpose. The purpose of establishing an organization culture is to ensure the survival or to gain a more competitive advantage.

The empirical condition revealed people are not satisfied with the services provided by these institutions due to several problems related to service quality and the inhibiting factors causing non-optimal public service. First, in terms of service implementation, is still constrained by the weak support of human resources (HR). Second, related to the public service quality, viewed from the perspective of customer satisfaction, the complaints or public dissatisfaction is associated with the provision of public services. Therefore, it is necessary to understand the concept of service quality itself, although the definition is rather difficult to understand. The concept of service as "The concept of service quality is somewhat elusive and resists easy definition, but essentially it emphasizes customer satisfaction as its primary objective". However, the concept of service quality basically emphasizes customer satisfaction as the ultimate goal. Furthermore, the concept of service quality should include: (1) measuring customer service expectations; (2) by improving services and lowering costs; and (3) provide customer appreciation.

The objective of this study was to reveal public service degree performed by hospitals in providing services with SIAHP in Indonesia.

Method

The study was conducted between January and April 2018 in three regencies in Indonesia, consist of Tangerang, Surakarta and Nganjuk. The approach used in this study is a qualitative approach with the aim to determine the health service level in hospitals in Indonesia. Samples were taken from some public hospitals in Tangerang Regency, a public hospital Tangerang City, a private hospital Awal Bros Tangerang City, private hospital Siloam Tangerang City, a public hospital in Surakarta Central Java and a public hospital Nganjuk East Java with the consideration of having homogeneity of the similar population. This qualitative approach used case study model to assess the health service quality in SIAHP patients, such as registration, polyclinic (doctor), pharmacy, payment, laboratory, outpatient, and inpatient service.

The focus of this research includes responsiveness, assurance, tangibles, accessibility, empathy, reliability, personal attention, convenience, measuring perception services and customer service expectations, improving services and lowering costs, valuing customers, and clarity (details of costs and procedures of administrative services).

Data obtained from the patient (P), patient’s family (F), nurse (N), doctor (D), resident doctor (R) and employee (E) through the interview, researcher observation field and documentation in the form of primary data with an interview and secondary data taken from research sites. This in-depth interview was also conducted with informants possessing adequate expertise. Although this study is limited by sample size, some important insights on satisfaction can be obtained from this study.

While data analysis is qualitative, where data is collected in the form of relevant findings, according to research focus, then presented in narrative form descriptively, factually and systematically. The following step is to draw conclusions in the form of data analysis with a logical explanation, where both data qualitatively and quantitatively (secondary data) presented with complementary.

Research Finding: This research examines health services conducted by public hospitals and private hospitals in Indonesia, especially in relation to patient care SIAHP as the findings as follows:

Responsiveness: Observations of the research indicate that community complaints have two forms, direct and indirect. Direct complaints are in the form of submitting a complaint to the organizer. Direct complain often occurs, but there’s a lack of response. Indirect complaints are letter posted in complaint box and/or via e-mail. This method does not necessarily obtain an answer, people who complain are never invited to talk together.

Some patients and patient family started that their complaints were never been solved satisfactorily. “I once delivered complain directly to the manager, however, there was no follow-up, I was only asked to
wait patiently without any clear deadlines or problem solving mechanisms. (P1)

“I had an experience for complaining, but the existing health workers were unable to provide a solution so I had to find other officers who were more suitable. I got not enough information to go to the right officer for the problem I was facing.” (F2)

On the other hand a nurse stated that they could not provide optimal services because of the patient’s queue level and limited personnel in the hospital. “There are very many patients we have to serve, they have different health problems, while the number of personnel owned by hospitals is very limited.”

This opinion was also supported by a doctor. “The hospital always provides the best service, but sometimes there are two problems that cannot be solved directly by the officer.” (D1)

Other patients expressed hope that the queue to get services could be accelerated. “I hope that the queue at registration, medical or pharmacy services can be accelerated, and every problem can be solved immediately” (P2)

The responsiveness is one dimension of service quality. Service quality is considered good when it gets a response from service providers. Observations by researchers in the field indicate that the response to health services is lacking due to the lack of service personnel and a large number of people who come for treatment.

Moreover, the responsiveness is the willingness to help customers and provide prompt service. This dimension is concerned with dealing with the customer’s requests, questions, and complaints promptly and attentively. A firm is known to be responsive when it communicates to its customers how long it would take to get answers or have their problems dealt with. To be successful, companies need to look at responsiveness from the viewpoint of the customer rather than the company’s perspective.

Assurance: The second dimension of service quality is assurance. This ensures patients obtain clear information on patients’ rights and obligations. Based on the study, the predetermined time frame was required to reduce confusion; It means that people know what to do and how to follow a predetermined path. However, based on interviews with informants and observations in the field, there were some persons remain confused, e.g. The availability of medicines prescribed by doctors in the pharmacies. Some patients feel this situation burden them. Pharmacies might run out of required medicines and resupply takes time. On the other hand, the patient requires it.

One of the patient’s family complained about the unavailability of medicines. “I often find in pharmacy having no generic medicines prescribed by doctors, so I had to look for these medicines to other pharmacies.” (P2)

This problem is according to pharmacy officers because the pharmacy might run out of required medicines and supply takes time. On the other hand, the patient requires it immediately.

Assurance is as the employees’ knowledge and courtesy and the service provider’s ability to inspire trust and confidence. Assurance may not be important in relative to other industries where the risk is higher and the outcome of using the service is uncertain. Thus, for the medical and healthcare industry, assurance is an important dimension that customers look at in assessing a hospital or a surgeon for an operation. The trust and confidence may be represented in the personnel who links the customer to the organization.

From the hospital’s point of view, assurance is a very important dimension observed by customers in assessing the hospital or doctors who work professionally. The trust and confidence of healthcare providers in these patients is a form of assurance.

Tangibles: Tangibles are used by firms to convey the image and signal quality. This was prevalent in all health care institutions. Patients usually arrive early, some minutes or even hours prior to service opening time, causing long queue. A similar case occurs in medical examination service.

Observations in some public hospitals and private hospitals revealed patients having to wait all day to get a medical examination.

Some patients complain about the length of the queue to get health services. “I usually arrive 30 minutes before the service starts, but it turns out that there are many other patients who are in line. Besides that, we also have to wait to get services from a doctor with a waiting time of between 30 and 90 minutes.” (P3)
The patient’s family also complained about the length of the queue in the pharmacy. “The queue does not only occur during registration but also when in the pharmacy, we have to wait long enough to get the medicine we need” (F3)

The patients register in the morning to obtain queue number, while the examination is conducted in the afternoon until the evening. Obviously, this old service management is related to the inadequate availability of infrastructure facilities, including medical personnel (nurses and doctors). In general, private hospital patient does not experience long queue all day long due to cash payment. Therefore, public hospital experience relatively long service and the private hospital can provide fast service.

Although the strategic importance of quality in the context of health care is widely accepted, significant differences exist between the various healthcare providers. A recent study in Egypt found, that the level of satisfaction of private hospital patients is higher than those of public hospital patients. Quality of care in the context of healthcare reveals a significant difference between different health care providers. The level of patient satisfaction in private hospitals is higher than general hospital patients. Customer service expectations, improved services and lower costs and customer’s appreciations are not generally experienced by the customers.

The essence of the problem lies in the reimbursement of the costs of the highly unbalanced SIAHP, while public hospitals and private hospitals are required to carry out the mandate of the law. Therefore, SIAHP services and government law implementation is important. This required the willingness of the management so customers may perceive as good service quality. The analysis of service quality enables hospital management to allocate the financial resources for improving performance in the areas that have more influence on the customers’ perception of service quality.

Reliability: Based on the empirical study exhibits that the average service officer can normally only work with a reasonable workload, so this reliable attitude is only encountered in those who have high empathy attitudes and full responsibility.

A patient complains about the alertness of the officer. “I see the officers busy but the service time are long enough, the officers also look less agile to handle their duties.” (P2)

The reliability is defined as the ability to perform the promised service dependably and accurately or delivering on its promises. This dimension is critical as all customers want to deal with firms that keep their promises and implicitly communicated to the firm’s customers.

However, in reality, the hospital to provide less satisfaction to the patient. This is a fact that is still widely found from hospital services in Indonesia. The lack of public services is related to development policies, especially regarding income and poverty, one of these approaches over the other, but rather to explore their implications for development policy. For the income-based approach, those implications have been explored at some length (for example, see World Bank, 1990).

Personal Attention: Usually, healthcare providers provide services according to generally accepted service standards. Therefore, this personal attention gives more deep attention such as empathy behavior. A large number of SIAHP patients who come to health services are in situations and conditions that do not allow extra attention, but this service can be quickly resolved.

Limited place and service personnel cause a long line of queue. These patients want to be served immediately, hence it is very difficult for the officer to pay special attention. However, management could increase service quality by increasing service counters; and health workers (service personnel and doctors).

A nurse stated that the large number of patients to be served caused very little attention to each patient. “We have to prioritize the completion of services to all patients, so that there was not enough time to provide personal attention.” (N2)

The bureaucratic habits and culture of the physician should also be changed. Doctors which usually starts their practice at late morning (after 09.00 am) could start earlier at 08:00 am as normal working time. Hence the patients do not have to wait for examination and make the waiting room crowded.

Conclusions

Research focuses exhibited the general picture that health services for SIAHP patients were fell at the level of less satisfying on registration services, polyclinic services, pharmacy services, payment services,
laboratory services, and outpatient and inpatient services. The patient’s dissatisfaction occurs because of the time of service, the availability of prescribed medicines. Therefore, hospital management needs to pay special attention to the service process to ensure the patients obtain optimal service.

**Ethical Clearance:** Taken from Universitas Islam Syeh Yusuf ethic committee.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**References**

The Effect of Sticky Autocidal Mosquito Trap (SAMT) on the Index of Transovarial Transmission of Dengue Viruses

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Abstract

Dengue Hemorrhagic Fever (DHF) is a health problem in Indonesia. All areas in Indonesia have the risk of DHF transmission, as the geographical environment condition, temperature and optimal rainfall cause the incubation period of extrinsic disease agent shorter and the pattern of Dengue virus transmission increases. This research aims to prove the effect of Sticky Autocidal Mosquito Trap (SAMT) on the index of transovarial transmission of Dengue viruses in the endemic regions of DHF. This research used a quasi-experimental design, namely Interrupted time series with a nonequivalent no-treatment control group time series. The population and sample in this research were Aedes aegypti mosquitoes in two endemic regions of DHF, namely Sungai Jawi Dalam and Batulayang Villages. There was a decrease into 0% since the 2nd week post intervention until the end of the research (4th week post intervention) in intervention area. However, on the contrary, there was an increase found starting from the 1st week in control area by 200%, from 3% to 10%. It is concluded that SAMT have significant effect on the decrease in the Index of Transovarial Transmission of Dengue viruses in the endemic regions.

Keywords: Sticky Autocidal mosquito Trap, Transovarial Transmission Index, Dengue Virus.

Introduction

Dengue Hemorrhagic Fever (DHF) is still a health problem in Indonesia. All areas in Indonesia have the risk of DHF transmission, as the geographical environment condition, temperature and optimal rainfall cause the incubation period of extrinsic disease agent shorter and the pattern of Dengue virus transmission increases. Based on existing reports, DHF has become an endemic problem in 33 provinces and 436 districts or cities, 605 sub-districts and 1800 villages. In the 2012-2013 period, dengue incidence reached 41.25/100,000 population, with Case Fatality Rate 0.7%. An increase in dengue cases occurs every year, as in 2014, it was noted that the number of dengue cases was 549 cases with 68 deaths, and five districts/cities, including the city of Pontianak, was declared as Outbreak (KLB). West Kalimantan Province was 2nd ranked in the Kalimantan region, after East Kalimantan, with 5,762 cases of DHF. In addition, the transovarial transmission index in Pontianak reached 76.6% in 2012.

The biting behavior of mosquitoes has an effect on the ability of mosquitoes to transmit dengue virus both horizontally and vertically transmission. The Horizontal transmission is the transmission of dengue virus from one person to another through mosquito bites, while vertical transmission (transovarial) is the transmission of dengue virus from infected mosquitoes to its progenies, so that since the stage of eggs, larvae, pupae and newly hatched young adult mosquitoes, they have been infected by a virus. The viruses can be transmitted through their bite to reach 80%, which results in an increased risk of transmission. The dengue virus can grow and multiply without causing death in mosquitoes because there is no cytopathic effect that forms. Viruses can only live on the living cells of certain suitable organisms...
(host cells), so that when these cells die, the virus dies. The intended host cell is *Aedes aegypti* mosquito. Therefore, there is a need to eliminate the *Aedes aegypti* mosquito as the host of the Dengue Virus to reduce the incidence of DHF in endemic areas. This is in line with WHO recommendations that the best way to control *Aedes aegypti* mosquitoes is directed at their habitat in residential settlements.

Based on the habit and the complex cycle of *Aedes* sp., it requires innovative and complex control of the egg-larvae/larvae-pupae-mosquitoes, so that the purpose of controlling the vectors of the *Aedes* sp. mosquitoes is right on the target. Thus, the control of DHF is specifically done on the vectors to prevent the spread of the viruses to some extent so as not to potentially transmit the DHF disease. The commonly used measurement is the virus Transovarial Transmission Index (TTI). The development of Sticky Autocidal Mosquito Trap (SAMT) is designed complexly, which is a combination between Sticky and Autocidal design, so that it has two functions, one side to catch the adult mosquitoes by sticking them on the sticky ovitrap and the other side as an autocidal ovitrap. The combination serves as a trap for gravid female mosquitoes infected with Dengue virus and simultaneously kills the mosquito larvae which are transovarily infected with Dengue virus, so that it can prevent the transovarial transmission of the virus and prevent the incidence of DHF in the endemic areas.

**Materials and Method**

**Traps: SAMT:** The sticky autocidal mosquito trap (SAMT) consists of 4 basic components: 1) ovitrap lid; 2) adhesive tape as adult mosquito killer; 3) buoy and nylon filter at the bottom of the capture chamber to prevent adult mosquitoes from moving between the capture chamber and the infusion reservoir; 4) rice straw soaking water as infusion reservoir to attract adult female gravid mosquitoes to lay eggs. The cost of materials was calculated at US$ 3.5 per trap without labor, and we hope to reduce its cost once the trap can be mass-produced.

This research is a quasi-experimental research using the interrupted time series design with a nonequivalent no-treatment control group time series. The time series study is often conducted for the purpose of determining the effect of either intervention or treatment. The research unit was a group of houses/buildings located in the selected research location consisted of 100 houses. The selection of research unit/location was conducted by using purposive sampling based on the evaluation and monitoring guidelines of the endemic areas of DHF vector control program from Ministry of Health and larvae index measurement guidelines from World Health Organization (WHO), and based on 5 (five) criteria; first, one of the villages was highly-endemic for 4 consecutive years having DHF cases; second, characteristics of the location (settlement, vegetation, and topography) that are equal; third, there are fatal cases of DHF in the last 4 years; fourth, there are new cases within the last 3 months before the research conducted; fifth, having a distance of about >5 km between research locations (between the treatment and control location). Then, there were 2 (two) villages in two sub-districts selected as the research locations, they were Sungai Jawi Dalam Village in West Pontianak Sub-District as experimental group and Batu Layang Village in North Pontianak Sub-District as control group. In the experimental group, intervention was done with the installation of SAMT intervention, but in the control group without intervention. Population and sample of the subject could not be identified for their density exactly, but could be measured by using the traditional index size of Aedes in research location and followed bymonitoring questioner. The presence of dengue virus on head squash preparation was conducted based on immunocytocchemical streptavidin biotin peroxidase complex (ISBPC) assays as described by Umniyati to identify the transovarial transmission index. The transovarial transmission index measurement was done 8 times in 8 weeks which 4 times before and 4 times after intervention, both in the intervention and control areas.

**Results**

This research has been approved by the ethical commission of Health Research of Faculty of Medicine of Diponegoro University based on the certificate number: 243/EC/FK-RSDK/2016. It was involved *Ae. aegypti* mosquitoes from hatched larvae in the ovitrap in the intervention area and control area in Pontianak City, West Kalimantan, Indonesia to confirm the effect of SAMT on the reduction of the transovarial transmission of DENV.

**The Microscopic Images:** The mosquitoes used were 7 days old average *Ae.aegypti* mosquitoes, which only fed with 10% sugar water solution without bloodfed. Each preparation contained 12 head squash of mosquitoes. Specifically, the positive and negative control mosquitoes were taken from Parasitology.
Laboratory of Faculty of Medicine of Gadjah Mada University. According to the Standard of Procedure of immunocytochemical streptavidin biotin peroxidase complex (ISBPC) method which has been prepared and standardized by Umniyati, the DENV detection was started from material preparation, coloring and microscopic examination with 40x, 100x, 400x, and 1000x magnifications. Positive control mosquitoes were male *Ae. aegypti* intrathoracically injected with DENV-3 strain H-87, whereas negative control mosquitoes are male Anopheles mosquitoes, because the mosquito is not the vector of DENV. The result of immunocytochemical assay to detect dengue antigen on head squashes from intervention area and control area is presented in Figure 1.

**Figure 1:** The Micrograph photos of head squash preparation with a magnification of 100x10 which show no brownish color on the negative control (A) and show brownish color deposits throughout most fields having brain tissue in positive control (B). The DENV positive antigen in the form of brownish hexagonal granules spreaded in the brain tissue of mosquitoes from the intervention area (image C) and Control area (image D) based on immunocytochemical assay streptavidin biotin peroxidase complex assay using monoclonal antibody DSSE10 against DENV.
Figure 1 shows the brown color of the brain of *Ae. aegypti* mosquito originating from intervention area weaker than the mosquitoes originating from the control area. This study also indicates that the images of positive infection rates of (+++), (++), and (+) could be found in the specimen of the control area, while there was only positive infection rate of (+) found in the intervention area.

**Results of TTI:** Effect of SAMT on the reduction of the transovarial transmission of DENV in *Ae. aegypti* presented in Figure 2.

Based on Figure 2, the percentage of TTI in the SAMT intervention area was 30% lower than the control area of 40%. There was a decrease on the TTI since the 3rd week before intervention in the intervention area. The TTI at the 1st week before intervention and the 1st week post intervention was 3%, and there was a decrease into 0% since the 2nd week post intervention until the end of the research (4th week post intervention) in intervention area. However, on the contrary, there was an increase found starting from the 1st week in control area by 200%, from 3% to 10%.

**Discussion**

The overview of the research locations showed that the characteristics of the endemcity and geographical environment and population of both locations are relatively similar. The transovarial transmission index measurements were conducted 8 times in 8 weeks; 4 times before and 4 times after the intervention. The measurements were conducted to obtain the information of treatment effect by comparing the results before and after the intervention. The management of bias against the confounding variable in this research used the statistical analysis. The results of measurement and statistical analysis with Wilcoxon signed rank test and Mann Whitney U Test in the same direction showed that temperature, humidity, and adult mosquito density do not have significant difference with a p-value > α (0.05). Thus, the effect of the decrease in the transovarial transmission index was actually by SAMT intervention, not by environmental conditions, such as temperature and humidity, predators, and mosquito density in the research locations.

The results of this research indicated the percentage of TTI in the intervention area with SAMT modification of 30% is lower than in the control area of 40%. This condition is still lower than in the previous research conducted in Pontianak City as an endemic region with a transovarial transmission index of 76.6% in 2012. The intervention using the modified SAMT indicated a positive (+) infection rate which is lower than in Control group which has a positive (+++) infection rate. This is
in line with the number of mosquitoes and larvae trapped in SAMT, which they were more than those trapped in the standard Ovitrap. The trapped adult mosquitoes and larvae have an effect on the replication of virus on mosquito cells as Obligate Intracellular Parasite, that is the ability of the virus that can only live in the living cells of mosquitoes, so that when the living cells in which it lives die, it will also die\textsuperscript{11}. According to the results of research on virology, certain conditions cause the replication of virus in different organs during embryogenesis process or in the final stages of the life of a mosquito may be varied. There was statistically significant difference. Thus the intervention carried out within 4 weeks succeeded in reducing TTI, because the number of mosquitoes infected with the dengue virus was trapped in SAMT, so that the population of the infected \textit{Ae. aegypti} mosquitoes was reduced. as in previous research that dengue virus is a true cell parasite whose existence is very dependent on its host, if the host dies then the DENV also dies.

The results of previous studies that vertical transmission of dengue virus occurs in 7 generations, DENV is continuously transmitted transovarially to generation (F)-7 then survives in the next generation\textsuperscript{12}. However, the time of intervention with SAMT for four weeks (four egg cycles into larvae) showed its effectiveness in destroying the dengue virus in \textit{Ae. aegypti}. Dengue virus in the ovarian tissues of mosquitoes will die with \textit{Ae. aegypti} trapped in SAMT. Intervention activities were carried out in the case area, so epidemiological investigations were carried out and action was focused on fogging and larviciding Thus the SAMT intervention carried out after the application of fogging and sprinkling of abate powder was selectively very effective for destroying the remaining or newly infectious mosquitoes from other endemic areas.

The success of the SAMT intervention can also reduce the occurrence of the risk of transmission throughout the time of delay in the patient going to the hospital. Delays in going to a hospital or health service will be a moving source and effectively transmit the virus horizontally or vertically. According to Achmadi U.F, that patients generally come to the hospital after it lasts 4 to 5 days since a person has a virus in his blood circulation. During that time there has also been an escalation of horizontal transmission of the virus that resembles a series of measurements: one to two, two to four, and so on. This is also the reason for the delay in implementing fogging focus\textsuperscript{13}. This intervention with SAMT will be able to solve the problem of the DHF pandemic due to the increasing increase in mobility, thus expanding the occurrence of transovarial transmissions throughout the world, for example in Malaysia, Thailand and Singapore and in Indonesia. Transmission like this also occurs in some urban villages endemic to DHF in the city of Yogyakarta, in some districts endemic for dengue in Central Java and also in Sampit, East Kotawaringin Regency, Central Kalimantan. The possibility will continue to expand to other regions in Indonesia\textsuperscript{14}.

Therefore in the future this tool needs to be tested extensively, so as to provide a wider value of benefit, especially in monitoring and controlling DHF vectors in endemic areas simultaneously and thoroughly. Based on the above, that the use of SAMT modification is effective in reducing the transovarial transmission index in \textit{Ae. aegypti} mosquitoes, so that it can suppress as low as possible transmission to humans who are vulnerable to endemic areas\textsuperscript{15}.

**Conclusion**

It is concluded that SAMT have significant effect on the decrease in the Index of Transovarial Transmission of Dengue viruses in the endemic regions.

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**Conflict of Interest:** Nil

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Contraceptive method use in Indonesia: Trends and Determinants between 2007, 2012 and 2017

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Abstract

Background: The contraceptive prevalence in Indonesia was still dominated by short-acting method. Recently, the use of traditional contraceptives in Indonesia show an upward trend which is high risk of unintended pregnancy and sexual transmitted disease. This study aims to examine the determinants of contraceptive use in Indonesia and find the differences in characteristics of users.

Material and Method: Data used were from the IDHS 2007, IDHS 2012 and IDHS 2017. Contraceptive method mix was used as dependent variables. Chi-square test and binary logistic regression were applied to find the significant factors.

Findings: The findings indicated that contraception in Indonesia was mostly used for fertility limiting. About 90% of contraceptive method mix in Indonesia are contributed by modern contraceptive method. Modern contraceptive method are frequently used by women who live in rural areas. Compared to modern contraceptive users, traditional users in Indonesia were more likely have good education and occupation and live in urban areas.

Conclusion: Women who used traditional method should be encouraged to switch into the more effective modern contraceptive method. Strategy to promote the use of Long-Acting Reversible and Permanent Method needs to be strengthened.

Keywords: Long-acting, short-acting, method-mix, modern contraception, traditional contraception.

Introduction

Family planning improve maternal health through reducing the number of pregnancies and reducing the probability of high-risk pregnancy. Family planning program ensures that all babies are wanted and planned. This program allowed couples to decide the number and timing of pregnancies. The family planning program in Indonesia has promoted modern contraceptive method especially for long-acting contraceptive method but the use of Long Acting and Permanent Method in Indonesia is still low. The contraceptive prevalence was still dominated by the use of injectables and oral contraceptives. The contraceptive prevalence rate increased from 50% in 1991 to 64% in 2017. Based on 2017 Indonesia Demographic and Health Survey (IDHS), the main reason among currently married women for using contraception was limiting pregnancy (40%) rather than spacing the next pregnancy (24%).

On the other hand, the use of traditional contraceptives in Indonesia show an upward trend in a decade from 5% in 2007 and 4% in 2012 to 6% in 2017. Traditional contraceptive method include periodic abstinence and withdrawal. These method are less effective compare to modern method if it is not used with self-discipline and proper knowledge. The main disadvantage of traditional method is high risk of unintended pregnancy and sexual transmitted disease. Users of periodic abstinence should discipline, have a
honorable timing management and good knowledge. In this method, women should identify the fecund period in their cycle. However, only 22% Indonesian women know accurately the fertile period.

This study examines the determinants of contraceptive use in Indonesia between 2007-2017 and determines the differences in characteristics between traditional and modern contraceptive users by exploring the changes in contraceptive method mix.

**Material and Method**

Data used were from the IDHS 2007, IDHS 2012 and IDHS 2017. All surveys were nationally representative samples that produced cross-sectional data on reproductive history among women in reproductive age between 15 and 49 years. Samples were limited to currently married women and they were using any contraceptives at the time of interview. Total samples in this study were 18,981 women from IDHS 2007; 20,640 women from IDHS 2012; and 22,623 women from IDHS 2017. Sample weights were used in the analyses.

Contraceptive method mix in this study was the percentage distribution of contraceptive users by the method. The dependent variable in this study was contraceptive used that redefines as 1 = using traditional contraceptive method and 2 = using modern contraceptive method. Descriptive analysis such as percentage was used in this study. Chi square test was carried out to analyze the difference between modern and traditional contraceptive use based on socio-demographic characteristics. Binary logistic regression was used to determine the difference in adjusted Odds Ratio. P less than 0.05 were considered significant.

**Findings:** Method of contraception include “modern” and “traditional”. Modern contraceptive method consist of female sterilization, male sterilization, IUD, implant, injectables, pills, condom and LAM, while traditional method consist of periodic abstinence, withdrawal and other traditional method.

Figure 1 presents the contraceptive method mix among currently married women for the last three surveys: 2007, 2012 and 2017. Modern contraceptive method dominated the method mix among three surveys. The data showed that the proportion of modern contraceptive method remained around 94 percent during 2007 and 2012, but it had down to 90 percent in 2017. On the other hand, traditional method had slightly improved from 6% during 2007 and 2012 to 10% in 2017.

In all survey years, injectable was the predominant method which about 50% used by women in Indonesia (see figure 1). Oral contraceptives were also popular in Indonesia which about one fifth of women using pills as their contraceptive method. The IUD’s share of use decreased slightly by 0.6% between 2007 and 2017. The proportion of contraceptive users relying on implants increased steadily form 4.5% in 2007 and 5.3% in 2012 to 7.4% in 2017. Moreover, the proportion of married women of reproductive age practicing female sterilization increased slightly from 5% in 2007 to 5.9% in 2017. However, the proportion of male sterilization was stagnant and still low at less than 0.5% in Indonesia between 2007 and 2017.

![Figure 1: Mixed contraception used 2007, 2012 and 2017](image-url)
Table 1 presented data on sample characteristics of married women who use any contraceptives. About 60.5% of currently married women who used contraceptives in 2007 were aged between 25 and 39 years. This percentage decreased to 57% in 2017. Contraceptive users were dominated by women who already have one or two children, which about 60% of these women used any contraceptive method. Contraceptive use among nulliparous was still limited. Less than 1% of nulliparous married women used contraceptive to delay their first pregnancy.

According data on fertility intention, the contraception in Indonesia were mostly used for fertility limiting rather than spacing purposes. The percentage of women who used contraception for limiting increased from 59.1% in 2007 to 63.3% in 2017. Based on the profile of contraceptive user (table 2), more than 60% of currently married women who use contraception lived in Java and Bali, while the rest lived in other islands in Indonesia.

Table 1: Percentage of sample characteristics of married women who use any contraceptive method

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>IDHS 2007 (n = 18981)</th>
<th>IDHS 2012 (n = 20640)</th>
<th>IDHS 2017 (n = 22623)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>14.8</td>
<td>13.0</td>
<td>10.0</td>
</tr>
<tr>
<td>25-39</td>
<td>60.5</td>
<td>59.2</td>
<td>56.9</td>
</tr>
<tr>
<td>40-49</td>
<td>24.7</td>
<td>27.8</td>
<td>33.1</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>1-2</td>
<td>58.8</td>
<td>61.9</td>
<td>62.4</td>
</tr>
<tr>
<td>3 or more</td>
<td>40.2</td>
<td>37.3</td>
<td>37.1</td>
</tr>
<tr>
<td>Fertility intention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Want more children</td>
<td>37.3</td>
<td>37.9</td>
<td>33.5</td>
</tr>
<tr>
<td>Undecided</td>
<td>3.6</td>
<td>4.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Want no more children</td>
<td>59.1</td>
<td>57.5</td>
<td>63.3</td>
</tr>
</tbody>
</table>

Table 2 showed the percentage of social demographic characteristics and other factors related to current used of contraceptive method. Compared to modern contraceptive users, traditional users in Indonesia were more likely to be older women, have higher parity, have higher education, have better knowledge on ovulatory cycles, working as white-collar workers, and live in urban areas. Correct knowledge of the ovulatory cycles was one of the important factors for traditional method users to avoid pregnancy.

Table 2: Distribution of method-mix and adjusted odds ratio determinants of modern contraceptives

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Distribution method mix</th>
<th>Adjusted odds ratio determinants*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traditional</td>
<td>Modern</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>5.3</td>
<td>13.1</td>
</tr>
<tr>
<td>25-39</td>
<td>55.9</td>
<td>59.0</td>
</tr>
<tr>
<td>40-49</td>
<td>38.8</td>
<td>27.9</td>
</tr>
</tbody>
</table>
The results of binary logistic regression were also shown in table 2. All factors were significant in bivariate statistics. Model 1 presented some factors which were not significant influencing contraceptive used. Two factors were dropped out from model 1: parity and wealth condition. Model 2 (see the last column in table 2) showed the significant factors associated to contraceptive used which consist of women’s age, fertility intention, knowledge of ovulatory cycle, education, women’s occupation, place of residence and region.

**Discussion**

This study investigates determinants of contraceptive method used by currently married women in Indonesia. About 90% of contraceptive method mix are contributed by modern contraceptive method. Although the used of long-acting method is still low, but the trend from three IDHS shows a gradual increased. A study qualitative study about Long-acting and Permanent Method (LAPM) in two provinces in Indonesia shows the reasons to choose short-acting rather than long-acting method are lack of awareness of benefit and side effects
of LAPMs, the fear of surgical consequences, the myths about negative effects of LAPMs and religious beliefs.

The results indicated that women used modern or traditional methods for limiting rather than spacing births. Similar results have been found in the Philippines where modern contraceptive use was dominantly used to limit births. However, for traditional methods (periodic abstinence and withdrawal) are frequently being used for spacing since women are still open if they have another pregnancy and also women’s belief that using traditional contraceptives is better than not using any contraceptives.

Multivariate analysis shows that women who live in rural areas tend to use modern contraceptive methods compared with those in urban areas. The result also presents that women from Java and Bali islands are more likely to use modern contraceptives compared to those from other islands. It is probably related to the Village Midwife Program that established since 1989 to address the access gaps to reproductive health care for rural women. The Village Midwife Program in Indonesia is significantly associated with the increase of injectable contraceptive use.

Traditional methods are common methods used by women in good education and occupation and lived in urban areas in Indonesia. A study shows that women prefer traditional methods since it is not associated with any negative side effects and no risk of subfertility. Therefore, counseling should be focused on effectiveness and safety of modern contraception.

Indonesia is a country that has method mix skewed toward injectables and oral contraceptives as short-acting reversible contraceptive methods. Besides Indonesia, there are four countries with skewed method toward injectables as dominant method: Ethiopia, Haiti, Myanmar and Rwanda. Skewed method mix is defined as a single contraceptive method that used by 50% or more users in a given country. Injectable and oral contraceptives are predominance in Indonesia which about 70% of women use the method. Injectable and oral contraceptives are mostly used by women younger limiters, older limiters and some women who want to space their pregnancies.

There is a mismatch between fertility intention that about 60% of women want no more children but they still use short-acting method. Indonesian Government has promoted LAPM as it is mentioned in the Indonesia’s Medium-Term Development Plan (RPJMN) 2015-2019 to increase the used of LAPM form 18.3% in 2015 to 23.5% in 2019. Therefore, to achieve national goals related to long-acting method, it is important to ensure the availability and accessibility of LAPM, improve health provider’s knowledge in providing quality contraceptive services to the clients and improve the quality of contraceptive counseling.

The use of modern contraceptive method to delay pregnancy among nulliparous is still low. Delaying the first pregnancy for women aged less than 18 years are important since pregnancy poses higher risk of complication that can be serious and even fatal causes maternal and child mortality. The low use of modern contraceptive method by nulliparous women may also contribute by the fear of subsequent fertility after stopping the method. Based on systematic reviews of many studies, contraceptive method—other than female and male sterilization—do not affect the return of fertility after discontinuing reversible contraceptive method. Reversible contraceptive method are safe to delay the first pregnancy. Therefore, counselling should be strengthened among nulliparous women in order to convince couples that contraceptive method do not reduce long-term subsequent fertility.

Conclusions

Based on the analysis, the contraception in Indonesia was mostly used for fertility limiting rather than spacing purposes. About 90% of contraceptive method mix in Indonesia are contributed by modern contraceptive method. The contraceptive prevalence was still dominated by the use of injectables and oral contraceptives. However, the traditional method are increased steadily in the last decade. Traditional method are mostly used by women in good education and occupation and lived in urban areas. Women who used traditional method should be encouraged to switch their method into the more effective modern contraceptive method. Moreover, strategy to promote the use of Long-Acting Reversible and Permanent Method needs to be strengthened.

Conflict of Interest: The authors declare that they have no competing interests.

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**Ethical Clearance:** This study did not require ethical approval since the data did not include personal identification. However, researcher has got approval to access the data set in the public domain by DHSPROGRAM and Indonesian National Population and Family Planning Board.

**References**


Risk Factors Analysis Related To Maternal Mortality in Banjar District on January 2015-September 2017 Periods

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Abstract

Maternal mortality rate (MMR) is the death rate of woman during pregnancy, childbirth, and purpureal periods which is caused by various factors but not by accident or incidental. Banjar Regency always gets the third highest maternal mortality in South Kalimantan Province. MMR of Banjar Regency in 2015 was 11 cases, in 2016 was 11 cases, and in 2017 became 10 cases. This study aims to explain the relationship between risk factors and the incidence of maternal mortality of Banjar Regency in the 2015-2017 periods. This research is a type of quantitative research, with case control design with a ratio of 1:1 between case (maternal mortality) and control. It used total sampling technique for case group. The number of respondents in this study amounted to 36 people consisting of 18 respondents in the case group and 18 respondents in the control group. Based on the results of the research there is no significant relationship between age, parity, education, job status, family income, ANC, recidency, time to reach health facility, childbirth helper, and place of delivery with maternal mortality in Banjar Regency.

Keywords: Risk factors, maternal mortality, Banjar Regency.

Introduction

Maternal mortality is the death rate of woman during pregnancy, childbirth or in 42 days after the end of pregnancy but not by accident.¹ Maternal Mortality Rate (MMR) in Indonesia was still high, if compared to ASEAN countries.² Data from the Indonesian Demographic Health Survey in 2007 showed that MMR was 228 per 100,000 live births.³ MMR in South Kalimantan in 2012 was 123/100,000 live births.⁴ This could not reach the SDG target to reduce MMR below 70/100,000 live births.⁵

Three of the highest cases of maternal mortality in South Kalimantan in 2016 were Kotabaru District (13 cases), Banjar Regency (11 cases), and Tapin District (9 cases). While in 2017 were Kotabaru and Banjarmasin (8 cases), Banjar Regency (7 cases), and 6 in Hulu Sungai Tengah Regencies.⁶

Maternal and perinatal health are national problems that need to be priority.⁷ One of maternal death’s effect is child’s growth and development.⁸

Based on the background of the above problems, the researchers are interested in conducting research on “Risk Factors Analysis Related to Maternal Mortality in Banjar District on January 2015-September 2017 Periods”.

Materials and Method

This research used case control design using 1:1 ratio and using total sampling technique for case. The number of respondents were 18 case respondents and 18 control respondents. The instruments were maternal mortality document and KIA books. Bivariate analysis used chi square statistical test.
Table 1: Risk Factors of maternal mortality based on chi square test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maternal Mortality</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case</td>
<td>Control</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years old; &gt; 35 years old</td>
<td>6</td>
<td>22.3</td>
<td>2</td>
</tr>
<tr>
<td>20-35 years old</td>
<td>12</td>
<td>66.7</td>
<td>16</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multigravida</td>
<td>10</td>
<td>55.6</td>
<td>6</td>
</tr>
<tr>
<td>Primigravida</td>
<td>8</td>
<td>44.4</td>
<td>12</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elementary-junior high school</td>
<td>12</td>
<td>66.7</td>
<td>8</td>
</tr>
<tr>
<td>&gt; senior high school</td>
<td>6</td>
<td>33.3</td>
<td>10</td>
</tr>
<tr>
<td>Job Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non worker</td>
<td>13</td>
<td>77.8</td>
<td>1</td>
</tr>
<tr>
<td>Worker</td>
<td>4</td>
<td>22.2</td>
<td>8</td>
</tr>
<tr>
<td>Family Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; Rp 2,500,000</td>
<td>12</td>
<td>66.7</td>
<td>12</td>
</tr>
<tr>
<td>&gt; Rp 2,500,000</td>
<td>6</td>
<td>33.3</td>
<td>6</td>
</tr>
<tr>
<td>ANC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incomplete</td>
<td>1</td>
<td>5.6</td>
<td>1</td>
</tr>
<tr>
<td>Complete</td>
<td>17</td>
<td>94.4</td>
<td>17</td>
</tr>
<tr>
<td>Recidency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>11</td>
<td>81.1</td>
<td>11</td>
</tr>
<tr>
<td>Urban</td>
<td>7</td>
<td>18.9</td>
<td>7</td>
</tr>
<tr>
<td>Time to reach health facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 8 minutes</td>
<td>15</td>
<td>83.3</td>
<td>13</td>
</tr>
<tr>
<td>≤ 8 minutes</td>
<td>3</td>
<td>16.7</td>
<td>5</td>
</tr>
<tr>
<td>Childbirth helper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not health worker</td>
<td>4</td>
<td>22.0</td>
<td>0</td>
</tr>
<tr>
<td>Health worker</td>
<td>14</td>
<td>77.8</td>
<td>18</td>
</tr>
<tr>
<td>Place of delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not health facility</td>
<td>4</td>
<td>22.5</td>
<td>5</td>
</tr>
<tr>
<td>Health facility</td>
<td>14</td>
<td>77.5</td>
<td>13</td>
</tr>
</tbody>
</table>

There was no relationship between age and maternal mortality (p=0.228). This was caused by samples taken into 20-35 years old as 77.8%. That age was the optimal age for pregnancy and childbirth because the function of reproductive organs and hormonal balance has been stable. The results of this study was in line with the Jayanti Research (2016) which states that there was no relationship between maternal age and maternal mortality (p value = 0.174).9

Based on field findings in 12 mothers (66.7%) with 20-35 years old but experienced death, the cause of death were 5 people experienced bleeding (41.7%), 2 people experienced labor complications (16.7%), 1 person hyperthyroidism (8.3%), 1 person experiencing amniotic embolism (8.3%), and 1 person giving birth not helped by health workers (8.3%). Those facts could be the other influencing factors that caused maternal mortality.

Based on the field findings on 2 mothers with risk age (11.1%) did not experience death because they did ANC routinely. ANC could find out the health conditions of mothers and babies. According to Supriyono (2012)
one effective way to prevent complications in pregnancy was detecting a high risk as early as possible through regular check to health workers and obtaining adequate services.\textsuperscript{10}

There was no relationship between the amount of parity and maternal mortality (\(p = 0.314\)). This was due to the most number of parity from the sample taken was primigravida (55.6%), not multigravida. This showed the possibility of primigravida had the opportunity to pose a risk of maternal death, such as preeclampsia. The results of this study was in line with the research of Sabatini and Inayah (2013) which stated that there was no relationship between parity and maternal mortality (\(p = 0.561\)).\textsuperscript{11}

Based on field findings on 8 mothers with primigravida (44.4%) but experienced death due to bleeding experienced by 4 mothers (50%), hypertension was experienced by 2 mothers (25%), retention of placenta experienced by 1 mother (12.5%), and amniotic embolism was experienced by 1 mother (12.5%). This showed that more deaths occurred in this study due to complications of pregnancy and childbirth.

Based on the findings of the field in 6 mothers with multigravida (33.3%) did not experience death due to delivery assisted by health workers. Although there were mothers who have risk factors, but with a competent birth attendant would reduce the risk.

There was no relationship between education and maternal mortality (\(p = 0.314\)). The results of this study was in line with Aeni’s research which stated that there was no relationship between education and maternal mortality (\(p = 1,000\)).\textsuperscript{12} Although the results was not significantly, but table 1 shows that mothers with low education tend to be at risk of maternal death.

Based on field findings on 8 mothers with primigravida (44.4%) but experienced death due to bleeding experienced by 4 mothers (50%), hypertension was experienced by 2 mothers (25%), retention of placenta experienced by 1 mother (12.5%), and amniotic embolism was experienced by 1 mother (12.5%). This showed that more deaths occurred in this study due to complications of pregnancy and childbirth.

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Based on the findings of the field in 6 mothers with multigravida (33.3%) did not experience death due to delivery assisted by health workers. Although there were mothers who have risk factors, but with a competent birth attendant would reduce the risk.

There was no relationship between income and maternal mortality (\(p = 1,000\)). This was caused by mothers who experience death consisting of low-medium family income and high income as the same percentage (50% each). The results of this study was in line with Aeni’s (2013) study which states that there is no relationship between family income and maternal mortality (\(p = 0.350\)).\textsuperscript{12}

Based on the findings of the field in 6 mothers with high income but experienced death (33.3%) due to 3 mothers died because of bleeding (74%) and 1 mother with risky parity (25%). This shows that although working with a good socio-economy still caused death if they had complications during pregnancy and childbirth and with high parity. One parity and high parity (more than three) had a higher incidence of postpartum hemorrhage.\textsuperscript{14}

Based on the findings of the field in 11 mothers who did not work but did not experience death (22.3%) due to their income included in the high category, so that mothers could meet their daily needs during pregnancy and maintain their health.

There was no relationship between income and maternal mortality (\(p = 1,000\)). This was caused by mothers who experience death consisting of low-medium family income and high income as the same percentage (50% each). The results of this study was in line with Aeni’s (2013) study which states that there is no relationship between family income and maternal mortality (\(p = 0.350\)).\textsuperscript{12}

Based on the findings of the field in 6 mothers with high income but experienced death (33.3%) due to 3 mothers died in bleeding, 1 mother died in hyperthyroidism, and one mother died in risky parity. Various risks related to reproductive behavior, health status and how to maintain health could cause complications during pregnancy and childbirth.\textsuperscript{15}

Based on the findings of the field, 12 mothers with low income did not experience death (66.7%) because mothers were able to give birth in health facilities and assisted by health workers. In addition, low income families were provided with health insurance which the premi were paid by the government, so that they
could deliver in health facilities to minimize the risk of maternal death.

There was no relationship between ANC compliance with maternal mortality (p = 1,000). It happened because the sample dominated by mothers who performed complete ANC (94.4%) in case and control. The results of this study was in line with Aeni’s (2013) study which stated that there was no relationship between ANC compliance with maternal mortality (p value = 0.08).12

Based on the field findings of 17 complete ANC mothers who experienced death (94.4%) due to high risk age, pregnancy complications, labor complications, and parity that could cause maternal death. Age of 20-35 years was the best age for pregnancy and childbirth.16

Based on field findings, 1 mother with incomplete ANC but did not experience death because in terms of age and parity was not at risk to experience death.

There was no relationship between the characteristics of the place of residence with maternal mortality (p = 1,000). This was caused by mothers who lived in rural had the same percentage with woman who lived in urban (50%). The results of this study was in line with the research of Sabatini and Inayah (2013) which states that there was no relationship between the characteristics of the place of residence and maternal mortality (p value = 0.139).11

Based on the findings of the field in 7 mothers who lived in urban areas (38.9) but experienced death due to 3 mothers died in hypertension (42.8%), 1 mother died of bleeding (14.3%), 1 mother died in hyperthyroidism (14.3%), 1 mother died of amniotic embolism (14.3%), and risky/multigravida parity (14.3%). Even though the mother lived in urban where health facilities were available, but if they had complications would cause maternal death. The effect of diseases on pregnant would make worse the condition of the mother and more susceptible to complications.12

Based on field findings in 11 (81.1%) mothers who lived in rural did not experience death because mothers were still able to access health facilities. This was supported by the availability of facilities owned by health workers made mothers felt safe and reduced the risk of childbirth.17

There was no relationship between the distance of coverage to health facilities and maternal mortality (p = 0.691). This was due to the overall sample taken had a fast travel time to health facilities which was 55.6%. The results of this study was in line with Juharni’s (2013) study which stated that there was no relationship between delays in referral travel and maternal mortality (p value = 0.074).16

Based on the findings of the field in 3 mothers with travel time to health facilities <8 minutes (16.7%) but experienced death due to other factors, there were 2 mothers with multigravida (66.7%), and 1 mother with a late decision to be referred (33.3%). The delay would bring a significant contribution to maternal mortality. First delay was in recognizing the existence of emergency condition. The second delay was in reaching referral health facilities, due to geographical and transportation facilities The third delay was obtaining medical assistance in referral health service place.18

Based on field findings in 13 (72.2%) mothers with long travel time (> 8 minutes) did not experience death due to mothers giving birth in health facilities that could reduce the risk of maternal death.

There was no relationship between birth attendants and maternal mortality (p = 0.104). The results of this study was in line with Aeni’s research which stated that there was no relationship between birth attendants and maternal mortality (p value = 0.104).

Based on the findings of the field in 14 mothers who gave birth to health workers (77.8%) but experienced death due to other factors, namely risk age (4 mothers/28.6%), risk parity (4 mothers/(28.6%) and delay in reaching health facilities because of the long travel time (6 mothers/42.8%). Thus, the presence of risk factors in the form of total parity and long travel times could cause maternal death even though it has been helped by health workers.

There was no relationship between the place of delivery and maternal mortality (p = 1,000). Although not significantly meaningful, table 1 showed that mothers who gave birth in health facilities tend to minimize the risk of death. The results of this study was in line with Suriani’s research (2017) which stated that there was no relationship between the place of delivery and maternal mortality (p = 0.126).13

Based on the findings of the field in 14 mothers who gave birth at a health facility (77.8%) but suffered death. Even though in the selection of the place of delivery was
correct, the incidence of maternal death also occurred in health facilities because of delay of the mother in referring the mother to the health facility, and they were late to be helped.\textsuperscript{13}

Based on field findings on 5 mothers who did not give birth at a health facility (27.8\%) but did not experience death because they were helped by a midwife and with an adequate midwife kit.\textsuperscript{19}

**Conclusion**

The results of this study indicated that there were no relationship between age, parity, education, job status, family income, ANC, recidency, time to reach health facility, childbirth helper and place of delivery with maternal mortality, but the data showed that there were complications during pregnancy and childbirth as risk factors that caused maternal death.

The suggestions were ANC must be done as early as possible. The complete facilities and infrastructure are also needed.

**Ethical Clearance:** This study received ethical clearance from the Committee of Research Ethics in Medical Faculty, Lambung Mangkurat University, Indonesia.

**Source Funding:** Faculty of Medicine, Lambung Mangkurat University

**Conflict of Interest:** The authors declare that they have no conflict interest.

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Knowledge, Awareness and Practices of Forensic Dentistry: A Questionnaire Study among Dental Personnel Practicing in Bhimavaram Town, South India

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Abstract

Aims: The aim of study is to assess the knowledge and awareness on forensic odontology among dentists in Bhimavaram town

Method and Material: A structured questionnaire comprising of 14 close ended questions (Sharma et al 2015) with slight modifications, validated through a pilot survey was distributed among 100 dentists residing at Bhimavaram town and were assessed. The questions were about importance of dental records and their maintenance, identification of child abuse or bite marks, importance of dental witness in the court of law for person identification and interest among dentists to learn about forensic odontology.

Results: This present study showed that 90.9% MDS participants and 77.7% BDS participants were maintaining their dental records in their dental practice, though 94.5% MDS and 75.5% BDS were aware about forensic dental witness, only 1.8% of MDS participants were called by court of law for forensic evidence. Only 7.2% of MDS participants were trained and confident in handling forensic related cases.

Conclusions: The results show that knowledge and awareness about forensic dentistry among BDS and MDS individuals are in primitive stage. However very few members of participants were trained in forensic dentistry which suggests that practice of same is to be progressed in Bhimavaram town.

Keywords: Forensic Odontology, Dentists, Awareness, Knowledge, Dental record.

Introduction

Forensic science refers to areas of endeavour that can be used in a judicial setting and accepted by the court and general scientific community to separate truth from untruth. Forensic is derived from the Latin word “forum”, which means “court of law”. Odontology refers to the study of teeth. Forensic odontology, therefore, has been defined by the Federation Dentaire International (FDI) as that branch of dentistry which, in the interest of justice, deals with the proper handling and examination of dental evidence, with the proper evaluation and preservation of dental findings.

Forensic dentistry involves the dispensation, reassess, evaluation and presentation of dental evidence with the rationale of contributing scientific and objective data in lawful processes. It is a challenging and captivating twig of forensic science that involves the application of dental sciences in the identification of
deceased individuals through the assessment of ante-and post-mortem records.[4] From AD 66 till date, dental identification has proved imperative in identifying deceased individuals, the first case being accepted by the law in the year 1849.[2] The term “forensic” has its origin in the Latin word “forensis” from “forum,” which means a place where legal matters are discussed.[5]

Interest in forensic dentistry was relatively dormant until the 1960s when renewed interest was sparked by the first formal instructional program in forensic dentistry given in the United States at the Armed Forces Institute of Pathology. [6] The first forensic dental identification in India was reported in a review conducted by Sansare and Dayal in 1995. According to this review, M. Raja Jayachandra Rathore of Canouj died on the battlefield in 1191. His body was identified by his false anterior teeth. This was probably the first case of identification using dentition from India.[7] Forensic odontology has become an integral part of forensic medicine over the past 100 years.[8] It may also be sub classified into forensic-odonto-toxicology, which deals with cases of poisoning, but this field is yet to gain popularity globally. [9]

A properly maintained patient record is a very important aspect of this patient care. In general, a “record” can be defined as information generated in the course of an organisation’s official transactions and one that is documented to act as a source of reference and a tool by which an organisation is governed.[10] A detailed and accurate dental record is essential as it serves the dentists own best interests in the event of a malpractice suit.[3] A complete record also enables communication with another practitioner who may be required to provide care to the patient in the absence of the primary clinician. They are essential for dental audit, which is a vital part of quality control. A dental audit critically analyses every aspect of dental care. Forensic dentists require knowledge encompassing a number of disciplines, since the dental records obtained can identify an individual or afford the information needed by the authorities to establish neglect, fraud or abuse. [3]

**Subjects and Method**

**Study design and population:** A cross sectional descriptive study was carried among 100 Dentists practicing in and around Bhimavaram town. Dentists possessing both BDS and MDS degree were included and consent was obtained. The study design and protocol was reviewed and approved by Institutional Ethical Review Board. The questionnaire survey validation was carried out and cron-bach’s alpha coefficient value of 0.84 was found.

**Methodology:** A structured questionnaire adapted from Sharma et al[14] with a little modification written in English which included 14 questions on the Knowledge Awareness and Practices about Forensic Dentistry (Odontology) was given to all the dentists willing to participate in the study, confidentially and anonymity of the participants was assured for same.

**Statistical analysis:** Descriptive statistics was done to summarize the responses to the questionnaire, with the results being presented as frequencies and percentages. Chi-square test was done to compare the 2 groups and the level of significance was set at $P \leq 0.05$.

The data were analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago, IL, USA).

**Results**

A total of 100 sample were taken, among these MDS were 55%, BDS were 45 % (table-1), (table-2)

**Do you maintain dental records in your clinics?:** Among the total subjects majority of MDS and BDS participants are maintaining their records in their regular practice. 35 (77.7%) members of the BDS and 50 (90.9%) members of MDS are maintaining their records in their regular practice. However the association between the groups are not significant ($P=0.104$)

**Do you know that you can present forensic dental evidence in the court as an expert witness?:** Among 55 individuals of MDS 52(94.5%) participants and 34(75.5%) members of the BDS among 45 individuals are aware with a significant difference ($P=0.052$) as they can present the dental evidence as an expert witness in court of law.

**Do you know the relevance of dental records in recognising the dead and accused criminals?:** Among 55 individuals of MDS 52(94.5%) participants and 34(75.5%) members of the BDS among 45 individuals are aware with a significant difference ($P=0.052$) as they can present the dental evidence as an expert witness in court of law.

**Do you have knowledge on bite mark patterns of teeth?:** About 18(40%) members of the BDS and
35(63.3%) individuals of MDS participants had an adequate knowledge about bite marks which are considered as most debated area in forensic significance and the association is significant (p=0.020).

**Have you been called by authority/court for forensic evidence related?:** Among all the BDS and MDS participants, Only 1 (1.8%) MDS participant was called by the court as forensic expert witness and the association was not significant (P=0.317).

**Do you think you have a crucial role in identifying deceased in the incidence of mass fatality?:** Among the total study group, 22 (48.8%) members of the BDS and 40 (72.7%) of MDS individuals were aware that they have a role in identifying deceased during a mass fatality and the association is with significant difference (P=0.02).

**Are you confident in handling forensic dentistry related cases?:** Among all the participants of the BDS and MDS, Only 2 (4.4%) members of the BDS and 5 (9%) members of MDS were confident enough to handle forensic dentistry related cases. However the association was not significant (P=0.252).

**Can you estimate dental age of an individual by examining the teeth?:** Among the study group, 31 (68.8%) of BDS and 53 (96.3%) of MDS individuals in the study had mentioned that they are able to estimate the dental age of an individual by examining the dental status of patient and the association is significant. (P=0.016)

**Do you think your present knowledge level/awareness about forensic dentistry is adequate?:** Among the study group only 4 (8.8%) of BDS and 9 (16.3%) of MDS individuals were with an adequate knowledge regarding forensic dentistry, although the values are not statistically significant (P=0.166).

**Can you identify indicatory of domestic violence and child abuse?:** Among all the participants 20 (44.4%) participants of BDS and 45 (81.4%) of MDS individuals mentioned that they are able to identify domestic violence, child abuse. However the association was significant (p=0.002).

**Have you handled any forensic dentistry related cases?:** Out of 55 MDS study group only 4 (7.2%) individuals handled forensic related dental cases, none of BDS individuals had experience in handling forensic related cases. (P=0.045).

**Have you been trained about forensic dentistry?:** Among all the participants, only 4 (7.2%) of MDS participants were trained in proper handling, examination and evaluation of dental evidence, which will be then presented in the interest of justice.

**Are you part of a forensic team in your city?:** Among all the participants, only 3 (5.4%) of MDS participants are in a forensic team in the study area, remaining 52 members of MDS and 45 members of BDS are not the part of forensic dentistry (p=0.083).

**Are you interested to attend any forensic odontology program in near future?:** Among study group 34 (74.5%) of BDS participants and 52 (94.5%) of MDS participants are interested in gaining knowledge about forensic deontology programmes for further evaluation. (p=0.052). (Graph-1, Graph-2)

**Discussion**

Keiser-Nelson defined forensic odontology as “that branch of forensic medicine which deals with proper handling, examination, presentation of dental evidence in court of law”.[1] Forensic odontology is an imperative branch that would lend a hand in solving cases of abuse and death.[1] According to board of Australian guidelines, forensic dentistry is considered as one of 13 recognisable dental specialities.[12] A forensic team should be comprised of crime scene investigator, forensic biologist, forensic pathologist, forensic toxicologist and forensic odontologist.

The practice of forensic odontology has gained significance in a number of urbanized countries across the globe but in developing countries like India, it is yet to gain full impetus. The law enforcement authorities in India usually look up the help of dental surgeons in government service rather than private dental practitioners who have degrees in forensic odontology from universities outside India and who are not in government service. Due to natural calamities like recent Titali in srikakulam or tsunami in 2004, the death toll in India was about more than 15,000[13] but it is a question left unrequited whether all victims were recognized. This could have been made possible if there were ample forensic odontologists for identification of the victims. The fruit for success of identification lies in accessibility and precision of record compilation and maintenance. So, greater familiarity and awareness of forensic odontology among the dental practitioners would be required in the emergent field of dentistry. This study was conducted
among the dental practitioners to assess their knowledge awareness about forensic odontology.

The present study was conducted among 100 dental practitioners (45 BDS, 55 MDS) of age group above 25 years. In the current study, the ratio of males and females is 3:1 with a range from 1 to 40 years. Among all individuals MDS participants had a better knowledge about forensic odontology and thereby playing a role in identifying victims in mass disasters. A similar study conducted by Sharma et al. [14] in 2015 also showed that more of MDS individuals had knowledge about forensic odontology when compared with BDS individuals.

90% MDS individuals and 77% of BDS individuals were maintaining their dental records in their regular practice. This is with the accordance of study conducted by Nagarajappa et al. [15] in Kanpur who proved that all the dental practitioners maintain dental records and can become valuable members of the dental identification process by developing and maintaining standards of record-keeping, which would be valuable in restoring their patient’s identity. Another study done in Rajasthan by Preethi [1] et al concluded that 93% of individuals included in the study were not maintaining dental records.

The results showed that maintenance of dental records is in its infant stage. Neither all the dentists maintain the dental records nor do they have knowledge and awareness on advantages of maintaining the same. The advantage of maintaining dental records of the patient is that, it serves as a future reference when needed to produce in court of law as forensic evidence but the irony is that is that if it is maintained, it is solely maintained for dental insurance claims and not for forensic purpose. Whether the records maintained by practitioners are complete and useful for forensic odontology would be a valid question?

The progression of forensic odontology in India has been relatively slow though there is a greater demand of forensic odontologists world-wide. The great deal of forensic work done by dentist is ‘Age estimation’ through human dentition. Though there are various method of age estimation, radiographic age estimation is the most prominent method. Age estimation plays an important role in the cases involved in the court of law. In the current study, 96% of MDS and 69% of BDS individuals were able to estimate the dental age of an individual by examining the dentition which is in accordance of study conducted by Sharma et al in which most of the participants are confident enough in identifying the age of the patient by examination the human dentition.

In current study group majority of individuals were able to recognize child abuse and domestic violence. They were able to distinguish the injury caused by bites through arch alignments and specific tooth morphology. Kenney and Clark have cited researches that suggest approximately 50% of injury in child abuse cases occur in the oral and perioral region. [16] Regarding the knowledge about forensic odontology among the participants majority of MDS participants were aware of the techniques, presentation, collection, identification and evaluation of dental evidence. Studies done by Khare et al and Harchandani et al concluded that there is lack of knowledge and awareness among the dentists in India about Forensic odontology. [17, 18] The present study had shown that many dentist are not having adequate knowledge in handling forensic dental cases as they were not trained about forensic dentistry and not a part in the forensic team in the city. The participants want to increase their knowledge about forensic dentistry through journals, workshops, CDE’s.

Conclusion

The current study conducted among 100 dental practitioners clearly reveals that the knowledge and practices of forensic dentistry are at an infant stage. No matter whatsoever, the importance of providing proper education and training in forensic odontology is the currently the need of the hour. Every dental practitioner has a responsibility to understand the importance of forensic implications associated with practice.

Ethical Clearance: Taken from Institutional Review board, Vishnu dental college

Source of Funding: Self

Conflict of Interest: NIL

References

Identification of Estrogen Levels in Dairy Cows Based on MUN Levels And Pregnancy Rates

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Abstract

This study aimed to determine the effect of Milk Urea Nitrogen (MUN) levels as an indicator of protein intake to estrogen levels and pregnancy status in dairy cows. Eighteen productive heifers from wagir district, Malang were collected out from criteria. Thus, they were groups based on MUN levels and reproductive status. Feeding is done in the same pattern. Blood drawing for estrogen level were analized by Enzyme Linked Immunosorbent Assay (ELISA). Milk extraction for analysis of urea levels using the Barthelot method. Pregnancy examinations were carried out three months after Insemination. Data analysis were processed using SPSS (Statistical Package for the Social Sciences) for Windows programs. The results showed that non-pregnant cow had MUN levels from 16-28 mg/dL and high estrogen levels at time of estrus were the same as estrogen levels in pregnant cow. It can be concluded that the same feed pattern different produces MUN levels, estrogen and pregnancy status, depending on the efficiency of nitrogen utilization in the body and physiological health of individual dairy cows.

Keywords: Friesian holstein, feed, estrogen, MUN, Pregnancy.

Introduction

High crude protein intake can increase milk production while increasing Blood Urea Nitrogen (BUN) and Urea Nitrogen (MUN) levels. Studies reported negative effects between Blood Urea Nitrogen (BUN) or Milk Urea Nitrogen (MUN) and fertility. Nutrition management plays an important role to achieve optimal production. Rumen Degradable Protein (RDP) will be partially absorbed by the rumen wall and some will enter the portal blood and carried to the liver in the form of ammonia and converted to urea. Thus, it will be carried by the blood to the kidneys which will come out in the form of urine and the mammary glands that come out in the form of MUN. The optimal MUN concentration for cow is 12-17 mg/dL. In some studies, MUN levels can affect fertility if the MUN concentration is above 18 mg/dL or above 19 mg/dL. The fertility decreases due to ammonia and changes in uterine pH during the luteal phase of the estrus cycle which is a critical period at the initial stage of embryo development that affects embryo quality.

Hormone estradiol plays a role in the estrus cycle, folliculogenesis and ovulation processes. Estradiol stimulated by LH is initially secreted by follicular cells. Excess urea may interfere with the neuromodulation of episodic GnRH/LH release in cows, especially during the early post-partum period.
The purpose of this study was to determine the effect of Milk Urea Nitrogen (MUN) levels on estrogen level in ovulation and determine pregnancy status in dairy cows by giving the same feed pattern.

**Materials and Method**

**Sample collection:** The study was conducted at the Wagir District, Gunung Kawi-Malang, East Java, Indonesia. Sampling was carried out on productive heifer based on recording data. The collected data were based on the criteria. Divided into three groups based on MUN levels and reproductive status. Blood drawing for estrogen level analysis was done at the time of estrus (H0), seven days after estrus (H+7), and twenty-two days after estrus (H+22). Milk extraction was carried out on the seventh day after estrus (H+7). A pregnancy checkup with rectal palpation.

**Estrogen Hormone Levels:** Estrogen hormone levels in the study using Enzyme Linked Immunosorbent Assay (ELISA).

**Milk Urea Nitrogen (MUN) Levels:** Milk urea levels in this study were examined by Barthelot.

**Pregnancy:** Pregnancy examinations were carried out 3 months after insemination using the rectal palpation.

**Data Analysis:** The data obtained were analyzed by independent t-test with SPSS (Statistical Package for the Social Sciences) for Windows programs.

**Result and Discussion**

**Selection and Grouping of Samples:** The data collection of female dairy cows was carried out at the farm in Preet, Sumbersuko Village, Wagir District, Gunung Kawi-Malang, Indonesia and was selected based on characteristics (Table 1), then 18 samples of dairy cows were obtained. After that, a grouping based on dairy cows which is a first-calf heifer, still productive, not pregnant, and has a normal estrus cycle. Feeding in dairy cows uses the same pattern, which is hay grass and KUD-made concentrates which produced significantly different levels of MUN (p <0.05) in each group (Table. 3). This is related to the use of nitrogen in each individual different cow for milk production and energy. Some studies report the presence of genetic variations in MUN concentrations (indirect indications of BUN) between cows and similar breeds, showing genetic differences in efficiency of nitrogen utilization[15,16,17]. Nourozi’s[18] said that the concentration of urea nitrogen will increase if high protein feed is given. Giving high crude protein has a negative effect on Blood Urea Nitrogen (BUN) and Nitrogen Urea Milk (MUN). BUN is directly proportional to MUN[19,20]. According to Gulinski[21], high levels of protein ration cannot always be optimally utilized by livestock, depending on the efficiency of N utilization for milk production, if not utilized, the concentration of urea nitrogen can increase. The urea nitrogen concentration in ruminants can be influenced by protein feeding and N utilization efficiency for milk production[22].

Ammonia is a result of protein metabolism, which will enter the liver and be converted in the form of urea. In the blood, the urea will be filtered by the glomerulus so that the filtrate will form, then the filtrate enters into Bowman’s capsule and finally flows in the tubes which are then excreted into urine[23]. Glomerulus Filtration Rate (GFR) is one way to measure the concentration of urea nitrogen in dairy cows[24]. If physiological problems occur in the kidneys, the BUN levels will be high. High levels of BUN indicate an inefficient use of N intake in the body for growth and milk production[21,22].

**Estrogen:** The results of the study of estrogen hormone levels at estrus (H0) were significantly different (p <0.05) in group II with group I and group III (Table. 4). Groups with high MUN levels in group III produced high MUN and estrogen at the time of estrus (H0). Urea increase in blood may affect GnRH secretion by changing the hypothalamic environment which can have a direct toxic effect on neurosecretory cells which are pulses of the GnRH generator so that they can change the environment of amino acid neurotransmitters in the preoptic area (POA) which can reduce the release of opioid peptides endogenous which interacts with GnRH neurons on the hypothalamic basal media[12]. So that there is an increase in estrogen levels at the time of estrus (H0) despite high MUN levels.

The hormone estrogen is associated with the growth and development of follicles in the follicular
phase, especially the formation of large follicles. In large follicles (dominant follicles) that undergo high estrogen-containing selection in follicular fluid, and immediately after the follicle selection process ends it contains mRNA for gonadotropin receptors and steroid hormones\textsuperscript{[25]}. If the concentration of urea or ammonia in high blood meal will reduce the LH bond to the ovarian receptors, causing a decrease in the level of ovulation and progesterone production\textsuperscript{[12]}. LH in granulosa cells functions as a stimulator and aromatase activity, and physiologically together with insulin is a regulator of estradiol production\textsuperscript{[24]}.

The results of the study were based on the identification of the estrogen hormone, showing all groups of cows ovulate (Table 2). The total protein intake given has no effect on milk production (Table 3), as opposed to Alstrup\textsuperscript{[26]} giving protein concentration in feed is directly proportional to the increase in milk production. The response of different milk production to the same quality and quantity of feed as in the results of the study can be caused by genetic factors\textsuperscript{[27]}.

**Pregnancy:** In the study MUN levels had an influence on pregnancy status, although all cows in the group ovulated (Table 2). Rectal palpation shows 6 pregnant from a total of 18 cows. This is related to the consumption of feed given, feed with a high content of RDP in dairy cows is closely related to an increase in the concentration of BUN or MUN and a decrease in pregnancy rates\textsuperscript{[1,20]}. In cattle with NEB and high RDP feeding proven to produce ammonia and urea which have a damaging effect on the development of oocytes and embryos\textsuperscript{[7]}. High urea levels have no effect on ovulation as the results of the study, but can affect changes in uterine pH, mineral imbalance in the uterus, affect ovarian function and hormonal imbalances in the estrus cycle, which can disrupt the development of gametes and embryos\textsuperscript{[2,28,29]}. According to Jourritsman\textsuperscript{[30]}, negative effect of protein supplementation associated with urea-N enhancement in the blood, which can affect the development of follicles and embryos in the ovary.

The effect of urea levels on fertility tends to occur during the division and blastocyst process in the embryo, whereas the increase in high blood urea is likely to occur before ovulation\textsuperscript{[28,29]}. In addition, high urea levels can increase prostaglandin F2α secretion and disrupt the secretion of progesterone in the uterus which causes suboptimal conditions for embryonic development.\textsuperscript{[12]}

### Table 1: Characteristics of cow

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>3-7</td>
<td>4,09 ± 0,39</td>
</tr>
<tr>
<td>Parity</td>
<td>2-5</td>
<td>2,31 ± 0,25</td>
</tr>
<tr>
<td>Body Condition Score (BCS)</td>
<td>4-7</td>
<td>5,02 ± 0,35</td>
</tr>
<tr>
<td>Feed: Hay (kg/day)</td>
<td>20-35</td>
<td>33,89 ± 1,44</td>
</tr>
<tr>
<td>Concentrat (kg/day)</td>
<td>6-15</td>
<td>10,59 ± 0,32</td>
</tr>
<tr>
<td>Milk Yield (liter/day)</td>
<td>10-35</td>
<td>19,43 ± 0,74</td>
</tr>
</tbody>
</table>

### Table 2: Identification of ovulation based on estrogen levels during estrus (H0) and seventh day after estrus (H+7)

<table>
<thead>
<tr>
<th>Cows identity</th>
<th>Estrogen Levels</th>
<th>Ovulation (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H0</td>
<td>H7</td>
</tr>
<tr>
<td>81414</td>
<td>91,51</td>
<td>57,31</td>
</tr>
<tr>
<td>81761</td>
<td>79,86</td>
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<tr>
<td>81155</td>
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<td>81894</td>
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</tr>
<tr>
<td>81368</td>
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<tr>
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<td>81715</td>
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<td>45,55</td>
</tr>
<tr>
<td>81795</td>
<td>78,65</td>
<td>34,01</td>
</tr>
</tbody>
</table>

### Table 3: Total protein intake (kg/day), milk yield (liters/day), MUN levels (mg/dL) and based on pregnancy status

<table>
<thead>
<tr>
<th>Group</th>
<th>Intake Protein Total</th>
<th>Milk Yield</th>
<th>MUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>37,06 ± 0,69</td>
<td>21,50 ± 8,02</td>
<td>12,67 ± 3,31 \textsuperscript{a}</td>
</tr>
<tr>
<td>II</td>
<td>37,45 ± 1,01</td>
<td>19,80 ± 6,81</td>
<td>10,70 ± 3,43 \textsuperscript{a}</td>
</tr>
<tr>
<td>III</td>
<td>38,12 ± 0,97</td>
<td>17,00 ± 6,67</td>
<td>18,54 ± 5,48 \textsuperscript{b}</td>
</tr>
</tbody>
</table>
Table 4: Estrogen levels in estrus (H0), seven day after estrus (H + 7), and twenty two after estrus (H + 22) are based on pregnancy status

<table>
<thead>
<tr>
<th>Group</th>
<th>Estrogen (H0)</th>
<th>Estrogen (H+7)</th>
<th>Estrogen (H+22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>85.99 ± 10.86 b</td>
<td>49.14 ± 8.47</td>
<td>45.85 ± 6.54</td>
</tr>
<tr>
<td>II</td>
<td>74.23 ± 22.41 a</td>
<td>46.95 ± 12.44</td>
<td>56.21 ± 15.49</td>
</tr>
<tr>
<td>III</td>
<td>82.69 ± 21.76 b</td>
<td>46.65 ± 12.39</td>
<td>55.13 ± 16.35</td>
</tr>
</tbody>
</table>

**Conclusion**

Non-pregnant cow had MUN levels from 16-28 mg/dL and estrogen levels increase at time of estrus were the same as estrogen levels in pregnant cow. Low and high level of MUN affects to the estrogen levels and pregnancy rate. That depending on the efficiency of nitrogen utilization and the physiological health of individual dairy cows.

**Competing Interests:** The authors declare that they have no competing interests.

**Source of Funding:** The authors would like to thank the Department Veterinary of Reproduction, Faculty of Veterinary medicine, Airlangga University, Surabaya, East-Java, Indonesian.

**Ethical Approval:** The research does not need ethical approval. However, samples were collected as per stand art collection method without any harm and stress to the animals.

**References**


The Prevalence of Extended Spectrum Beta-Lactamase (ESBL) Producing gut flora among Pregnant Women peripartum in Community and Hospital, Indonesia

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Abstract
The data of the carrier rate of ESBL producing bacteria in pregnant women in Indonesia is limited. ESBL-producing bacteria colonization among women during labor is one of the risks for spreading and infection to the neonate. This study aimed to compare the carrier rate of ESBL-producing bacteria in pregnant women in the community and hospitals. This study was an observational analytic study with cross-sectional approach. Samples were collected from rectal swab of pregnant women who visited during antenatal care at the Primary Health Center (PHC), and inpatient pregnant women that referred to Dr. Soetomo referral hospital, Surabaya. The samples were cultured on MacConkey Agar media supplemented with cefotaxime 1 mg/L, incubation 37oC overnight. The growth colonies that were suspected ESBL producer were further identified by biochemically and confirmed the ESBL using the DDST (Double Disk Synergy Test) method. Among 200 samples (101 from PHC and 99 from hospital), 79 ESBL producers were identified, 28 (40%) from PHC and 51 (68.9%) from hospital. The carrier rate of ESBL producing bacteria was significantly different between PHC and hospital (p=0.001; 95%CI = 1.54-4.98). The antibiotic consumed by pregnant women was higher in hospital rather than PHC (p=0.001). Conclusion: The carrier rate of ESBL producing bacteria among pregnant women in hospital was higher than PHC. Antibiotic used was identified as risk factor.

Keywords: ESBL, Enterobacteriaceae, Pregnant woman, Indonesia.

Introduction
Extended-spectrum beta-lactamase (ESBL) is a plasmid-mediated derivative enzyme and is produced by Enterobacteriaceae mainly E. coli, K. pneumoniae, and K. oxytoca, although it is also known to be found in Proteus sp., Salmonella sp., and other gram-negative bacteria¹. Initially, ESBL was known as HAI (Healthcare-associated infection), since the late 90s, ESBL producing enterobacteriaceae findings have been reported in the community regarding urinary tract infections (UTI)².

In 2001 and 2002 was first reporting of ESBL producing bacteria from fecal in Spain and Poland. However, studies conducted in Indonesia have not found any carrier of ESBL producer, as well as in the following year, the increase was still relatively small, at 10%. After 2008 the rapid increase emerged from reports in Thailand, which stated an increase of more than 60%².
**Escherichia coli** is a normal gastrointestinal flora that most often detected since ESBL findings in the community were reported\(^3\). Although *E. coli* is a commensal bacterium, different environments could change it be pathogenic\(^4\). Known as a cause of urinary tract infections (UTI), surgical wound infections, and neonatal meningitis, *E. coli* colonization has also been reported in pregnant and non-pregnant women. *E. coli* infection in pregnant women could have an effect on pregnancy outcomes including infection in newborns\(^5\).

The most common cause of early-onset sepsis in several studies is coagulase-negative *Staphylococcus* sp. While in other studies were group B *Streptococcus* sp. (GBS) and gram-negative bacteria such as *E. coli* and *Klebsiella* sp.\(^6\).

Every year was estimated around 23.4% of newborn deaths were caused by infection, of which half occurred in their first week of life\(^7\). This might occur because of the vertical transmission process, which occurred during labor bypassed through the vagina or the horizontal transmission process that could occur due to contact between the mother and the baby after birth\(^8\). The presence of these routes also allows the risk of introducing ESBL producing enterobacteriaceae from mother to baby.

This study aimed to compare the carrier rate of ESBL-producing bacteria in pregnant women in the community and hospitals.

### Materials and Method

This study was an observational analytic study with the cross-sectional approach. The subjects of the study consisted of 101 community respondents, namely pregnant women who went to the Jagir Primary Health Center for antenatal visited, with inclusion criteria having not been hospitalization for the past year, and 99 pregnant women were included until 7 days after labor who were hospitalized at Dr. Soetomo hospital, and Airlangga University hospital with inclusion criteria have been hospitalized for more than two days. Each respondent in this study had obtained information for consent and filled out an informed consent form as an agreement to take part in the study. The data from respondents were collected, after filling the questionnaire which included demographic data, antibiotic consumed and other data.

From each respondent, rectal swab was taken using Amies transport media and on the same day, were immediately cultured on MacConkey selective media supplemented with 1 mg/L cefotaxime. The growth isolates were identified biochemically (TSI, indole, motile, citrate, MR and VP test), then proceed with the ESBL confirmation test using the double disc synergy test (DDST) method, which cefotaxime 30 µg, ceftazidime 30 µg, ceftriaxone 30 µg, aztreonam 30 µg, and amoxicillin/clavulanic acid 30/10 µg antibiotic discs with 15 mm distances from edge to edge, was applied on Mueller Hinton agar media. The test results were considered positive when showed an increasing diameter of inhibition zone of disc that facing against clavulanic acid discs. The examination was carried out in the Laboratory of Clinical Microbiology, Dr Soetomo hospital Surabaya.

The data was analyzed by SPSS Statistical Software Version 20.

### Result

During the study, as many as 200 pregnant women were recruited, 101 from PHC and 99 from hospital. The demographic data in both PHC and hospital showed mostly aged from 21 until 35 years old. The education level were 12(11.9%) university graduate, 67(67.7%) high school, 19(19.2) primary high school, and 3(3%) primary school or lower in PHC, while in hospitalized patient were 10(10.1%) university graduate, 44(44.4%) high school, 27(27.3) primary high school, and 18(18.2%) primary school or lower. Table 1.

The total 200 fecal specimens were collected during the study, 101 from PHC and 99 from hospital. Among these, 79 ESBL producers were identified, 28 (40%) from PHC and 51 (68.9%) from hospital. Table 2. The ESBL producing bacteria, were dominated by *E. coli* 42 strains (53.2%), *K. pneumoniae* 12 (15.2%), *S. paratyphi* 5 (6.3%), *Shigella* spp. 2 (2.6%) and the others. The carrier rate of ESBL producer between pregnant women from PHC and hospital was significantly difference (p=0.001; 95%CI=1.54-4.98).

The antibiotic consumed by pregnant women during the study were 28 (40%) among pregnant women in PHC and 51 (68.9%) for hospitalized pregnant women who visiting PHC rather than pregnant women that were hospitalized during their labor (p=0.001; 95%CI=1.54-5.53). Table 3.
Table 1. Demographic data of pregnant women that visited PHC and that were hospitalized in Dr. Soetomo hospital and Airlangga University hospital, 2018

<table>
<thead>
<tr>
<th>Demographic</th>
<th>n (%) of women by sampling location</th>
<th>PHC* (n=101)</th>
<th>Hospital (n=99)</th>
<th>Total (n=20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;21</td>
<td>6(5.9)</td>
<td>5(5.1)</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-35</td>
<td>82(81.2)</td>
<td>64(64.7)</td>
<td>146</td>
<td>0.093</td>
<td></td>
</tr>
<tr>
<td>&gt;35</td>
<td>13(12.9)</td>
<td>30(30.3)</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary School &amp; Lower</td>
<td>3(3)</td>
<td>18(18.2)</td>
<td>21</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Primary High School</td>
<td>19(19.2)</td>
<td>27(27.3)</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary High School</td>
<td>67(67.7)</td>
<td>44(44.4)</td>
<td>111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>12(11.9)</td>
<td>10(10.1)</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*= Primary Health Center

Table 2. Prevalence of ESBL producing bacterial gut flora among pregnant women in Indonesia PHC and hospital

<table>
<thead>
<tr>
<th>ESBL producer</th>
<th>Bacteria</th>
<th>n(%)of pregnant women in *PHC (n=101)</th>
<th>n(%)of pregnant women in Hospital (n=99)</th>
<th>OR (CI-95%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td><em>Escherichia coli</em></td>
<td>14(50)</td>
<td>29(56.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Enterobacter aerogenes</em></td>
<td>1(3.6)</td>
<td>4(7.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Klebsiella pneumoniae</em></td>
<td>5(17.8)</td>
<td>7(13.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Klebsiella oxytoca</em></td>
<td>2(7.1)</td>
<td>4(7.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Salmonella paratyphi</em></td>
<td>1(3.6)</td>
<td>4(7.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Proteus vulgaris</em></td>
<td>2(7.1)</td>
<td>1(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Proteus mirabilis</em></td>
<td>1(3.6)</td>
<td>0(0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Yersinia enterocolitica</em></td>
<td>0(0)</td>
<td>2(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Shigella boydii</em></td>
<td>1(3.6)</td>
<td>0(0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Shigella dysenteriae</em></td>
<td>1(3.6)</td>
<td>0(0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-total positive</td>
<td></td>
<td>28(27.72)</td>
<td>51(51.52)</td>
<td>2.77</td>
<td>0.001</td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td>73(72.28)</td>
<td>48(48.48)</td>
<td>(1.54-4.98)</td>
<td></td>
</tr>
</tbody>
</table>

Note: *= Primary Health Center; **Significantly different using Chi-Square Test (p<0.05)

Table 3. The antibiotic consumed by pregnant women before and during delivery

<table>
<thead>
<tr>
<th>Variable</th>
<th>PHC* (n,%)</th>
<th>Hospital (n,%)</th>
<th>OR (CI 95%)</th>
<th>p value**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic</td>
<td>Yes</td>
<td>20(30.8)</td>
<td>41(30.2)</td>
<td>2.92 (1.54-5.53)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>81(70.2)</td>
<td>58(68.8)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *= Primary Health Center; **Significantly different (p<0.05)

Discussion

ESBL-producing bacteria usually colonized the intestine without caused signs of infection. Their spread could occur either fecal-oral or through hand contact of health workers or contaminated objects. Infection that could be caused by ESBL-producing
Gram-negative bacteria includes even systemic or local infections. This study showed that the prevalence of ESBL producing bacterial gut flora in pregnant women in hospital was 51.52% that was highly significance against pregnant women from PHC 27.72% (p=0.001, 95%CI=1.54-4.98). The data suggest that the carrier rate of ESBL-producing bacteria among pregnant women in the Hospital was almost twice more than the PHC.

This data similar with the study of many countries in Africa showed that the overall pooled prevalence of colonization with ESBL producing enterobacteriaceae in pregnant women and post-partum women in Africa was 17% (10% – 23%)\(^{20}\). The study in Madagascar, in which the incidence of neonatal sepsis was high, among pregnant women in community showed also the similar prevalence of gut bacterial flora producing ESBL colonization, of 18.5\(^{21}\). It would be impact of the transmission of ESBL producing bacteria to the sepsis neonates. The other studies also showed the similar rate of ESBL producing gut flora enterobacteriaceae, such as Tanzania 15% (in 2013)\(^{22}\), India 15% (data 2007-2009)\(^{23}\) and Madagascar 10% (in 2009)\(^{24}\).

The prevalence of ESBL producing gut flora in hospital was significantly higher than community pregnant women. It was suggested due to the many factors, such as antibiotic selective pressure or transmission during hospital stay. The existence of a high ESBL carrier in a hospital compared to a community could be related to selective antibiotic\(^{11}\).

Woodmansey et al (2004) showed the influence of antibiotic selective pressure and transmission during hospital care for the increasing of ESBL colonization\(^{12}\). Results of fecal carriers investigations in normal deliveries and cesarean deliveries infants showed a significant association with ESBL producing enterobacteriaceae carrier risk\(^{12}\). Not only the history of care in a long-term care place that can spread ESBL-PE to acute care facilities, but also the spread of ESBL-PE in long-term care places obtained during treatment in acute care facilities\(^{13}\).

This study showed that antibiotic consumed by pregnant women in hospital is higher than in PHC. As the study of Kang et al (2012), the criteria of women, age, illness, severity of disease, co-morbid conditions, history of the use of cephalosporin antibiotics and penicillin derivatives, it was found that a history of antibiotic use was a factor that had a significant correlation\(^{14}\). Antibiotic used can disrupt the gut microbiota, in both of oral or injectional antibiotic treatment. It can suppress the gut flora and allowing he emergence and development of resistant bacteria, such as ESBL producing bacteria\(^{15}\).

In this study, *E. coli* and *K. pneumoniae* were the most prevalent ESBL producing bacterial gut flora. That was like the multicenter study result that conducted in Surabaya, Malang and Semarang, where *E. coli* and *K. pneumoniae* were known as the highest ESBL producing bacteria in Indonesia\(^{16}\). Especially ESBL-producing *E. coli* and *K. pneumoniae* have been known as a serious pathogen in both of hospital and in community since decades ago\(^1\).

Frequently, *K. pneumoniae* and *E. coli* are species that were often found to be the caused of UTI in the pregnancy and postpartum periods where 80% were resistant to the third and fourth generation of cephalosporins\(^{17}\). A study in patients with UTI showed that of 22 Carbenemase-producing gram-negative bacteria, four strains also produced ESBL\(^{18}\).

Until the late 1990s, the highest ESBL producing bacteria were *K. pneumoniae*, but the situation has changed since the early 2000s when isolates were more often obtained from the community. This was related to the dominance of *E. coli* as ESBL producer and CTX-M expression was more commonly found\(^3\). The CTX-M type was more easily spread because it used an enzyme encoded by the genes carried by the plasmid and/or other mobile genetic material, while the SHV, and TEM type spread through clonal bacteria\(^{19}\).

*Escherichia coli* is an intestinal commensal bacteria that most commonly found in the female reproductive tract. However, extra intestinal *E. coli* was the second most common caused of obstetric infections. Its presence could be causing different manifestations among pregnant women, including amniotic membranes infections, urinary tract infections or endometrial infections, sometimes even caused sepsis\(^4\).

All these data showed the important of exploring the ESBL producing bacteria harbouring among pregnant women. The high carrier rate of the ESBL producing bacterial among pregnant women, not only will impact for infection in the pregnant women itself, but also their baby.
Conclusions

This study showed that there was a significant difference between the carrier rate of ESBL-producing gut bacterial flora in pregnant women in the Primary Health Center (community) (27.72%) and hospitals (51.52%). The dominant bacterial was *Escherichia coli*. Antibiotic use was a risk factor for ESBL producers colonization.

Conflict of Interest

None declare.

Ethical Clearance

This study was approved by the Ethical Committee from the Dr. Soetomo Hospital and Airlangga University Hospital.

Source of Funding

This study was supported by grant of Tahir Professorship by Airlangga University No. 1149/UN3/2018.

References


Detection of Trypanosomiasis in Horse in Bima, West Nusa Tenggara Province, Indonesia

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Abstract

Trypanosomiasis or surra is a disease caused by blood parasite of Trypanosoma evansi. Trypanosomiasis disease in Indonesia includes Strategic Diseases of Infectious Diseases (SDID). The purpose of this study is to detect Trypanosomiasis in horses in Bima, Indonesia. A total of 90 horse blood samples were used for the study. Sample examination using blood smears technique with Giemsa staining and Card Agglutination Test of Trypanosoma evansi (CATT). The result of examination of blood samples by microscope obtained 3 positive samples infected T. evansi and by CATT obtained 1 positive samples containing antibodies against T. evansi. It was concluded that trypanosomiasis in horses in Bima was 3.3%.

Keywords: Bima, Blood Smears, Card Agglutination Test of Trypanosoma evansi (CATT), Horse, Trypanosoma evansi.

Introduction

Bima is one of the cities in the province of West Nusa Tenggara, known as a tourist destination in Indonesia because it has natural beauty, customs, and the diversity of animals such as horses. The horse in Bima is used as a means of transportation, a source of meat, milk and a horse game. The existence of horses in the area can be threatened by disease and one such disease is Trypanosomiasis. Trypanosomiasis or Surra is a disease caused by \textit{Trypanosoma evansi} \textsuperscript{[1]}.

Trypanosomiasis in Indonesia is a disease that is categorized as Strategic Diseases of Infectious Diseases (SDID) list in Minister of Agriculture decree number 4026 / Kpts / OT.140 / 4/2013 on the establishment of strategic infectious animal diseases \textsuperscript{[2]}. Clinical features of infected horses \textit{T. evansi} is decreased body weight, low reproductive, growth delay, decreased work force, state of immunosuppression (decreased immune responsiveness) and death \textsuperscript{[3]}.

The first incident of this disease in Indonesia was known in 1897 which was identified by Panning C. A from horse blood located in Semarang, Central Java. Outbreak of Surra disease occurred in Tegal, Central Java in 1898 with prevalence of 7% and in 1900 - 1901 surra disease spread to Pasuruan, East Java and in 1920 - 1927 there were 25,000 head of livestock \textsuperscript{[4]}. Study results from Mastra \textsuperscript{[5]} stated that the prevalence of antibodies to Trypanosomiasis on Sumbawa island has an average of 15.3% with variations ranging from 11.2% - 20.8%. In 2010 Sumba region experienced outbreak of Surra disease. A total of 4268 animals infected with Trypanosomiasis consisting of 1608 horses, buffalo 2648 head, and 196 cows and 1760 dead tail consisting of 1159 horses, 600 buffalo, and 1 cow. Morbidity and mortality data were obtained from accumulated disease incidence over a 2-year period from 2010 to 2012 \textsuperscript{[4]}.
While in Kabaru Village, Rindi Sub-district, East Sumba District, from 100 horses taken blood samples, there were 8 horses that were positive for *Trypanosoma evansi* so it can be concluded that the prevalence of Typanosomiasis in the area is 8% [6]. Another incidence of Surra disease occurred in Banten in the year 2013 - 2014 recorded 14 buffalo in Pandeglang regency infected by Surra disease. This incident was supported by PCR analysis results against the bloodsucking flies vector (*haematophagous flies*), showing a positive outcome indicating the threat of outbreaks of Surra outbreaks, with an initial incidence in May 2013 [7].

The diagnosis of trypanosomiasis can be done by examining the presence of parasites as a gold standard diagnosis and antibody testing of *Trypanosoma* with Card Agglutination Test of *Trypanosoma evansi* (CATT), and can be confirmed by molecular examination (PCR). Research data can be used as a basis for control of trypanosomiasis in Bima, and and support government programs to treatment and prevent Surra disease.

**Method**

The samples used in this study were 90 samples of horse blood taken from horse raised in regency and city of Bima, collected in January 2018. Examination of samples by blood smear method and Card Agglutination Test of *Trypanosoma* (CATT). The research was conducted at the Parasitology Laboratory of Faculty of Veterinary Medicine, Airlangga University, Surabaya and Veterinary Research Center of Bogor. The tools used in this research are cotton, venoject, vacuum tube with EDTA, glass object, shaker / rotator, stick, plastic card and timer. The material used is alcohol 70%, Giemsa 10%, absolute methanol, Card Aglutination Test of *T. evansi* (CATT) production by Institute of Tropical Medicine Antwerp, positive control and negative control serum against *T. evansi*.

**Ethical approval**

Ethical approval was obtained from Animal Care and Use Committee (ACUC), Veterinary Medicine Faculty, Airlangga University. No: 1.KE.134.08.2018.

**Take blood of sample**

Blood collection can be done on cattle in standing position, sitting or lying down, in a state of calm. Blood is taken through the jugular vein by first cleansing the fur and giving antiseptic. The needle is inserted in the jugular vein, when the blood is seen starting out, then the needle is connected to the vacutainer tube [8].

**Preparation of blood with Giemsa staining**

Blood that has been taken directly dripped over glass and made blood smear. The dried blood was then fixed by using absolute methanol for ± 3 minutes, and stained with 10% Giemsa solution, 30 minutes. The preparations are then washed in running water, and allowed to dry at room temperature. The preparations are examined under a microscope with 1000x magnification using immerse oil.

**Card Aglutination Test of *Trypanova evansi* (CATT)**

The CATT test is in accordance with the Institute of Tropical Medicine Antwerp [9] procedure. The first stage, preparing CATT antigen. CATT buffers up to 2.5 ml are taken and transferred into vials containing CATT antigen, mixed well. The second stage prepares the reaction control. 0.5 ml CATT buffer is captured and transferred into 2 vials intended as positive and negative controls after which already equipped with drops on vials. Sample preparation to be tested with 1: 4 or 1: 8 dilution ratio. Agglutination reaction stage, 25 μl serum or plasma dripped on the test area of CATT, then add 1 drop of CATT antigen, and mixed with stirrer until evenly distributed, test on a flat bed orbital rotation for 5 minutes at 70 rpm. After 5 minutes, read the test results by comparing the existing standard as shown in Figure 1.

![Fig 1. Standard reading of CATT results](image)

**Results**

The test results using two different method namely blood pillow and CATT obtained different results. The results of examination using blood smear obtained 3
samples from 90 samples obtained *T. evansi* (Figure 2), while using Card Agglutination Test of *Trypanosoma evansi* (CATT) obtained 1 positive antibody 3 (+++), which can be seen in Figure 3.

**Figure 2. Trypanosoma evansi on the blood smear with Giemsa staining (Magnification 1000X)**

Serologically tested results using Card Agglutination Test of *Trypanosoma* (CATT) of 90 samples tested, obtained 1 positive sample (positive 3 / +++). CATT test results can be seen in Figure 3.

**Figure 3. Serological test results using CATT**

*Description: + positive control, - negative control, 1-5, 6-8 is the sample. Sample no. 7 by showing positive results +++.*

**Discussion**

Based on the results of research that has been done in Bima using horse blood samples with blood testing method and serological test in this case is Card Agglutination Test of *Trypanosoma evansi* (CATT) got different results in both method. In the test by using blood smear method of 90 samples tested there are 3 positive samples *Trypanosoma* sp and visible parasitic formation on examination of blood smear in accordance with Figure 2, whereas, on the test using CATT only 1 sample positive. Differences in test results can be seen from the working principles of each method. The working principle of the blood smear is to find the causative agent of the blood protozoan *Trypanosoma* sp. which is different from the CATT that detects antibodies. This is one of the reasons why there are differences between the two method. The use of CATT is excellent for detecting chronic infection because *Trypanosoma* sp. antibodies have been established and can be detected. In the case of acute infection, the use of CATT is not recommended because antibodies from the host have not been established and usually horses with trypanosomiasis disease are fast, acute and fatal [5].

The results of the study concluded 0.3% of horses in Bima suffer from Trypanosomiasis. This result is lower than the report on Trypanosomiasis in the surrounding area (Sumbawa island). Mastra [6] reported that seroprevalence of Surra disease in regency and city of Bima is 20.8% and 20.0% in cattle, buffaloes and horses. The spread of Trypanosomiasis disease in regency and city of Bima can not be separated from the vector role of blood-sucking flies *Tabanus* sp. which acts as a mechanical vector [10]. Another factor contributing to the Trypanosomiasis event in Bima is maintenance management. The maintenance of horses in Bima is done extensively, so the control of a disease event is also difficult to suppress and implement. In addition, the presence of vectors of bloodsucking flies that many in the field is an important factor of disease transmission [2]. The other factors of transmission are in Bima has tradition of horse race, that can make the transmission and spread of Trypanosomiasis disease is higher because use horses from others Bima area and outside Bima area. Need for preventive measures to support government programs in addressing the spread of this disease with maintenance management, vector control and control of livestock traffic.
Based on the results of the examination with CATT, it is recommended to use a blood smear as a gold standard examination to detect agents causing trypanosomiasis in horses.

Conflict of interest

The authors declare that there is no conflict of interests.

Acknowledgement

The author would like to thankful to my parents, veterinarian on duty in Bima, and Animal Husbandry and Animal Health Service of West Nusa Tenggara Province.

Source of Funding

Funding in this study came from personal funds.

References

Assessment of Stress Reactions and Identification of Family Experiences in Primary Care Post Restrain Schizophrenia in East Java Indonesia. Mix Method: Sequential Explanatory

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²Department of Nursing, Faculty of Nursing, University of Airlangga, Indonesia
³Department of Public Health, Faculty of Public Health, University of Airlangga, Indonesia

Abstract

After the life of the schizophrenia, post-Restrain is a person who has been free from restraining, but stress reaction on the client family schizophrenia post-Restrain has not been said to end the role in family factors. The aim of the study was to investigated stress reaction and family experiences in primary care post restrain schizophrenia and to explain the stress reaction and experience of families who have people with schizophrenia post-restrain. Material and Method: A total of 135 families who have people with schizophrenia post-restrain October to December 2018. This research Mix Method: Sequential Explanatory design, the research instrument used was The Kempe Family Stress Inventory with The sensitivity of the KFSI was calculated at 80%. The specificity was 89.4%, the positive predictive value was 52.5%. Negative predictive value was 96.8%. The results of the study illustrated that the total mean score of a stress reaction in families normal was 43.48 [S.D=5.6], Mild was 34.33 [S.D=4.7], Severe was 56.45 [S.D=4.45]. The psychological burden was expressed by families in the form of fear and worry, the results showed a reaction to high stress and family experience lacking in primary care of people with post-restrain mental disorders. Conclusions: Most of the stress on families who have schizophrenia post-restrain in East Java is still showed revealed that the overall family stress reaction parent beaten of deprived schizophrenia and A majority parent has substance abuse history and Multiple stress.

Keywords: Stress, Experience, Schizophrenia, Primary care, Post-Restrain.

Introduction

After the life of the schizophrenia, post-Restrain is a person who has been free from restraining, but stress reaction on the client family schizophrenia post-Restrain has not been said to end the role in family factors. The psychological burden was expressed by families in the form of fear and worry to treat Schizophrenia, family stress reaction parent beaten of deprived schizophrenia and substance abuse history and multiple stress¹. Primary care is the basic ability of humans to meet their needs to maintain life, health, in accordance with health conditions²,³. Families have several important reasons for the treatment of schizophrenia, as families are most associated with schizophrenia, families are considered to be most aware of the condition of family members who experience schizophrenia⁴,⁵. WHO [World Health Organization] said at least one in four people in the world have mental problems, it is estimated there are around 450 million people in the world who have mental health problems⁴,⁵. The results of the Basic Health Research stated that the prevalence of severe mental disorders in the Indonesian population was 0.17% and the prevalence of mental
disorders in East Java in severe mental disorders (psychosis/schizophrenia) was 0.22\% and mental-emotional disorders at 6.5\%\(^5\). The results of the basic health research in 2018 showed schizophrenia 7 per mile previously only 1.7 permil, Mean while, the East Java Provincial Health Office recorded at least 731 people suffering from mental disorders in 26 districts / cities\(^5\). From the preliminary study conducted on October 18, 2018, the family experience of questionnaires, family stress reaction parent beaten of deprived schizophrenia and substance abuse history and multiple stress reaction in biological and psychological matters such as expressed by families in the form of fear and worry to treat Schizophrenia.

**Materials and Method**

This study used Mix Method: Sequential Explanatory design. Research variables are stress reactions on family and family experiences. Target participant who treating post restrains schizophrenia in East Java Indonesia 2018. Total 135 families were selected using by simple random sampling technique who treating post restrain schizophrenia. Step 1 explorative questionnaire and step 2 explanation three biggest themes of finding the study in step 1. The research instrument used was The Kempe Family Stress Inventory with The sensitivity of the KFSI was calculated at 80\%. The specificity was 89.4\%. the positive predictive value was 52.5\%. Negative predictive value was 96.8\%\(^23\).

The sample size was calculated using power analysis. The sample size are 1) the power of a statistical test (1-β), 2) level of significance (α), and the population effect size (γ). Therefore, the sample size in this study has estimated the significance at 0.05, a power of 0.80, and the small effect size 0.25, requiring a sample size of 135 families for the study. The questionnaire of this study was developed by the researcher based on a literature review of The Kempe Family Stress Inventory with The sensitivity of the KFSI was calculated at 80\%. The specificity was 89.4\%. the positive predictive value was 52.5\%. Negative predictive value was 96.8\%. We used SPSS 21.0 to conduct statistical analyses of all data. Quantitative data were presented as, Mean, Standard deviation (SD) and We used to in depth interview of qualitative data.

**Findings**

**Step 1 explorative data as Demographic data**

**Table 1. Socio-demographic characteristics of participants (n=135)**

<table>
<thead>
<tr>
<th>Characteristics Family</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>58</td>
<td>(43)</td>
</tr>
<tr>
<td>Female</td>
<td>77</td>
<td>(57)</td>
</tr>
<tr>
<td><strong>Age [M]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carer</td>
<td>23.20 years</td>
<td></td>
</tr>
<tr>
<td>Living in one house</td>
<td>22.40 years</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced / never married / widow</td>
<td>79</td>
<td>(59)</td>
</tr>
<tr>
<td>Married</td>
<td>56</td>
<td>(41)</td>
</tr>
<tr>
<td><strong>Duration of illness [M]</strong></td>
<td>1.4 years</td>
<td></td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time / part time</td>
<td>122</td>
<td>(90)</td>
</tr>
<tr>
<td>Unemployed / retired / student</td>
<td>13</td>
<td>(10)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary School</td>
<td>25</td>
<td>(18.5)</td>
</tr>
<tr>
<td>Junior high schools</td>
<td>23</td>
<td>(17)</td>
</tr>
<tr>
<td>Senior high schools</td>
<td>87</td>
<td>(64)</td>
</tr>
<tr>
<td><strong>Residences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>6</td>
<td>(4)</td>
</tr>
<tr>
<td>Rural</td>
<td>129</td>
<td>(96)</td>
</tr>
<tr>
<td><strong>Relationships: families are patients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couples</td>
<td>12</td>
<td>(10)</td>
</tr>
<tr>
<td>Parents</td>
<td>82</td>
<td>(60)</td>
</tr>
<tr>
<td>Children</td>
<td>9</td>
<td>(6)</td>
</tr>
<tr>
<td>Sibling</td>
<td>32</td>
<td>(24)</td>
</tr>
</tbody>
</table>

Demographic data of the sample: the mean age carer 23.2 years [SD=13.45] and living in one house 22.4 years [SD=12.22]. A majority of them were Female [n=77, 57\%]. Most Marital status divorce [n=79,59\%]. The mean Duration of 1.4 years [SD=0.6]. The majority employment full time [n=122,90\%]. Most Education were senior high schools [n=87,64\%]. A majority Residences were Rural [n=129, 96\%]. Most Relationships were Parents [n=82,60\%] respectively and it is shown in Table 1.
Table 2. Mean, standard deviation [SD] of Item in the KEMPE Family Stress Inventory (n=135)

<table>
<thead>
<tr>
<th>Stress Reaction</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>43.48±5.6</td>
</tr>
<tr>
<td>Mild</td>
<td>34.33±4.7</td>
</tr>
<tr>
<td>Severe</td>
<td>56.45±4.45</td>
</tr>
</tbody>
</table>

Item in the KEMPE Family Stress Inventory

<table>
<thead>
<tr>
<th>parent beaten or deprived</th>
<th>45.36±8.12</th>
</tr>
</thead>
<tbody>
<tr>
<td>parent has Criminal or Mental Illness Record, or Substance Abuse History</td>
<td>12.34±3.7</td>
</tr>
<tr>
<td>parent suspected of abuse in the past</td>
<td>7.2±1.7</td>
</tr>
<tr>
<td>parent with Isolation, Low Self-esteem, or Depression</td>
<td>4.1±1.23</td>
</tr>
<tr>
<td>multiple stresses or crises</td>
<td>8.1±2.4</td>
</tr>
<tr>
<td>violent temper outbursts</td>
<td>5.5±3.5</td>
</tr>
<tr>
<td>rigid, unrealistic expectation</td>
<td>4.2±2.3</td>
</tr>
<tr>
<td>harsh punishment</td>
<td>5.9±1.4</td>
</tr>
<tr>
<td>difficult and/or provocative or perceived to be by parent</td>
<td>3.9±1.2</td>
</tr>
<tr>
<td>unwanted or at risk for poor bonding</td>
<td>3.4±1.5</td>
</tr>
</tbody>
</table>

Base on table 2 Family stress reaction: the study findings revealed that the overall family stress reaction parent beaten of deprived schizophrenia average score was 45.36 (SD=8.12) and for lowest stress reaction that Unwanted or at risk poor Bonding average score was 3.4 (SD=1.5). The second highest stress reaction that Parent has Criminal or Mental Illness Record, or Substance Abuse History average score was 12.34 (SD=3.7). Consequently, average Multiple Stresses or Crises score was 8.1 (SD=2.4), Parent Suspected of Abuse in the Past average score was 7.1 (SD=1.7) but Parent with Isolation, Low Self-esteem, or Depression average score was 4.1 (SD=1.23), Violent Temper Outbursts average score was 5.5 (SD=3.5), Rigid, Unrealistic Expectation average score was 4.2 (SD=2.3), Harsh Punishment average score was 5.9 (SD=1.4) and for Difficult and/or Provocative or Perceived to be by Parent average score was 3.9 (SD=1.2). Respectively and it is shown in Table 2.

Step 2 explanation three biggest themes of study

Table 3. Description of Interview

<table>
<thead>
<tr>
<th>Session</th>
<th>Interview method</th>
<th>Theme</th>
<th>Contents</th>
<th>Duration [mins]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Face to face interview session</td>
<td>Parent Beaten or Deprived</td>
<td>Threatening incident Get physical abuse Get social isolation from schizophrenia</td>
<td>5-10</td>
</tr>
<tr>
<td>2</td>
<td>Face to face interview session</td>
<td>Parent has Criminal or Mental Illness Record, or Substance Abuse History</td>
<td>Previous events of abuse History of the disease Previous criminal actions</td>
<td>5-10</td>
</tr>
<tr>
<td>3</td>
<td>Face to face interview session</td>
<td>Multiple Stresses or Crises</td>
<td>fear and worry when caring for the form of burden felt when caring for the most stressful event when caring for</td>
<td>5-10</td>
</tr>
</tbody>
</table>

Parent Beaten or Deprived

With regard to the theme of Parent Beaten or Deprived, as stated by the participants:

“Sometimes if the desire is not followed he is angry and threatens to hit” (P1)

“Other than that when schizophrenia asked about something, he threw objects near him....(P6) (P8)

“Ever hit a neighbor when asking for food and drink...” (P1)

Other Barrier related to Deprived

“ When schizophrenia went on a rampage or was angry I did restrain it back” (P3)

“I help provide food and drink and take a bath if needed”(P4)

Parent has Criminal or Mental Illness Record, or Substance Abuse History

“Schizophrenia has experienced divorce with his wife, it happened about 1 year ago....” (P7) (P9)
“Schizophrenia, when fired from their work, is often daydreaming and alone, and asking for money to be able to work again...” (P10)

Multiple Stresses or Crises

“Yes, when schizophrenia goes on a rampage, I ask my neighbors and other families for help in engaging in schizophrenia so as not to harm others, this makes me very stressful” (P11) (P5)

“Schizophrenia also sometimes, clothing, urinates and defecates in places so it makes me very disturbed and stressed, I am patient and resigned...” (P2)

Discussion

Families stress reaction in treating schizophrenia is felt like a psychological burden showed revealed that the overall family stress reaction parent beaten of deprived schizophrenia. The psychological burden was expressed by participants in the form of fear, worry and increase blood pressure6,8,9. The fear here is because coping mechanisms, for example, the client sometimes if the desire is not followed he is angry and threatens to hit will get angry and hurt others around him. Feelings of worry until the heart flutters also feel family if schizophrenia goes on, do not go back home and make mistakes outside6,9,10. The family believes that post-restrain schizophrenia is left by work by his family, schizophrenia post restrain will run around the house, angry, and harm other people so that the perceived family is not calm while taking care of post restrain schizophrenia. The family system approach to mental health is justified under conditions of self care, and therapeutic interventions for children must, therefore, also involve parents and siblings8,9,10,11. Knowledge of unique family attachment patterns is useful for adapting therapeutic treatments and preventive interventions for schizophrenia and families affected by the family burden. Family members assist in caring for clients. If the family works, then other family members who help take care of client needs such as eating and drinking. The family helps meet the needs of personal hygiene in schizophrenia. The family revealed that post-restrain schizophrenia has a desire to take a bath and did not want to take a bath. The relationship between the general tendency to avoid actions in problem situations and the tendency to seek social transfer to overcome stress12,15,17. Assertive behavior was also found to correlate with the tendency to be involved in substitution activities26. Greater willingness to display assertive behavior is observed in subjects who express a tendency to avoid thinking about problems and find active solutions in stressful situations11,18,19,20. Therefore, the family tries to meet the needs of post-restrain schizophrenia bath so that personal hygiene in schizophrenia can be well maintained and can prevent disease. The family stated that the fulfillment of bathing needs is illustrated by bath time, bathing method, bathing place, and problems when bathing are not met. The hospital or nurse must do family coping while facing various problems in treating the client’s mental disorder after post. This activity can be realized through the provision of counseling services and health care workers always control families and clients. Multiply family empowerment in managing the various burdens faced by families who care for post-mental disorders18,19,20. The need for primary care elimination in schizophrenia post-restrain helps fulfill the need for self-elimination care in schizophrenia post-restrain. Schizophrenia also sometimes urinates and defecates in places so it makes me very disturbed and stressed, I am patient and resigned. Family environment interaction affects both aggressions directed outward and symptoms of mood and anxiety disorders in a specific way20,21,22. The family explained that the method of schizophrenia post-restrain removal is varied, that is by covering the soil, being given a hole, given water to wash, toilet, and indoors.

Conclusion

Most of the stress on families who have schizophrenia post-restrain in East Java is still showed revealed that the overall family stress reaction parent beaten of deprived schizophrenia and A majority parent has substance Abuse History, parental reports of symptoms of PTSD (post-Traumatic syndrome) and depression have strong negative effects on girls’ outcomes, including stigma experienced, externalizing behavior, and school days rather than boys8,10,11,15,16,24. The perceptions of family caregivers in this area and about their free time, this can provide a broader perspective for mental health therapists, rehabilitation managers and policy makers to understand needs, overcome challenges and barriers from this family care group11,12,15. Researchers argue that meeting the needs of primary care for family baths helps meet the need to bathe post-restrain schizophrenia. The family revealed that post-restrain schizophrenia had a desire to take a bath and did not want to take a bath. The relationship between the general tendency to avoid actions in problem situations and the tendency to seek social transfer to overcome stress12,15,17. Assertive behavior was also found to correlate with the tendency to be involved in substitution activities26. Greater willingness to display assertive behavior is observed in subjects who express a tendency to avoid thinking about problems and find active solutions in stressful situations11,18,19,20. Therefore, the family tries to meet the needs of post-restrain schizophrenia bath so that personal hygiene in schizophrenia can be well maintained and can prevent disease. The family stated that the fulfillment of bathing needs is illustrated by bath time, bathing method, bathing place, and problems when bathing are not met. The hospital or nurse must do family coping while facing various problems in treating the client’s mental disorder after post. This activity can be realized through the provision of counseling services and health care workers always control families and clients. Multiply family empowerment in managing the various burdens faced by families who care for post-mental disorders18,19,20. The need for primary care elimination in schizophrenia post-restrain helps fulfill the need for self-elimination care in schizophrenia post-restrain. Schizophrenia also sometimes urinates and defecates in places so it makes me very disturbed and stressed, I am patient and resigned. Family environment interaction affects both aggressions directed outward and symptoms of mood and anxiety disorders in a specific way20,21,22. The family explained that the method of schizophrenia post-restrain removal is varied, that is by covering the soil, being given a hole, given water to wash, toilet, and indoors.
process elimination in post-restrain schizophrenia in East Java Indonesia.

**Conflict of interest**

The Author (s) declare that they have no conflict of interest.

**Source of funding**

Others source.

**Ethical Clearance**

This study was approved by the institutional review board of Ethical Approval (No.280-KEPK). The research received a certificate from the Airlangga University ethical permission.

**References**


Exclusive Breastfeeding: The Importance of Infant Growth and Development

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Abstract

Breast milk is the best nutrient for infant especially for the newborn. Nutrition in breast milk has benefits for improving infant’s growth and development. The infant are expected to be the successor of the nation that has competitiveness and high productivity by getting the best nutrition in the breastmilk. This research aims to determine the relationship of breastfeeding with infant’s growth and development in Sudiang Raya District Makassar City. This research is an analytic with cross sectional study design. The population were all the infant aged 6-12 months in Sudiang Raya distric as many as 192 infants. Total sample were 78 infant. The results showed that the exclusive breast feeding was high (66,7%) compared to the non-exclusive breast feeding (33,3%). Based on data analysis found that there were a significant relationship between breastfeeding and infant’s growth based on BB/U index with ρ: 0,000, PB/U index with ρ: 0,001 and BB/PB index with ρ: 0,010. There were also a significant relationship between breastfeeding and infant’s development with ρ: 0,000. Giving breast milk to the infant can increase growth and development so that it can improve their health status.

Keywords: Breast milk, Infant, Growth, Development.

Introduction

Based on data from the 2013 basic health research for the city of Makassar, breastfeeding <1 hour was 63.6%, breast milk for the past 1-6 hours was 20.5%, who gave breast milk for the last 7-23 hours was 1.5%, breastfeeding for the last 24-47 hours was 7.7% and the last ≥48 hours was 6.8%²,⁵,⁹. Growing and developing are two things that have different meanings. Growth and development is a continuous process that occurs since conception and continues into adulthood. Therefore, in the process of reaching this age the child must go through various stages of growth and development¹⁵,¹⁶,¹⁸.

Data from the Ministry of Health of the Republic of Indonesia (2006) in Kholifah (2014), there are 16% of children under five in Indonesia who experience general developmental disorders. Whereas UNICEF (2011) data in Fauzia (2015), there are 27.5% or 3 million children under five who experience motor development disorders. This shows an increase in the number of toddlers who experience general developmental disorders which include gross motor development disorders, fine motor skills, hearing loss, intelligence and delayed speech.

Based on the description of the low rates of exclusive breastfeeding, the importance of the benefits of exclusive breastfeeding and the number of patients with growth disorders in Indonesia which continues to increase, the authors are interested in examining the
“relationship between breastfeeding and infant growth in the Sudiang Raya area of Makassar City”.

Material and Method

This study is an analytical study with a cross sectional study design. This research was conducted in the Sudiang Raya Urban Village in February-June 2017.

The population in this study were 192 infants aged 6-12 months. The sample was chosen by random sampling method and selected 78 babies. The instrument used was the Pre Development Screening Questionnaire, digital scales and fixation boards.

The type of data collected consists of two types, namely primary data and secondary data. Primary data is data obtained from respondents through observation and interview activities.

The primary data collected is as follows:

1. Respondent and family characteristics including name, age, date of birth, parent’s name, address of parents, work of parents, education of parents, tribes of parents and religion of parents obtained through interviews.

2. Providing breast milk to babies obtained through interviews directly with the mother of the baby.

3. Baby growth which includes data on body weight and body length of the baby. Body weight data was measured using weight scales and body length data was measured using a fixation board conducted directly by the researcher towards the respondent.

4. Development of infants is assessed based on the suitability of development based on the age of the baby at that time. Developmental screening uses the form of the Pre Development Screening Questionnaire conducted by researchers on parents, closest people or baby caregivers.

Meanwhile, secondary data obtained in the form of the number of babies, schedules and locations of posyandu were obtained through the Sudiang Raya Health Center in Makassar City.

Data on body weight and body length were processed using the WHO Antro application that displays the nutritional status of the sample.

Data from the sample development interviews were assessed manually based on scoring from the Pre Development Screening Questionnaire form. Data analysis using SPSS with the chi square test.

Findings

Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n¹</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-8 month</td>
<td>56</td>
<td>71.9</td>
</tr>
<tr>
<td>9-12 month</td>
<td>22</td>
<td>28.1</td>
</tr>
<tr>
<td>Baby Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>women</td>
<td>41</td>
<td>52.6</td>
</tr>
<tr>
<td>administration of breast milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusive</td>
<td>52</td>
<td>66.7</td>
</tr>
<tr>
<td>Father’s age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-30 years</td>
<td>43</td>
<td>55.1</td>
</tr>
<tr>
<td>Mother’s age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-30 years</td>
<td>58</td>
<td>74.3</td>
</tr>
<tr>
<td>Fathers’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>52</td>
<td>66.7</td>
</tr>
<tr>
<td>Mother’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>50</td>
<td>64.1</td>
</tr>
<tr>
<td>Father’s occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>private employees</td>
<td>29</td>
<td>37.2</td>
</tr>
<tr>
<td>Mother’s occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>housewife</td>
<td>70</td>
<td>89.7</td>
</tr>
</tbody>
</table>

n¹ = 78

Based on age, it was found that infants who were sampled were generally aged between 6-8 months as many as 56 infants (71.9%). According to gender, it is known that babies are generally female, as many as 41 babies (52.6%) and exclusively breastfed as many as 52 babies (66.7%)

It is known that mothers of babies generally aged between 19-30 years are 58 people (74.3%). While the baby’s father is generally aged 19-30 years as many as 43 people (55.1%), the majority of parents’ education is graduating from high school. The mother of a baby with high school education graduated as many as 50 people (64.1%) and father of a baby with high school education as many as 52 people (66.7%). Mother’s work as a housewife is 70 people (89.7%), while the baby’s father works as a private employee as many as 29 people (37.2%).
Administration of Breast Milk

<table>
<thead>
<tr>
<th>Administration of breast milk</th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive</td>
<td>52</td>
<td>66.7</td>
</tr>
<tr>
<td>Non Exclusive</td>
<td>26</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Based on the results of research conducted in the Sudiangan Raya area of Makassar City in infants aged 6-12 months, it was found that 52 infants (66.6%) received exclusive breastfeeding and 26 exclusive breastfeeding (33.4%).

Relationship between Giving Breast Milk with Baby Growth

Table 3. Relationship between Giving Breast Milk with Baby Growth

<table>
<thead>
<tr>
<th>Good nutritional status</th>
<th>Administration of breast milk</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exclusive</td>
<td>Non Exclusive</td>
<td>n%</td>
<td>n%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>good nutritional status</td>
<td>51</td>
<td>18</td>
<td>73.9</td>
<td>26.1</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>body length according to age</td>
<td>50</td>
<td>17</td>
<td>74.6</td>
<td>25.4</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>body weight according to body length</td>
<td>52</td>
<td>22</td>
<td>70.3</td>
<td>29.7</td>
<td>0.010</td>
<td></td>
</tr>
</tbody>
</table>

The chi-square test results of the relationship between breastfeeding and infant growth based on index body weight according to age and body length according to age with a value of $\rho = 0.000$, body length according to age index with a value of $\rho = 0.001$ and index body weight according to body length with a value of $\rho = 0.010$. According to the results of the study, infants who were exclusively breastfed had normal nutritional status based on the body weight according to age index of 51 infants (98.1%) and those who were not exclusively breastfed 18 infants (69.2%) had good nutritional status. Based on body length according to age index, 50 infants (96.2%) had normal body length and were given exclusive breastfeeding and 17 babies (65.4%) had normal body length but were not given exclusive breastfeeding. Meanwhile, based on the body weight according to body length index all infants fed exclusively breastfed had normal nutritional status while 22 infants who were not given exclusive breastfeeding (84.6%) had normal nutritional status and 4 infants (15.4%) among them were thin.

Relationship between Breastfeeding Mother and Baby Development

Table 4. Relationship between Breastfeeding Mother and Baby Development

<table>
<thead>
<tr>
<th>Baby development</th>
<th>Administration of breast milk</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exclusive</td>
<td>Non Exclusive</td>
<td>n%</td>
<td>n%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corresponding</td>
<td>49</td>
<td>9</td>
<td>84.5</td>
<td>15.5</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Not corresponding</td>
<td>3</td>
<td>17</td>
<td>15</td>
<td>85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of statistical analysis prove that there is a significant relationship between breastfeeding and infant development in the Sudiangan Raya area of Makassar City with a value of $\rho = 0.000$. Infants who were exclusively breastfed were 52 babies (66.7%), 49 infants (94.2%) of whom had development according to their age and 3 babies (5.8%) had inappropriate developments. Meanwhile, of the 26 babies (33.3%) who were not given exclusive breastfeeding as many as 17 babies (65.4%) had inappropriate development and 9 babies (34.6%) had the appropriate development.

Discussion

Mother’s milk (ASI) is the best food for newborns, breast milk should also be given as early as possible when the new baby is born. Breastmilk given to babies after birth until the fourth or seventh day contains colostrum which is a liquid that is rich in protein and functions to fight infection, thereby reducing morbidity and even mortality. The provision of ASI can also help the survival of babies, especially families from low socio-economic groups by helping to alleviate the family’s economic burden and improve the quality of life for babies from poorly maintained sanitation environments.

Based on the results of research conducted in the Sudiangan Raya area of Makassar City in infants aged 6-12 months, it was found that 52 infants (66.6%) received exclusive breastfeeding and 26 exclusive breastfeeding (33.4%). The provision of exclusive breastfeeding to infants is higher than that of infants who are not given exclusive breastfeeding according to previous studies. Previous research conducted in the working area of the health center in Tamalanrea, Makassar, also stated that more groups were given exclusive breastfeeding.
namely 29 respondents (56.9%) compared to non-exclusive breastfeeding groups, namely 22 respondents (43.1%)\textsuperscript{19,20,21}. Growth is a quantitative change in the form of an increase in the number, size, dimensions of cells, organs and individuals. Not only changes in physical size of the body but also the structure of organs and brain\textsuperscript{18,19}.

Based on the results of statistical analysis states that there is a significant relationship between breastfeeding and infant growth in the Sudiang Raya area of Makassar City based on the index body weight according to age, body length according to age and body weight according to body length. The chi-square test results of the relationship between breastfeeding and infant growth based on index body weight according to age with a value of $\rho = 0.000$, body weight according to age index with a value of $\rho = 0.001$ and index body weight according to body length with a value of $\rho = 0.010$.

This is in accordance with previous research where there was a significant relationship between exclusive breastfeeding and the growth of 6-month-old infants in the Working Area of Berseri Pangkalan Kerinci Health Center, Pelalawan Regency. Likewise with the research which states that exclusive breastfeeding affects the nutritional status of infants\textsuperscript{9,10,11,14}.

Giving intake other than breast milk for infants under 6 months of age can increase the risk of infectious diseases and trigger malnutrition. This is because the provision of intake other than breast milk cannot be properly digested by the intestines of the newly developing baby and the non-sterile manufacturing process can mediate the entry of infectious disease-causing bacteria\textsuperscript{4}.

Development is a change that occurs quantitatively and qualitatively, increasing the ability of the body’s function to be better and predictable which is an interpretation of maturation or maturity. Changes in development occur in gross motor function, fine motor, cognitive, language, emotional and behavioral development as a result of development that is influenced by the environment\textsuperscript{1,3,4}.

The results of statistical analysis prove that there is a significant relationship between breastfeeding and infant development in the Sudiang Raya area of Makassar City with a value of $\rho = 0.000$. Infants who were exclusively breastfed were 52 babies (66.7%), 49 infants (94.2%) of whom had development according to their age and 3 babies (5.8%) had inappropriate developments. Meanwhile, of the 26 babies (33.3%) who were not given exclusive breastfeeding as many as 17 babies (65.4%) had inappropriate development and 9 babies (34.6%) had the appropriate development.

The results of this study are in line with research conducted in July (2015) where there was a significant relationship between exclusive breastfeeding and exclusive breastfeeding on the development of children aged 3-12 months in which 25 infants (41.7%) who were exclusively breastfed had normal development.

Optimal child growth is influenced by three basic needs. The three basic needs are ASUH in the form of fulfilling children’s basic needs in the form of intake such as breastfeeding and monitoring growth, ASIH in the form of fulfilling children’s emotional needs such as love and treatment from people around their environment and ASAH obtained through the learning process\textsuperscript{20,21}.

### Conclusion

1. Based on the body length according to age index, 96.2% had normal body length exclusively breastfed and 65.4% had normal body length but were not given exclusive breastfeeding. Meanwhile, based on the body weight according to body length index all infants who were given exclusive breastfeeding had normal nutritional status (100%) while 84.6% of infants who were not given exclusive breastfeeding had a normal nutritional status and 15.4% were thin.

2. Infants aged 6-12 months who are given exclusive breastfeeding in the Sudiang Raya area of Makassar City have a development that is in accordance with their age of 62.8%. Meanwhile, infants who were not given exclusive breastfeeding had an inappropriate development of 65.4%.

3. Giving breast milk to infants aged 6-12 months in the Sudiang Raya area of Makassar City has a significant relationship to the growth of infants with $\rho: 0.000$ for index body weight according to age, $\rho: 0.001$ for display body according to age index and $\rho: 0.010$ for index body weight according to body length index.

4. Giving breast milk to infants aged 6-12 months in the Sudiang Raya area of Makassar City has a significant relationship to the development of infants with $\rho: 0.000$. 
Conflict-of-Interest Statement

There was no conflict of interest at the time this research was conducted.

Source of Funding

This study received independent funding and assistance through the Makassar health polytechnic Risbinakes fund of the Ministry of Health of the Republic of Indonesia.

Ethical Clearance

Before the research was conducted, researchers obtained ethical clearance from the ethics commission of health research at the Makassar Health Polytechnic.

References


Efficacy of Ice Ball Oral Care on Subjective-Objective Oral Health Status in Cancer Patients: A Pilot Study

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²Nursing Department, Namseoul University, 31020, Korea.

Abstract

Background/Objectives: Oral mucositis and oral discomfort are common side effects in cancer patients undergoing chemotherapy. The purpose of this study is to examine the efficacy of ice ball oral care on subjective-objective oral health status induced by chemotherapy in adult cancer patients among Korean women.

Method/Statistical analysis: Participants were randomly assigned either to the experimental group (n=15) that received ice ball oral care during chemotherapy or the control group (n=15) that received normal saline oral care during chemotherapy.

Findings: There was a significant difference in oral mucositis, and oral discomfort between the two groups, and there were significant changes over time and the group by time interactions.

Improvements/Applications: The findings of the study demonstrated that ice ball oral care was more effective than the normal saline oral care in improving subjective-objective oral health status in adult cancer patients undergoing chemotherapy.

Keywords: Cryotherapy, Drug Therapy, Oral Mucositis, Nursing, Health.

Introduction

Chemotherapy is reportedly applied to 60-70% of cancer patients.¹ It may improve the patients’ survival rate, but, at the same time, might expose its toxicity to normal cells as well as cancer cells, and result in a vast level of destruction of cells and other side effects including oral mucositis.² Oral mucositis usually results from destruction of mucous membrane, which is attributable to decline of immunity and damage to oral epithelial cells from toxic treatments such as chemotherapy and radiation therapy.³

Chemotherapy is likely to result in stomatitis of Level 3 or higher (frequency of 47%)⁴. Oral discomfort including saliva change, burning sensation⁵, might often lead to decline of nutrition intake⁶ and whole body septicemia⁷, which would require decreased drug dosage or lengthened time of treatment⁸.

Thus, it is essential to provide nursing that would reduce risk factors of impeding oral comfort of cancer patients undergoing chemotherapy before therapy begins. Many factors affecting the strength and frequency of oral mucositis have been reported: types of chemotherapeutic agents and their dosage,² cancer types and patients’ haematologic status, oral health before therapy and oral nursing during chemotherapy⁹. The most important element for prevention of oral complications would be oral nursing.¹⁰ The change in one’s oral health would be an index that might indicate the result of treatment or oral health⁹, and would help suppress the occurrence of oral mucositis due to side effects of chemotherapy.
Oral mucositis which is objective oral health status might be a dangerous disease that can negatively influence therapy and even threaten a patient’s life. Thus, adult cancer patients should be given a proper and effective oral nursing to prevent oral mucositis, but, in reality, therapeutic intervention after the outbreak of the disease is the focus of clinic rather than prevention of the disease. Adult cancer patients tend to have enduring neutropenia due to chemotherapy, which often leads to infectious diseases such as oral mucositis. Therefore, every effort to prevent them from being infected by oral mucositis and effective oral nursing should be provided.

The guidelines for preventing oral mucositis and complications used home and abroad emphasize education of basic oral nursing, oral health matters and oral health management. Also, application of mouthwash liquids such as normal saline, chlorohexidine, and nystatin is recommended and oral cryotherapy is often suggested for patients under chemotherapy.

Oral cryotherapy can lead to vasocontriction and reduce blood flow to oral membrane, and, as a consequence, block the occurrence of reactive oxygen in cells due to anticancer medicine or radiation. Thus, it can an expected effect of reducing exposure to toxicity of anticancer agents. It has been reported that oral cryotherapy using ice cubes help maintain low intraoral temperature, reduce intraoral blood flow, alleviate inflammation, and exposure to toxicity of anticancer medicine.

Thus, we are in need of scientific and objective investigation that explores the prevention of oral mucositis and oral discomfort which is subjective oral health status resulting from chemotherapy. The results of such researches are expected to provide knowledge and information on basic nursing, and empirical evidence and data that can be practical applied in the clinic field.

Method
Design

The present research proceeded with a random control group pretest posttest design to identify how ice ball oral care affects mucositis and oral comfort of adult cancer patients undergoing chemotherapy.

Participants

The criteria for selection of subjects were as follows: (1) patients diagnosed of cancer hospitalized for chemotherapy, (2) those within the normal range in tests of white blood cell, neutrophilic leukocyte, hemoglobin, platelet count, albumin, creatine, alkaline phosphatase, and (3) those within the normal range of OAG (less than 8 points), without dysphagia, and melt ice balls and melt them in the mouth.

The predicted number for this pilot study was 30, half of which can be allocated for each of the two groups. A total of 30 patients were finally registered as the subjects. The participants were randomly classified into two subgroups: the experimental group of 15 and the control group of 15 patients. In an effort to reduce the risk of intervention contamination, the subjects were first allocated to the control group and after measurement of the control group, the experimental group were given intervention. To minimize the experimenter effect, then, the researcher performed the intervention of ice ball oral care, and an assistant conducted a pretest and a posttest.

Intervention

Experimental group

Following the guidelines of oral care nursing for cancer patients and the results of previous studies, nurses were asked to give the patients of both groups the following instructions, demonstrate them and check if they accurately follow it; to brush the teeth using the same toothbrush and toothpaste for 3 minutes 4 times every day, after every meal and before going to bed. Also, both groups were instructed not to use commercial mouthwash during the chemotherapy period, since it can stimulate oral membrane. During the intervention period, the experimental group were offered ice ball of 2.5cm in diameter in a bottle.

Control group

The control group, in contrast, did receive the same treatment of nursing except that they were not given ice balls oral care.

Measurements

Mucositis: The current research adopted Oral Assessment Guide (OAG) developed by Elier et al. OAG measures medical workers’ evaluation of patients’ changes in 8 areas by palpation and ocular inspection: voice, deglutition, lips, tongue, saliva, mucous membrane, gum and teeth. Each item was measured on a 3 point scale: 1 point for normal, 2 points for moderate
changes like swelling, redness, and changes in color and viscosity of saliva, and 3 points for serious changes including ulcer, bleeding and infection. The reliability of the instrument, in Elie et al.\textsuperscript{14} was .91 and the reliability in this study was obtained at .95.

**Oral discomfort:** This study adopted Beck’s\textsuperscript{15} Oral Perception Guide. This tool consists of 8 items measured on a 4 point scale: lips, tongue, gum, saliva, teeth, appetite, voice and discomfort when eating. The total score would range from 8 to 32 and a higher score means a greater level of oral discomfort. The reliability and validity of the scale was not reported in Beck’s\textsuperscript{15} research. Cronbach’s $\alpha$ in this study was .78.

**Data collection and analysis**

Data was collected for 3 months between April, 2017 and June, 2017. The participants were recruited by posting an advertisement for research subjects in the wards and the outpatient clinic department in Korea.

The collected data was analyzed by using the statistical program of SPSS WIN 24.0. Descriptive statistics, chi-square tests, and Fisher’s exact test were used to identify the homogeneity of participants’ characteristics and outcome baseline variables between the experimental and control groups. The test of homogeneity of oral discomfort was analyzed by Mann Whitney U test. The changes in their mucositis and oral discomfort were analyzed by paired t-test. The scores of mucositis of the two groups were the same at the pretest. Thus, the changes in their mucositis and oral discomfort after the chemotherapy were measured by using paired t-test.

**Ethical consideration**

To protect the rights of the participants, this study was conducted after receiving approval from the C University Institutional Review Board (IRB No. 01-009).

**Results**

**Demographic characteristics**

**Comparison of General and Clinical Characteristics and Study Variables between Experimental and Control Groups at Baseline**

The research subjects’ age and level of education were collected for their general characteristics. Their clinical characteristics included the name of the diagnosed disease, period of cancer diagnosis, cancer surgery, stage of cancer, and chemotherapy agent.

The data for these characteristics can be found in Table 1. Chi-square and fisher’s exact test identified homogeneity of the two groups, since no significant difference was found.

As for mucositis, the subjects of both groups had no oral problems with the score 8.0 of OAG, and thus the two groups do not show normal distribution, since the dependent variables of both groups are identical (Table 1).

| Table 1. General and Clinical Characteristics of Homogeneity Test between Experimental group and Control group (N=30) |
|---|---|---|---|---|---|
| Variables | Categories | Exp. (n=15) | Cont. (n=15) | $\chi^2$ | p | Range |
| Age(yr) | 20–40 | 4(26.7) | 6(40.0) | 0.88 | .390$^\dagger$ | 22–72 |
| | 40–60 | 6(40.0) | 4(26.7) | | | |
| | 60–80 | 5(33.3) | 5(33.3) | | | |
| Education | High school | 5(33.3) | 6(40.0) | 1.99 | .268 | |
| | University | 7(46.6) | 5(33.3) | | | |
| | Graduate | 3(20.0) | 4(26.7) | | | |
| Diagnosis | Cervix cancer | 4(26.6) | 6(40.0) | 4.88 | .090$^\dagger$ | |
| | Endometrial cancer | 7(46.6) | 5(33.3) | | | |
| | Ovarian cancer | 4(26.7) | 4(26.7) | | | |
Test of interventions

Mucositis

There will be a significant difference between the experimental group and the control group in mucositis depending on the measurement. The result found that the two groups exhibited a statistically significant different after intervention. The mucositis of the experimental group gradually increased from 8.00 at the pretest, to 9.36 after the chemotherapy. The control group scored 8.00 at the pretest and 9.98 after chemotherapy (Table 2).

Oral discomfort

Paired t-test tested that there will be a significant difference between the experimental group and the control group in oral discomfort depending intervention. It was found that the two groups showed a statistically significant different. The oral discomfort of the experimental group gradually decreased from 11.06 at the pretest, to 10.08 after the chemotherapy. The control group scored 11.86 at the pretest and 12.98 after chemotherapy (Table 2).

Discussion

It was found that ice ball oral care had a significant impact on mucositis. Both groups exhibited worsened oral mucositis. Other than the pretest, the two groups exhibited statistically significant difference in the occurrence of oral mucositis depending on the time of measurement (Table 1).

This finding is different from that of a previous research\(^6\), in which 3 groups of cancer patients were set: a group using chlorohexidine as the hydrous fluid to prevent oral mucositis, another group with oral cryotherapy, and another group without cryotherapy. It was found in that research that the delay period for dietary intake for the three groups was 8.5 days, 12.13 days, and 13.55 days. Thus, it was hard to claim that oral cryotherapy is responsible for the change in oral mucositis, since no significant difference was found.

Previous researches reported in the literature that oral cryotherapy decreased the occurrence of serious oral mucositis in the group of blood cancer patients under stem cell transplantation and that Melphalan can be used as an effective nursing drug to prevent oral mucositis\(^16\). Toro et al.\(^17\), reported that 90 percent of the experimental group with oral cryotherapy did not have oral mucositis in contrast to mere 34% of the control group using physiological saline solution. Also, in the measurement of oral mucositis on the 9\(^{th}\) day after the start of chemotherapy, the experimental group under oral cryotherapy marked the average of 0.43 in WHO grading, whereas the control group who only had brushing and rinsing the teeth recorded 1.14, which

<table>
<thead>
<tr>
<th>Period of having disease(year)</th>
<th>≤1</th>
<th>1–3</th>
<th>≥3</th>
<th>Cancer surgery</th>
<th>Stage of cancer</th>
<th>Chemotherapy agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp</td>
<td>6(40.0)</td>
<td>4(26.7)</td>
<td>5(33.3)</td>
<td>Yes</td>
<td>Stage 2</td>
<td>Cisplatin-etoposide</td>
</tr>
<tr>
<td>Cont</td>
<td>7(46.6)</td>
<td>6(40.0)</td>
<td>2(13.3)</td>
<td>No</td>
<td>Stage 3</td>
<td>Carplan-gemcitabine</td>
</tr>
<tr>
<td></td>
<td>7(46.6)</td>
<td>8(53.3)</td>
<td></td>
<td></td>
<td>Stage 4</td>
<td>Taxol-carploplatin</td>
</tr>
<tr>
<td>U</td>
<td>2.44</td>
<td>.203†</td>
<td>.93</td>
<td>3.41</td>
<td>.182†</td>
<td>3.12</td>
</tr>
<tr>
<td>p</td>
<td>.1–5</td>
<td></td>
<td>.277†</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†Fisher’s exact test

Table 2. Homogeneity Test for Mucositis and Oral discomfort between Experimental group and Control group (N=30)
clearly shows that oral cryotherapy contributed to lower occurrence of oral mucositis\textsuperscript{16}.

It was also found that ice ball oral care exerted a significant effect on oral discomfort. Oral discomfort was the worst after chemotherapy in control group. This finding is basically consistent with the research report that 40 percent of the patients under chemotherapy expressed oral discomfort such as mouth dryness, change in one’s taste and appetite, and difficulty in indigestion and that oral discomfort increased with a greater number of chemotherapy sessions\textsuperscript{18}. This finding is in the same line of the reports that oral discomfort can be dependent on the process of oral mucositis\textsuperscript{9}, types of anticancer medicine\textsuperscript{7} and oral nursing method.\textsuperscript{19}

Considering the agreement that oral comfort gradually worsens as the number of chemotherapy sessions\textsuperscript{18} further researches should control exogenous variables like the period of anticancer drug and haematological change in the process of chemotherapy\textsuperscript{8}.

\textbf{Conclusion}

The current research found that oral cryotherapy exerted a significant effect on oral mucositis, and oral discomfort of adult cancer patients under chemotherapy among Korea women. Thus, it can be used as an effective treatment to help reduce oral mucositis and oral discomfort of those patients. However, it should be admitted that the present research has a limitation in that the research subjects were recruited from a single medical institution and the size of samples is relatively small. Further researches are expected to expand to a set of institutions and a bigger group of subjects to help come to a generalized conclusion.

\textbf{Ethical clearance -} Not required

\textbf{Source of funding-} This study was supported by Namseoul University.

\textbf{Conflict of Interest –} Nill

\textbf{References}


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Study of Environmental Management on The Event of Dengue Hemorrhagic Fever (DHF) In Banjarbaru City, Kalimantan Selatan

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1Environmental Health Department, 2Public Health Magister Program, 3Student of Public Health Program Medical Faculty of Lambung Mangkurat University, 4Health Polytechnic of the Ministry of Health of Banjarmasin.

Abstract

Dengue fever is one of the main problems of public health in the world and nationally. This research was carried out in Banjarbaru City, South Kalimantan Province. The study population was the population of Banjarbaru City with a sample of 100 respondents in 5 sub-districts, namely South Banjarbaru District, North Banjarbaru District, Cempaka District, Landasan Ulin District and Liang Anggang District. This research is an observational study with case control research design, while the type is explanatory to explain the causal relationship between variables. Based on the results of the study it can be seen that there are 3 variables that have a relationship and 15 variables that are not related to the incidence of DHF in Banjarbaru City. Related variables include the habit of removing or recycling used goods (p-value = 0.045), the habit of cleaning the yard (p-value = 0.024), fogging program (p-value = 0.034).

Keywords: Environmental management, Dengue fever.

Introduction

Dengue is one of the main problems of public health throughout the world. Dengue fever is still endemic in certain areas, especially in tropical countries such as the continents of Asia and Africa. This disease is also one of the biggest killers, 86% of deaths occur in groups with high risk factors such as infants, toddlers and pregnant women1.

According to the WHO report, every year new cases of dengue fever of around 250 million are found with nearly 880,000 deaths. The incidence of dengue fever throughout Indonesia tends to decrease, which is 4.10% (in 2005) to 1.38% (in 2013), but has not reached the specified target of 1.25%. In addition to the progress that has been achieved, there are still many obstacles that must be faced, among others, access to services in remote areas, considered neglected disease, epidemiological disparities, management weaknesses especially limited competent resources, inadequate funding, weak cross-sectoral collaboration and community independence in controlling fever bleed2.

Most endemic areas of dengue fever are areas with a middle to lower economic condition so that dengue fever more often affects residents with lower to lowest economic status. The same was stated by Breman et al. That the poor population had the greatest risk of 58% of cases of dengue fever in the 20% of the poorest population in the world plus they got the worst service and the economy worsened due to their illness3.

There are 424 districts in Indonesia endemic to dengue fever from 576 existing districts, an estimated 45% of Indonesia’s population is at risk of contracting dengue fever. In 2009 there were 1,143,024 clinical dengue fever, 200,000 were examined by confirmation. This number may be smaller than the actual situation because the locations that are endemic to dengue fever are remote villages with difficult transportation facilities.
and low access to health services⁴.

Based on data, if compared to last 2016, the trend of dengue cases decreased. Because, in January 2016, there were 1,890 cases of dengue fever in South Kalimantan, up to 14 people who died. Then, in February 2017 there were 1,358 cases with 5 fatalities. It was recorded that as of early April 2016, the number of cases of dengue attacks that occurred reached 3,359 cases, with the death toll increasing to 22 people.

The number of people with dengue attacks rose sharply by 1,350 cases compared to the previous month. Most areas of DHF attacks include Banjarbaru City, Banjar Regency, Tabalong, Tanah Bumbu, Hulu Sungai Selatan, and Hulu Sungai Tengah. In 2015, the number of dengue sufferers was 3,668 cases with 40 people killed. In addition to DHF, South Kalimantan is also an area prone to dengue fever. South Kalimantan Health Office records 155 villages and urban villages or about 10 percent of the number of villages / kelurahan are vulnerable or in the red category of dengue fever.

**Material and Method**

This study is an observational study with a case control research design, while the type is explanatory, namely to explain the causal relationship between variables through hypothesis testing and by using the survey method. The population in this study were the people of Banjarbaru City who were spread in 5 Subdistricts namely South Banjarbaru District, North Banjarbaru District, Cempaka District, Landasan Ulin District and Liang Anggang District. The 5 sub-districts in detail were divided into 20 urban villages with a total of 100 respondents.

**Findings**

**Table 1. Results of Univariate Analysis**

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Density of occupants</td>
<td>Qualify</td>
<td>97</td>
<td>97.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not eligible</td>
<td>3</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>Humidity</td>
<td>Ideal</td>
<td>60</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Ideal</td>
<td>40</td>
<td>40.0</td>
</tr>
<tr>
<td>3</td>
<td>Place of Breeding</td>
<td>There is</td>
<td>99</td>
<td>99.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is not</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>Resting place</td>
<td>There is</td>
<td>96</td>
<td>96.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is not</td>
<td>4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Based on table 1, it can be concluded that the majority of respondents’ dwellings have occupancy and humidity densities that meet the requirements. 97% of respondents have occupancy density that meets the requirements. 60% of the research respondents have ideal occupancy humidity levels. 99% of respondents have breeding places and 96% have mosquito resting
Based on the findings only found 26% of respondents detected had larvae in their homes. Based on table 1, it is known that the majority of respondents have implemented the Mosquito Nest Eradication (PSN) program by 3M Plus. This can be seen from the positive habits of respondents, namely, the habit of draining landfill by 96%, the habit of closing landfill meetings by 60%, and the habit of removing or recycling used goods by 87%.

In this study, the habit of installing wire nets, the habit of hanging clothes, sleeping habits using mosquito nets, the habit of using mosquito repellent, habit of napping, and the habit of cleaning the yard are also habitual factors studied to find a connection with the incidence of dengue in the Banjarbaru City community.

Table 1 illustrates that there are negative habits of respondents that can lead to dengue cases, namely, the lack of respondents who put wire nets (22%) and sleep using mosquito nets (32%). In addition, the majority of respondents have other negative habits such as hanging clothes (58%), cleaning the home page <4 times a week (70%) and nap habits (81%).

Table 1 illustrates that there are negative habits of respondents that can lead to dengue cases, namely, the lack of respondents who put wire nets (22%) and sleep using mosquito nets (32%). In addition, the majority of respondents have other negative habits such as hanging clothes (58%), cleaning the home page <4 times a week (70%) and nap habits (81%).

Table 2. Bivariate Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>The Incidence of Dengue Hemorrhagic Fever</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DHF</td>
<td>Non DHF</td>
</tr>
<tr>
<td>Density of occupants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualify</td>
<td>1</td>
<td>33,3 %</td>
</tr>
<tr>
<td>Not eligible</td>
<td>6</td>
<td>6,2 %</td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideal</td>
<td>2</td>
<td>5,0 %</td>
</tr>
<tr>
<td>Not Ideal</td>
<td>5</td>
<td>8,3 %</td>
</tr>
<tr>
<td>Place of Breeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>There is not</td>
<td>7</td>
<td>7,1 %</td>
</tr>
<tr>
<td>Resting place</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that there are 3 variables that have a relationship with the incidence of dengue in the city of Banjarbaru. These variables include the habit of getting rid of or recycling...
used goods (p-value = 0.045), the habit of cleaning the yard (p-value = 0.024), fogging programs (p-value = 0.034). While other unrelated variables include occupant density (p-value = 0.197), humidity (p-value = 0.699), resting place (p-value = 1,000), larvae existence (p-value = 1,000), landfill drainage habits (p-value = 1,000), habit of closing TPA meetings (p-value = 0.433), installing wire netting (p-value = 1,000), habit of hanging clothes (p-value = 1,000), sleeping habits using mosquito nets (p-value = 0.423), habit of using mosquito repellent (p-value = 0.098), nap habit (p-value = 0.234), larvae presence (p-value = 1,000), mosquito larvae examination (p-value = 0.436), program abasiasi (p-value = 1,000), and epidemiological investigations (p-value = 1,000).

Discussion

In handling DHF, the role of the community to suppress this case is very decisive. Therefore the program of Eradicating Mosquito Nests (PSN) by 3M Plus needs to be carried out continuously throughout the year, especially in the rainy season. The PSN program, namely: 1) Drain, is to clean the place that is often used as a water reservoir such as a bathtub, water bucket, drinking water reservoir, refrigerator water reservoir etc. 2) Close, which is to close tightly places water storage such as drums, jugs, toren water, etc.; and 3) Reuse or recycle used goods that have the potential to become mosquito breeding sites for dengue transmission. Chi Square test results with a confidence level of 95% were used to see the relationship between the habit of recycling used goods and the incidence of dengue in Banjarbaru City, South Kalimantan, the results showed that the p-value = 0.045. which means that there is a significant relationship between the habit of recycling used goods and the incidence of dengue in Banjarbaru City, South Kalimantan.

The results of statistical tests show a p-value of 0.043 where the value of p <0.05 means that there is a relationship between the habit of cleaning used goods and the incidence of dengue in the city of Banjarbaru. The results of this study are in line with the results of Kurniawan’s research (2013) which states that there is a relationship between the habit of cleaning the yard and the incidence of DFH in Gonilan Village, Kartasura District, Sukoharjo Regency (p-value = 0.034).

The Ministry of Health of the Republic of Indonesia suppresses the spread of dengue disease by creating a P2DBD program (Dengue Hemorrhagic Fever Control) with the existence of Kepmenkes No. 581 of 1992 concerning the eradication of DFH (and Kepmenkes No. 92 of 1992 concerning Amendments to the Attachment to the Minister of Health Decree No. 581 of 1992), coupled with the Decree of the Director General of Disease Management (P2) & Environmental Health (PL) No. 914 of 1992 concerning P2DBD technical instructions.

Implementation of P2DBD program optimally is basically to reduce the number of dengue cases. Activities in the P2DBD program carried out to date include Epidemiological Investigations, Fogging Focus, Larvicides, Periodic larval examinations, Eradication of Mosquito Nests (PSN), and Health Extension.

The results of the statistical test showed a p-value = 0.034 where the value of p <0.05 means that there is a fogging program with the incidence of dengue in the city of Banjarbaru. The results of this study are in line with the results of Rahayu’s research (2013) which states that there is a relationship between fogging focus and the incidence of DFH in the target area of Sambungmacan I Puskesmas Sragen Jawa Tengah in 2013 (p-value = 0.000).

Conclusion

1. There is no relationship between occupancy density and the incidence of dengue in Banjarbaru City, South Kalimantan.
2. There is no moisture relationship with the incidence of DFH in Banjarbaru City, South Kalimantan.
3. There is no relationship between breeding sites and the incidence of dengue in Banjarbaru City, South Kalimantan.
4. There is no relationship between the resort and the incidence of dengue in Banjarbaru City, South Kalimantan.
5. There is no relationship between larva’s existence
6. There is no relationship between the habit of draining landfill and the incidence of dengue in Banjarbaru City, South Kalimantan.

7. There is no relationship between the habit of closing the landfill meeting with the incidence of dengue in Banjarbaru City, South Kalimantan.

8. There is a relationship between the habit of getting rid of or recycling used goods with the incidence of DHF in Banjarbaru City, South Kalimantan.

9. There is no relationship between installing wire mesh with the incidence of DHF in Banjarbaru City, South Kalimantan.

10. There is no relationship between the habit of hanging clothes and the incidence of dengue in Banjarbaru City, South Kalimantan.

11. There is no relationship between sleep habits using mosquito nets and the incidence of DHF in Banjarbaru City, South Kalimantan.

12. There is no relationship between the habit of using mosquito repellent and the incidence of dengue in Banjarbaru City, South Kalimantan.

13. There is no relationship between the habit of napping and the incidence of dengue in Banjarbaru City, South Kalimantan.

14. There is a relationship between the habit of cleaning the yard and the incidence of dengue in Banjarbaru City, South Kalimantan.

15. In the environmental management application program related to dengue prevention programs, there are variables related to the incidence of DHF in Banjarbaru City, South Kalimantan, namely fogging program variables while unrelated variables include larva examination programs, epidemiological investigations, and abatement.

**Ethical Clearance:** This study approved and received ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, LambungMangkurat University, Indonesia. In this study we followed the guidelines from the Committee of Public Health Committee of Public Health Research Ethics of Medical Faculty, LambungMangkurat University, Indonesia for ethical clearance and informed consent. The informed consent included the research title, purpose, participants’s right, confidentiality and signature.

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**Conflict of Interest:** The authors declare that they have no conflict interest.

**Daftar Pustaka**


The Effect of the Community Led Total Sanitation (CLTS) Method on the Event of Diarrhea in Balita in Banjar District

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⁴Health Polytechnic of the Ministry of Health of Banjarmasin.

Abstract

Diarrhea was ranked second as the leading cause of death in infants. Diarrhea in Indonesia is still an endemic disease and is a potential disease outbreak accompanied by death. Health profile data in 2016 showed that there were 6,897,463 estimated cases of diarrhea in health facilities, while those handled only around 2,544,084 (36.9%). The cases of diarrhea in South Kalimantan were 107,725, while those handled were only 9,986 (9.3%). Banjar Regency is the highest regency, both cases of diarrhea with a total estimated cases of 22,422, while those treated are 9650 (43%). The influence of the CLTS method which includes open defecation, CTPS (Hand Washing with Soap) behavior, drinking and food water management, waste management and household wastewater management with the incidence of diarrhea in infants in Banjar Regency. The design of this study is analytical, with a cross sectional approach. The population in this study were all mothers who had toddlers in Banjar Regency. The sample hereinafter referred to as the respondent in this study was determined using a purposive sampling technique with a minimum sample size of 100 people. Chi-square statistical test with 95% confidence level. The results of the study of all family members have behaved well with defecation in sanitary ware that is 100% and doing a good CTPS of 100%, there is no significant effect of the influence of drinking water and food with the incidence of diarrhea in infants in Banjar Regency, there is no significant effect between waste management and the incidence of diarrhea in infants in Banjar Regency, there is no significant effect between household wastewater management and the incidence of diarrhea in infants in Banjar Regency.

Keywords: Flies density, Environmental factors, Sanitation facilities, Sanitation behavior.

Introduction

Diarrhea was ranked second as the leading cause of death in infants. Every year around 2.5 billion cases of diarrhea occur in children under the age of five, and it is estimated that the number of cases will be relatively the same over the past two decades. Diarrhea is a disease that tends to cause death in sufferers and toddlers are the most vulnerable groups affected. The highest incidence of diarrhea cases occurs in the first two years of life and will decrease with increasing age¹.

Diarrhea in Indonesia is still an endemic disease and is a potential disease outbreak accompanied by death. Health profile data in 2016 showed that there were 6,897,463 estimated cases of diarrhea in health facilities, while those handled only around 2,544,084 (36.9%). The cases of diarrhea in South Kalimantan were 107,725, while those handled were only 9,986 (9.3%). Banjar Regency is the highest regency, both cases of diarrhea with a total estimated cases of 22,422, while those treated are 9650 (43%).
Material and Method

The design of this study is analytical, with a cross-sectional approach, which aims to determine the effect of the CLTS method which includes open defecation behavior, handwashing with soap behavior, management of drinking water and food, waste management and household wastewater management with the incidence of diarrhea in toddlers in Banjar Regency. Cross-sectional design is a study to study the dynamics of correlation between risk factors and effects, by approaching, observing or collecting data at one time.

Findings

Table 1 Univariate Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Defecation Behavior</td>
<td>Good</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not good</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Behavior of Hand Washing with Soap</td>
<td>Good</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not good</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Food management</td>
<td>Good</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not good</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Waste management</td>
<td>Good</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not good</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Management of household wastewater</td>
<td>Good</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not good</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>Diarrhea events</td>
<td>Diarrhea</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not diarrhea</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

The results of the study showed that all respondents had applied good defecation behavior. This means that all family members have defecated in sanitary latrines. The results showed that all respondents had applied good CLTS behavior. This means that all family members have behaved handwashing using soap and running water. Respondents whose method of managing drinking water and food are classified as good are 99 (99%) respondents. Meanwhile, respondents with poor management of drinking water and food were only 1 (1%) of respondents. Respondents whose waste management has been classified as good at 94 (94%) respondents. Meanwhile, respondents whose waste management is still classified as poor are only 6 (6%) respondents. This is due to the fact that in the area that is the location of the research itself, there is indeed a landfill, so that people are easy when they want to dispose of garbage, moreover there are officers who carry the garbage.

Table 2. Bivariat Analysis

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Diarrhea Event</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diarrhea</td>
<td>Not Diarrhea</td>
</tr>
<tr>
<td>Food management</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Good</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Not Good</td>
<td>55</td>
<td>55,6</td>
</tr>
<tr>
<td>Waste management</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Good</td>
<td>51</td>
<td>54,3</td>
</tr>
<tr>
<td>Not Good</td>
<td>5</td>
<td>83,3</td>
</tr>
<tr>
<td>Management of household wastewater</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Good</td>
<td>43</td>
<td>52,4</td>
</tr>
<tr>
<td>Not Good</td>
<td>13</td>
<td>72,2</td>
</tr>
</tbody>
</table>

Respondents who experienced diarrhea were more prevalent in respondents who had good drinking water and food influences as many as 55 (55.6%) respondents compared to respondents who had poor water and food influences as many as 1 (100%) respondents. Whereas the respondents who did not suffer from diarrhea were more prevalent in the respondents who had the influence of drinking water and good food, as many as 44 (44.4%) respondents compared to those with poor drinking water and food, as many as 0 (0.0%) respondents.

Respondents who experienced diarrhea were found more in respondents who had good waste management, as many as 51 (54.3%) respondents compared to respondents who had poor waste management, that is 5 (83.3%) respondents. Whereas the respondents who did not suffer from diarrhea were more prevalent in respondents who had good waste management, that is as many as 43 (45.7%) respondents compared to those with less good waste management, namely 1 (16.7%) respondents.

Discussion

Open defecation behavior reflects a culture of ignorance of society that can be interpreted as an attitude of no matter what, not participating in thinking about
other people’s cases. In this case the community does not care about the adverse effects of open defecation on themselves and others. Family latrines that do not meet the requirements are the cause of environmental pollution including soil pollution, water pollution, food contamination, and fly reproduction. Feces that are disposed of in the open can be used by flies which play a role in the transmission of fecal diseases, flies like to place their eggs in open human feces, then flies alight on feces and human food2

Sanitation facilities, healthy hygiene behavior (PHBS) have a close relationship with the incidence of diarrhea. The behavior of washing hands before eating, before feeding the baby and also after defecating becomes a factor in breaking the chain of transmission of diarrheal diseases. The behavior of removing stool in the place (toilet) is also very influential in preventing the transmission of diarrheal diseases3

The results of previous studies indicate that the incidence of diarrhea occurs mostly in respondents who use the poor type of TPSS as many as 45 respondents (42.5%). But based on the results of the analysis, there was no correlation between the incidence of diarrhea and the type of TPSS used. This is because although the type of TPSS is bad, the respondents are usually more often to burn dirt / garbage that is piled up or throw it into the sea so that the environment is kept clean4.

Drink and food hygiene and sanitation efforts basically include people who handle food, food storage, food processing equipment, food storage and presentation. Foods that are not managed properly and properly by food handlers can cause negative impacts such as disease and poisoning due to chemicals, microorganisms, plants or animals, and can cause allergies. The cleanliness factor of handlers or food management commonly called personal hygiene is a procedure to maintain cleanliness in the management of safe and healthy food. The cleaning procedure is clean behavior to prevent contamination of the food being handled5.

**Conclusion**

1. There is the influence of defecation behavior with the incidence of diarrhea in infants in Banjar Regency.
2. There is the influence of Hand Washing with Soap behavior on the incidence of diarrhea in infants in Banjar Regency.
3. There is no influence of water, drinking and food management with the incidence of diarrhea in children under five in Banjar Regency.
4. There is no effect of waste management on the incidence of diarrhea in children under five in Banjar Regency.
5. There is no effect of household wastewater management with the incidence of diarrhea in children under five in Banjar Regency.

**Ethical Clearance:** This study approved and received ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia. In this study we followed the guidelines from the Committee of Public Health Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia for ethical clearance and informed consent. The informed consent included the research title, purpose, participants’s right, confidentiality and signature.

**Source Funding:** This study done by self funding from the authors.

**Conflict of Interest:** The authors declare that they have no conflict interest.

**Reference**

Improving Knowledge of Elementary School Students as Peer Educators of Reproductive Health

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⁶Faculty of Public Health, Diponegoro University.

Abstract

Background: Awareness and knowledge about reproductive health among children in the elementary school in Indonesia was really low. Education about reproductive health is needed to increase the knowledge of reproductive health among elementary school students. This research is conducted to analyze the impact of Training-of Trainer model in elevating the knowledge of elementary school students as peer educators for reproductive health.

Method: This research used quasi-experimental method, with pretest and posttest one group only design. The samples of this research are 30 peer educators, which were selected purposively from 3 state elementary schools in the District of Brebes, Central Java, Indonesia. The intervention that had been given was a training about reproductive health for a whole day by a Facilitator Teacher and a Peer Educator from State Junior High School 2 Brebes. The assessments had been conducted before intervention and a month after intervention.

Result: According to the difference test using Wilcoxon Match paired Test, significant differences were found in the knowledge of the participants before and after Training-of Trainer model intervention (p=0.002) and there was an of 1.26 points in the knowledge.

Conclusion: Education about reproductive health by using training-of-trainers for a whole day could significantly elevate the knowledge of peer educators related to reproductive health within a month after the training had been conducted. The roles of peer educators are crucial because as peer facilitators, they are more trusted and it makes children more comfortable in performing discussion. Trained peer educators are expected to be reliable agents in changing reproductive health behavior of elementary school students.

Keywords: Knowledge, Training-of-trainers, Reproductive health, Elementary school students.

Introduction

Maternal mortality ratio (MMR) in Indonesia still high, which reaches 229 cases out of 100,000 live birth (133-379) during 2008.¹ MMR in Brebes is the highest in Central Java, which causes by, among others, adolescent pregnancy. Marriage record in Brebes in
2015 shows that 40% of total marriage number occur in 13 to 18 year old children, which 70% of it are caused by adolescent pregnancy. Adolescent pregnancy later causes the lack of information about reproductive health among younger generation, including children in the elementary school. This causes numerous marriage that happen after they are graduated, or even before their graduation.

The needs and the types or risk in reproductive health in adolescents and younger generation have different features with children and adults. The types of risk of reproductive health are including pregnancy, abortion, sexually transmitted diseases, sexual abuse, and limited access to information and healthcare service.\textsuperscript{2,3} particularly normal birth. Method: Ovid Medline, CINAHL, Cochrane and Web of Knowledge databases were searched to identify research articles published in English from 2000 to 2012, using specified search terms in a variety of combinations. All articles included in this structured review were assessed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA These risks later cause several related factors, such as early marriage and solicitation to perform sexual intercourse, access to education and jobs, gender inequality, sexual abuse, media exposure, and lifestyle.

Awareness and knowledge related to reproductive health among elementary school was really low. Nowadays, the efforts in providing reproductive health to elementary school students is still considered as a taboo. Education through peer educators by using training-of-trainers model is expected to be one of strategic moves to increase the knowledge about reproductive health among elementary school students. The purpose of this research is to analyze the impact of Training-of Trainer model in increasing the knowledge among elementary school students as peer educators of reproductive health.

Method

This research used quasi-experimental method, with pretest and posttest of one group design to evaluate the impact of Training-of Trainer model in order to increase the knowledge, attitude, and practices about reproductive health among elementary school students by the peer educators. The population of this research was 30 elementary students within the District of Brebes, Central Java, Indonesia, during July to December 2017. This research was specifically conducted to three state elementary schools, with an approval from the local government. After purposive random sampling screening had been conducted, 30 peer educators from three elementary schools were selected as participants. Data analysis for this research was through difference test by using Wilcoxon Match Paired Test because the data could not be normally distributed.

Findings

The total amount of peer educators was 30 participants, which majority were females (66.7%), consisted of 11 year old students (56.7%) and 5th grade students (66.7%). The latest education of the fathers’ participants were mostly Bachelor degree (63.4%), however, some were junior high school graduates (3.3%). Meanwhile, the latest education of the mothers’ participants were mostly senior high school or vocational school (40.1%), however, some were elementary school, junior high school, and associate’s degree graduates (3.3%).

Fundamentally, adolescents started facing several health risks during puberty, one of those is reproductive health. In a circumstances when reproductive health was not being maintained well, it would certainly cause various problems, such as early pregnancy disturbance, abortion, sexually transmitted diseases like HIV/AIDS, and sexual violence. The condition of adolescents’ reproductive health was also affected by nutrition, physical health, psychological, economics, and gender inequality that makes it hard for young women to avoid the exposure of sexual intercourse or commercial sexual intercourse.\textsuperscript{4–6}

World Health Organization (WHO) released a guide about adolescent pregnancy prevention and the impact of poor reproductive health management among adolescents from LMICs, which focused on four main strategies in preventing adolescent pregnancy: (1) improving the access to contraception and its usage; (2) preventing marriage below 18 year old; (3) improving knowledge and understanding about the importance of adolescent pregnancy prevention; and (4) preventing non-consensual sexual intercourse and sexual abuse.\textsuperscript{7}
Table 1. Knowledge Difference among Participants Before and After Intervention

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Before Intervention</th>
<th>After Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>Definition of reproductive health</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>2</td>
<td>The difference of male and female reproductive systems</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>3</td>
<td>The importance of reproductive health</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>4</td>
<td>Unwanted disease prevention</td>
<td>29</td>
<td>96.7</td>
</tr>
<tr>
<td>5</td>
<td>Physical transformation in females</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>6</td>
<td>Characteristics of physical transformation in females</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>7</td>
<td>Physical transformation in males</td>
<td>27</td>
<td>90.0</td>
</tr>
<tr>
<td>8</td>
<td>Characteristics of physical transformation in males</td>
<td>21</td>
<td>70.0</td>
</tr>
<tr>
<td>9</td>
<td>Definition of menstruation</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>10</td>
<td>Procedure in handling students during menstruation</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>11</td>
<td>Menstruation as a normal sign</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>12</td>
<td>Nocturnal emission in males</td>
<td>29</td>
<td>96.7</td>
</tr>
<tr>
<td>13</td>
<td>Definition of nocturnal emission</td>
<td>27</td>
<td>90.0</td>
</tr>
<tr>
<td>14</td>
<td>Nocturnal emission as a normal sign</td>
<td>29</td>
<td>96.7</td>
</tr>
</tbody>
</table>

Result in Table 1 showed that there were knowledge improvements after intervention that were inferred from several knowledge unawareness related to reproductive health, such as: physical transformation in males during puberty, characteristics of physical transformation, procedure in handling female students during menstruation, nocturnal emission in males, definition of nocturnal emission as a normal and natural occurrence when semen was ejected out through male’s reproductive organ. It showed that students were paying attention and able to gain more knowledge and information.

Table 2. Knowledge Score Difference of Participants

<table>
<thead>
<tr>
<th>Participants’ Knowledge related to Reproductive Health</th>
<th>Before Intervention</th>
<th>After Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Total correct answer is 85% or less</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Total correct answer is more than 85%</td>
<td>27</td>
<td>90.0</td>
</tr>
<tr>
<td>Total score</td>
<td>30</td>
<td>100.0</td>
</tr>
<tr>
<td>Mean</td>
<td>13.00</td>
<td>14.26</td>
</tr>
<tr>
<td>SD</td>
<td>0.99</td>
<td>0.90</td>
</tr>
<tr>
<td>Delta</td>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>Minimum score</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Maximum score</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Wilcoxon Test</td>
<td>p= 0.002 (p &lt; 0.05)</td>
<td></td>
</tr>
</tbody>
</table>

The result of normality test, as appeared in Table 2, obtained abnormal distribution of pretest variable (p=0.001) and abnormal distribution of posttest variable (p=0.000), therefore, Wilcoxon Test was chosen for this research. From difference test by using Wilcoxon Test, significant knowledge difference between before and after intervention was revealed (p=0.002).

Due to fulfilling the information about reproductive health, reproductive health education is urgently needed. Several educational model like role play, booklet, and fun learning were effective and showed significant results in improving knowledge and awareness about reproductive health. A study from United Nation Fund for Population Activities emphasized that the knowledge in reproductive health, physical transformation in male and female, and physical protection could still be unfulfilled, especially because of the lack of knowledge, social stigma, law and policy that obstruct the access of unmarried adolescents to contraception and abortion, and judgmental attitude from healthcare service officers.

Andrade et al. in their research stated that reproductive health and sexual education program in school focused on the relation between adult and children by conducting training and encouraging teachers to improve the connection with students. Teachers were
trained to provide advices to adolescents and their parents about reproductive and sexual health.\textsuperscript{11} A study about reproductive health counselling in elementary school students by counsellors through booklet with simple language proved that it significantly elevated students’ awareness and motivation to protect their reproductive health.\textsuperscript{12}

Reviewing the program conducted before, the keys of success in raising the awareness about reproductive health was by building training network, and conducting training and education about reproductive health. However, it needed more effort to create a continuous implementation of reproductive health education, which was by improving the availability and access to qualified reproductive healthcare services across Indonesia.\textsuperscript{13}

\textbf{Conclusion}

The result of this research shows that elementary students in Brebes Regency are lack of knowledge about reproductive health. Education on reproductive health is urgently needed in order to improve knowledge about sexuality and decision making for the future goals among elementary school students. If elementary school students have more profound comprehension about reproductive health, sexuality, and gender, the younger generation will understand the risk of involve in unsafe sex and unfulfilled needs. Sharing the responsibility among males and females will also give a better chance.

Total score of knowledge difference among participants between before and after intervention through education about reproductive health by peer educator reveals significant difference with $p=0.002$ and average improvement of 1.26 point. It implies that reproductive health education through training-of-trainers model by peer educators significantly improves knowledge of elementary school students.

\textbf{Conflict of Interest}

The authors hereby declare that they have no conflict of interest within this research.

\textbf{Source of Funding}

Research funding fully covered by Research and Community Empowerment Institution of Diponegoro University.

\textbf{Ethical Clearance}

This research has been proved by Health Research Ethics Committee, Faculty of Public Health, Diponegoro University, Indonesia Number: 43/EC/FKM/2017 approved in 13\textsuperscript{th} April 2017.

\textbf{References}


Effect of Feeding Moringa Oleifera Leaves Capsule’s on The Uric Acid in Pre-Elderly

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Abstract

The objective of this study is to investigate the effect of moringa leaves powder which is packed in a capsule to the uric acid level of pre-elderly and elderly. The subjects of this study were 24 pre-elderlies and elderlies which were 47 years old and older. These subjects were divided into two groups, one was given 2g of moringa leaves powder and the other was given 3g of moringa leaves powder. The experiment was conducted for 14 days. The subjects’ blood sample was taken to measure their uric acid level. The result of this study indicated that moringa leaves capsule’s intervention decreased the uric acid level as demonstrated by the measurement in Day-7 and Day-14. Therefore, this research concluded that moringa capsule intervention for 14 days had an ability to decrease uric acid level.

Keywords: Moringa Leaves Capsule, Uric Acid Level.

Introduction

Hyperuricemia (high uric acid level in blood) is the major biochemical cause of gout which is linked with several chronic diseases, such as obesity, hypertension, coronary heart disease, diabetes, and kidney injury. Hyperuricemia is caused by the activity of xanthine oxidase enzyme. This enzyme holds an important role on the purine catabolism and takes two forms, they are xanthine oxidase (XO) and xanthine dehydrogenase (XDH). XDH enzyme is converted to be XO and catalyzes hypoxanthine oxidation to be xanthine and eventually become uric acid which caused gout disease.

Uric Acid (UA) is the last metabolite of endogenous and purine metabolism that will be released from the human body through urine, feces, and sweat. Inhibiting xanthine oxidoreductase (XO) significantly repairs endothelium dysfunction independently aside from uric acid decrease. Natural polyphenol compound that is contained by several plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit the uric acid synthesis. Potential of various natural active ingredients on the XO regulation and uric acid serum concentration was already studied in the model of gout. One of the plants which contain polyphenol compound is Moringa Oleifera.

Moringaoleifera Lam. is a species of the Moringaceae family that is well known for its varied medicinal uses and high nutritional value. Moringa had been reported as a valuable source of both macro- and micronutrients. In addition, the leaves possess phytochemicals, including glucosinolates, flavonoids, and phenolic acids. Many studies have shown that moringa leaves have various bioactivities and health benefits, including antibiotic, antitrypanosomal, hypotensive, antispasmodic, antiulcer, hypocholesterolemic, and hypoglycemic activities. Several studies indicated that the intervention of moringa leaves extract was able to decrease the uric acid level of male Wistar rat. Scientific research regarding the effect of moringa leaves powder consumption to the uric acid level was numerously done, however, they were mostly conducted to the animal as their subject, and only a few of them that was conducted by involving human as their subject. Moringa leaves capsule has already been widely consumed and circulated in the market, however, the study regarding its effectiveness to the decrease of the uric acid level has not been done for pre-elderly and elderly.
Material and Method

Research design is Quasi-experiment. This research was conducted through two steps, they were introductory research (analysis of antioxidant, total phenol and total flavonoid contained in the moringa leaves powder), and moringa leaves powder intervention. The main ingredients in this study were moringa leaves powder which was obtained from the MoringaOleifera garden, the property of the Research and Development Center of MoringaOleifera that is located in Blora, Central Java. The analysis that was conducted to moringa leaves powder was conducted to observe the activity of antioxidant, total phenol, and flavonoid. Antioxidant analysis used DPPH spectrophotometry method. Total phenol analysis used Folin-Ciocalteuaucolorimetric method. Total phenol analysis procedure was in accordance to kemenkes (2011). Total flavonoid analysis was in accordance to BPOM (2004).

The second step of the research was the intervention of moringa leaves powder capsule. The subjects were divided into three groups, one as a control group while the other two were treatment groups. Control group was given allopurinol 100 mg twice a day (morning and afternoon)14. Meanwhile, the first treatment group was given 4 capsules (equal to 2 g leaves powder) twice a day (2 capsules in the morning and 2 capsules in the evening), and the second treatment group was given 6 capsules (equal to 3g leaves powder) twice a day (2 capsules in the morning and 2 capsule in the evening). In the first meeting with the subjects, their blood sample was taken to be measured as initial data along with the questionnaire. Intervention was conducted for 14 days. Questionnaire data consisted of subject’s identity, economic and social characteristic, body weight and height measurement, food consumption, medical record, knowledge and behavior. Blood was taken in the pre, mid and post-treatment. The equipment that was used to measure uric acid level was Easy Touch® II Blood Uric Acid Test Strips.

Subject selection was conducted purposively according to predetermined criteria (posbinducikarawangmember that is 47 years old or older and is currently suffering from hyperuricemia [blood’s uric acid level ≥ 6 mg/dL and ≥ 7 mg/dL for female and male respectively], and disposes to sign the informed consent). Subject number calculation was based on the certain formula, and it has resulted in 24 subjects which were divided into two groups (control and treatment group). Data processing and analysis were done using software Microsoft Excel 2013 and software SPSS 16. Respondents’ characteristic data were descriptively analyzed. The first analysis step was to test the normality of the data using the Kolmogorov Smirnov test. Spearman correlation test would be used if the data did not pass the normality test, and Pearson correlation test for the data that passed the normality test. Paired-test was used to observe uric acid level changes before and after intervention for both treatment groups, meanwhile, the comparison between control and treatment group used ANOVA test.

Results

The Composition of Antioxidant, Total Phenol, and Total Flavonoid of Moringa Leaves

Chemical compounds’ concentration in the moringa capsules is quite varied based on the location where the plant grows, whether it is sub-tropical or tropical area1. However, researchers agreed that moringa leaves are a good source of antioxidant. Moringais already deemed as a natural antioxidant2. The result of IC50 that was obtained from the observation of moringa leaves powder was 78.54 ppm. Meanwhile, phenol level that was detected was 0.47% and flavonoid was 0.39.

The Effect of Intervention to the Subjects’ Uric Acid Level

| Table 1 | Pre, mid and post-treatment uric acid level |
|-----------------|------------------|------------------|------------------|
| Subject’s Group | Control | Treatment | ANOVA |
| Pre-treatment D-0 | Average ± SD (mg/dL) | 9.32 ± 1.77 | 6.6 ± 1.16 | 5.77 ± 0.46 | 0.352 |
| Mid-treatment D-7 | Average ± SD (mg/dL) | 9.32 ± 1.77 | 7.02 ± 0.76 | 6.1 ± 0.22 | 0.044 |
| Post-treatment D-14 | Average ± SD (mg/dL) | 10.82 ± 2.18 | 8.32 ± 1.19 | 6.33 ± 1.04 | 0.000 |
| Δ uric acid from D-0 to D-7 | Average ± SD (mg/dL) | 2.72 ± 0.97 | 1.82 ± 1.87 | 2.63 ± 1.77 | 0.001 |
| p-value Paired test | 0.064 | 0.015 |
| Δ uric acid from D-7 to D-14 | Average ± SD (mg/dL) | 1.22 ± 0.84 | 0.82 ± 1.04 | 3.42 ± 1.96 | 0.016 |
| p-value Paired test | 0.109 | 0.008 |
| Δ uric acid from D-0 to D-14 | Average ± SD (mg/dL) | 3.93 ± 1.59 | 2.73 ± 2.39 | 3.50 ± 2.27 | 0.002 |
| p-value Paired test | 0.038 | 0.013 |
Based on the measurement from D-0 to D-7, the uric acid level of all the control group (+) and treatment group significantly decreased (p<0.05). The result of the paired test between D-7 and D-14 demonstrated that there was a significant uric acid level decrease for treatment group (p<0.05), meanwhile, control group’s uric acid level were quite stable significantly (p>0.05). Overall, the paired test for the measurement results from D-0 to D-14 demonstrated that all groups experienced an uric acid level decrease (p<0.05). The difference between the uric acid level at D-0 and D-14 (∆ uric acid level) for the control group (+) and 3g treatment group were the highest of all. They were 2.72 ± 0.97 mg/dL and 2.63 ± 1.77 mg/dL respectively. Meanwhile, 2 g treatment group’s ∆ uric acid level was 1.82 ± 1.87 mg/dL.

UA level decreased in all treatments (Table 1). This result showed that there was a possibility for allopurinol and moringa leaves powder capsule to suppress the increase of UA level so that the intervention of moringa leaves powder were possibly not significant. The result of the ANOVA test in the initial measurement (H-0) showed that there was no difference of UA level between groups (p>0.05). The result of ANOVA results in the D-7 and D-14 measurement showed that there was a significant decrease of UA level (p<0.05). Based on the Duncan test, the UA level between control (allopurinol) and treatment groups in the D-7 and D-14 were significantly different. This indicated that the intervention of moringa leaves powder capsule significantly decrease UA level (p<0.05). Overall, all the groups demonstrated UA level decrease, however, a consistent UA level decrease until it reached normal level was only demonstrated by the treatment group.

**Discussion**

Allopurinol is a medicine that is generally used to inhibit xanthine oxidase activity and decrease uric acid level serum. Allopurinol inhibits oxidase by using the concentration of xanthine oxidase (SOD), GSH-Px, adenosine deaminase (MDA), and NO. Xanthine oxidase catalyzes the conversion of hypoxanthine to be xanthine and eventually become UA. Oxygen reactive species that is excessively produced by UA production leads to the excessive production of MDA and NO that will eventually increase the activation of SOD and GSH-Px. SOD catalyzes superoxide anion in the dismutation reaction, and GSH-Px helps to decrease lipid hydroperoxide and hydrogen peroxide. The increase of Reactive Oxygen Species (ROS) production decreases double unsaturated lipid to form MDA and holds a function to be a biomarker of oxidative damage and the decrease of the antioxidant level. Besides that, XO is able to catalyze inorganic nitrite to be NO by increasing the activity of nitrite reductase.

Natural polyphenol compound that is contained by several plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit uric acid synthesis. Polyphenol compound is able to inhibit the expression and release of several inflammation-pro-mediator and a proteolytic enzyme, the different transcriptional factor activity, and in-vitro ROS production. Study on the animal with rheumatoid arthritis, osteoarthritis and gout showed that there was a decrease in tissue damage and uric acid level. Antioxidant and flavonoid in several plants which are linked to the modulation that is oxidative stress are able to be an alternative medicine for hyperuricemia since it inhibits the activation of XO.

Phenol, flavonoid, and antioxidant which have a significant double effect on the prevention of free radical activity hold a potential to be XO inhibitor which decreases uric acid as the effect of hyperuricemia. In the experiment which used rats with hyperuricemia, antioxidant and flavonoid did not only push down the high level of UA and XO but also manage the level of factors regarding oxidative stress, especially in the liver. Moringa leaves powder capsule is able to be a strong candidate for curing hyperuricemia because of its role in inhibiting XO activity which (several of them) linked to its modulation from oxidative stress.

**Conclusion**

The intervention of moringa leaves powder capsule for 7 days potentially cures hyperuricemiaby suppressing uric acid level, meanwhile, the intervention of moringa leaves powder capsule for 14 days was significantly decrease uric acid level.

**Acknowledgement**

The research was fully supported by the Bogor Agricultural Institute and BPPSDMK Indonesian Health Ministry of providing facilities for conducting this research. This research has obtained Ethical Approval from the Human Ethics Committee of Bogor Agricultural University No: 085/IT3.KEPMSM-IPB/SK/2018

**Sources of Funding:** BPPSDMK Indonesian Health Ministry
Conflict of Interest: All authors declared no conflict of interest within this study.

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The Effect of Moringa Capsule and Moringa Tea Consumption on the Elderly’s Uric Acid Level

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Abstract

The objective of this study is to investigate the effect of moringa leaves powder which is packed in a capsule to the uric acid level of pre-elderly and elderly. The subjects of this study were 24 pre-elderlies and elderlies which were 47 years old and older. These subjects were divided into two groups, one was given 2g of moringa leaves powder and the other was given 3g of moringa leaves powder. The experiment was conducted for 14 days. The subjects’ blood sample was taken to measure their uric acid level. The result of this study indicated that moringa leaves capsule’s intervention decreased the uric acid level as demonstrated by the measurement in Day-7 and Day-14. Therefore, this research concluded that moringa capsule intervention for 14 days had an ability to decrease uric acid level.

Keywords: Moringa capsule, Moringa tea, Uric acid.

Introduction

Uric acid is the last metabolite of endogenous and purine metabolism that will be released from the human body through urine, feces, and sweat. The high intensity of uric acid in the blood (hyperuricemia) might be indicated several diseases, such as rheumatic, arthritis, cardiovascular disease, neurological disease, insulin resistance, hypertension, and kidney disease. Hyperuricemia is affected by xanthine oxidase enzyme activity. This enzyme plays an important role in purine catabolism and it has two form, they are xanthine oxidase (XO) and xanthine dehydrogenase (XDH). XDH enzyme is converted to be XO and catalyzes hypoxanthine oxidation to be xanthine and eventually become uric acid which is a major trigger forgout disease. XO was significantly and independently repair endothelial dysfunction of uric acid decrease1.

Natural polyphenol compound that is contained by several plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit the synthesis of uric acid2,3. One of the plants which containing polyphenol compounds is Moringa Oleifera. Moringaoleifera Lam. isaspeciesof the Moringaceae family that is well known for its varied medicinal uses and high nutritional value. Moringa Oleifera(kelor in Indonesian) is deemed to have an ability in curing various diseases due to its content, they are secondary metabolites such as tannin, saponin, alkaloid, flavonoid, phenol, and glycoside4,5. This study reported that there was a decrease in the wistar rats’ uric acid levels when moringa tea with quersetin 10 mg/kg was given to the rats for 14 day6,7. Scientific studies regarding moringa product consumption mostly use animals as their subject, and there were still limited numbers that observe human.

Material and Method

This study was used quasi-experimental design. This study was conducted in two steps. First, initial study (antioxidant analysis) and main study (moringa leaves product intervention). The main materials that was used in this study were moringa leaves powder and tea which were obtained from Moringaoleifera Garden (The property of PusatPenelitiandanPengembanganMoringaoleifera–Moringa Oleifera Research and Development Center in Blora, Central Java). The antioxidant analysis used DPPH and spectrophotometry. Subject’s inclusion criteria in this study were: 1) The member of PosbinduCikarawang which are 47 years old or older, 2)
hyperuricemia, 3) Physically independent, indicated by being able to walk 20 steps without any help, 4) Willing to participate and sign the informed consent. Subject’s exclusion criteria in this study were: 1) Currently participating in the other study, 2) Routinely consumes antioxidant supplement and/or phytopharmaca, 4) Routinely consumes drugs which decrease uric acid level. These subjects were divided into two groups. First, the group that was given 1 package of moringa tea (equal to 1.5g moringa tea). Second, the group that was given 2 moringa capsules (equal to ± 0.5g moringa leaves powder). Both products contain antioxidant activity (IC50-DPPH) for approximately 139.93 ppm every day for 14 days. Uric acid level measurement used Easy Touch® II Blood Uric Acid Test Strips as its tool. Data processing and analysis were done using Microsoft excel 2013 and SPSS 16 program. To identify the difference between uric acid level before treatment and after treatment, this study used paired-test. Meanwhile, to compare control groups in the study, ANOVA test was used.

Results

Antioxidant activity

Moringa leaves capsule contains chemical compounds which are quite various. Moringa leaves tend to have different content of chemical compounds which is depended on the origin area of the leaves (whether it is sub-tropical or tropical area)\(^1\). Moringa is deemed to be natural antioxidant\(^2\). This study’s result demonstrated that antioxidant IC50-DPPH on both forms of moringa product was 139.93 ppm.

The Effect of moringa leaves products on subject’s uric acid level

Table 1. Subject’s uric acid level during pre, mid and post-treatment

<table>
<thead>
<tr>
<th>Uric acid</th>
<th>Control (n=8)</th>
<th>Treatment Group</th>
<th>p(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD (mg/dL)</td>
<td>Mean ± SD (mg/dL)</td>
<td>Mean ± SD (mg/dL)</td>
</tr>
<tr>
<td>Pre-treatment day-0</td>
<td>10.03 ± 1.50</td>
<td>10.21 ± 1.27</td>
<td>10.65 ± 1.06</td>
</tr>
<tr>
<td>Mid-treatment day-7</td>
<td>8.79 ± 0.98</td>
<td>8.46 ± 0.92</td>
<td>8.71 ± 1.06</td>
</tr>
<tr>
<td>Post-treatment day-14</td>
<td>8.26 ± 0.85</td>
<td>7.42 ± 1.11</td>
<td>6.87 ± 0.48</td>
</tr>
<tr>
<td>∆ day-0 to day-7</td>
<td>1.24 ± 0.61</td>
<td>1.75 ± 0.91</td>
<td>1.46 ± 0.75</td>
</tr>
<tr>
<td>p(^1)</td>
<td>0.001*</td>
<td>0.001*</td>
<td>0.001*</td>
</tr>
<tr>
<td>∆ day-7 to day-14</td>
<td>0.52 ± 0.33</td>
<td>1.03 ± 0.59</td>
<td>2.00 ± 0.75</td>
</tr>
<tr>
<td>p(^1)</td>
<td>0.003*</td>
<td>0.002*</td>
<td>0.000*</td>
</tr>
<tr>
<td>∆ day-0 to day-14</td>
<td>1.76 ± 0.78</td>
<td>2.78 ± 0.49</td>
<td>3.46 ± 0.86</td>
</tr>
<tr>
<td>p(^1)</td>
<td>0.000*</td>
<td>0.000*</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*significant p<0.05; p1) Paired-samples T test; p2) Anova

During the period of treatment, blood sampling was undergone once in seven days. In the initial measurement (day-0), subject’s uric acid level was 10.32 mg/dL. Uric acid levels test result demonstrated that 18 subjects were categorized hyperuricemia. Based on the result of paired-test, during Day-0 to Day-7 treatment, all groups that were given moringa capsule, moringa tea, and the control group experienced a significant uric acid level decrease (p<0.05). Paired test result of Day-7 to Day-14 demonstrated that treatment groups for both moringa capsule and moringa tea experienced a significant uric acid level decrease (p<0.05), meanwhile, control group’s uric acid level remains stable (p>0.05). Paired-test result of Day-0 to Day-14 indicated that all groups (a group that was given moringa capsule, a group that was given moringa tea, and control group) experienced a significant uric acid level decrease (p<0.05). The uric acid level difference (table 10) between day-0 and day-7 measurement (∆ uric acid level) of the control group and moringa tea group was the highest, while moringa capsule group experienced slower decrease. Uric acid level decreased for all treatment groups. This result demonstrated that there was a possibility of allopurinol, moringa capsule, and moringa tea to be able to inhibit uric acid level increase. ANOVA test result in the initial measurement (day-0) indicated that there was
no significant uric acid level difference between groups (p>0.05). ANOVA test result between groups of Day-7 to Day-14 indicated a significant decrease (p<0.05). Based on the advanced test(Duncan test), uric acid level of the control group (allopurinol), morgina capsule and morgina tea of day-7 to day14 was significantly different. This result indicated that the consumption of morgina capsule and morgina tea (p< 0.05) significantly decrease uric acid level compared to the control group. Overall, all groups demonstrated uric acid level decrease, however, the consistent uric acid level decrease was only demonstrated by the group which was given morgina tea.

Discussions

Hyperuricemia is the major biochemical cause of gout which is linked with several chronic diseases, such as obesity, hypertension, coronary heart disease, diabetes, and kidney injury. Studies regarding hyperuricemia pathogenesis inhibitor effectiveness and medicinal treatment tend to be linked with several focuses, they are: a) Hyperuricemia pathogenesis depends on the enzyme in the purin metabolism and kidney transporter uric acid; b) xanthine oxidase, c) transport protein regarding uric acid metabolism in the kidney, several of them contribute to the uric acid reabsorption, such as URAT1, ABCG2 and GLUT9, several of them are protein secretion, such as OAT1 and UAT. Natural polyphenol compound contained by several kinds of plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit uric acid synthesis. Polyphenol compound is able to inhibit expression and extrication of several inflammations and proteolytic enzyme, different transcriptional factor activity, and reactive oxygen species production by in vitro. Studies on the animal models’ rheumatoid arthritis, osteoarthritis, and uric acid demonstrated a decrease in tissue damage and uric acid level. Antioxidant and flavonoid in plants that are partially linked with oxidative stress modulation were able to be an alternative medicinal treatment for hyperuricemia disease since it inhibits the activation of xanthine oxidase.

Phenol, flavonoid, and antioxidant had a significant double effect on the antidote of free radicals and is potentially act as an inhibitor of xanthine oxidase to lessen the effect of hyperuricemia. In the experiment of wistar rats with hyperuricemia, antioxidant and flavonoid did not only press the high uric acid level and xanthine oxidase level but also managed the factor level which linked with oxidative stress, especially in the liver. Moringa capsule and morgina tea are able to be a candidate of medicinal treatment for hyperuricemia because it inhibits xanthine oxidase activation, which is partially linked with its modulation of oxidative stress. Allopurinolis a drug that is mainly used to decrease xanthine oxidase and uric acid level serum. Moringa capsule and morgina tea which is consumed every day for 14 days consecutively have a potential to inhibit XOD in the hyperuricemia medicinal treatment. As much as 1.5 g morgina powder capsule 3 g morgina tea contains the equal amount of antioxidant which is 139.93 ppm. This is supported by the study of in vivo and in vitro experiment on the wistar rats, indicated that morgina leaves decreased wistar rat’s uric acid serum, inhibited liver’s XOD and adjusted it with mRNA transcription in the transporter of kidney’s uric acid URAT1, GLUT9, OAT, UAT and ABCG2 to be normal in the transcription level. In the liver’s purin metabolism, xanthine and hypoxanthine is oxidized into uric acid by XOD. The experiment of morgina tea consumption for wistar rats, the effect was demonstrated by significantly inhibiting XOD activity. Liver’s enzyme activity (XOD and ADA) and kidney’s mRNA expression of genes (GLUT9 and URAT1) was analyzed to further identify the mechanism that leads to hypouricemic effect. Xanthine and hypoxanthine are oxidized to be uric acid by XOD which is happened in the liver. This fact indicated that morgina tea’s hypouricemic effect is based on the inhibition of XOD activity. The increase of ADA activity leads to the increase of xanthine and hypoxanthine in the body and causes cytotoxicity. Besides that, the decrease of activity which is able to increase anti-inflammation effect in the body. Tea is able to prevent ADA hepatic activity until the certain limit for the hyperuricemic rats. Two kinds of tea in the certain dose is not only able to decrease the forming of xanthine and hypoxanthine, inhibit ADA activity, and eventually decrease uric acid level in the body, but also help to increase body’s anti-inflammation ability.

Conclusion

The consumption of morgina capsule and morgina tea for seven days consecutively has a potential effect on the medicinal treatment of hyperuricemia by decreasing uric acid level. Meanwhile, the consumption of morgina capsule and morgina tea for fourteen days consecutively has a potential to significantly decrease uric acid level.
Acknowledgement

The research was fully supported by the Bogor Agricultural Institute and BPPSDMK Indonesian Health Ministry of providing facilities for conducting this research. This research has obtained Ethical Approval from the Human Ethics Committee of Bogor Agricultural University No: 085/IT3.KEPMSM-IPB/SK/2018

Sources of Funding: BPPSDMK Indonesian Health Ministry

Conflict of Interest: Nil

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The Correlation between Child Spacing (Heading), Exclusive Breastfeeding and Parenting with Child Development at First 1000 Days of Life

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²Faculty of Medicine, Sebelas Maret University, Surakarta.
³Nutrition Science Study Program, Postgraduate, Universitas Sebelas Maret, Surakarta.
⁴Child Health Departement FK-UNS/Dr. Moewardi, Surakarta.

Abstract

Introduction: Child developmental disorder during the first 1000 days of life should be a serious concern because it will have an impact on children's development in the future. Distance birth, exclusive breastfeeding and parenting could affect the child's development during the first 1000 days of life.

Method: This research is an observational analytic research with a case control approach. The study was conducted in Klaten, Karanganyar and Sragen district in February-June 2017. Subject retrieval using multi-stage random sampling. The variables in this study are within the child, exclusive breastfeeding, parenting and toddler development. The research data obtained through interviews using a questionnaire and analyzed using chi-square analysis.

Results: Child spacing <2 years (Heading) (OR:1.71; p <0.001; CI (95%) = 1.07 to 2.74), exclusive breastfeeding (OR: 4.81; p <0.001; CI (95%) = 2.87 to 8.06) and parenting (OR: 6.36; p <0.001; CI (95%) = 3.79 to 10.69) significantly associated with children development in the First 1000 Days of Life.

Conclusion: Child spacing less than 2 years (heading) can interfere with the process of child development. Exclusive breastfeeding and good parenting can make the child development process be better according to the age.

Keywords: Child spacing, Exclusive breastfeeding, Parenting, Child development, First 1000 Days of Life.

Introduction

Period of the first 1000 days of life (HPK) beginning from the phase of pregnancy up to 2 year old child is a crucial period determinants of health and intelligence of the human resources in the future. Growth and very rapid development occurred during the first 1000 days of life. The health problems that occur in the period of 1000 HPK will not only affect the physical growth, but also on mental development and intelligence, which is visible from the physical size that is not normal and the quality of work that is not competitive which results in lower economic productivity.

Developments is a continuous process. Health Departments of Republic Indonesia certify the quality of child’s development requires serious attention.
says about 250 million children under five years are at risk of development that are not optimal. The incidence of developmental disorders that occurred in Indonesia as much as 18%. Disruption that often occurs in children such as delays in motoric, language, behavior, autism, and hyperactivity. The high incidence of developmental delay is caused by the lack of parents’ knowledge about the importance of the first 1000 days of life. Child development during 1000 HPK can be affected by several factors such as child spacing, exclusive breastfeeding and parenting.

Pregnancy spacing can affect fetus health. Too close pregnancy spacing can cause serious complications in pregnancy or childbirth. Birth spacing <2 years may increase the risk of low birth weight and fetal death when born. Baby with LBW will have an impact on children’s growth, productivity and intellectual in a future. Ma’ruf et al also explains that the birth spacing <2 years can cause premature birth which affects the development disorder.

Breastfeeding is one of the factors that can affect children health and development. Children aged 0-6 months are breastfed exclusively have better health, optimal growth and development also improve children intelligence. The research of Fitri et al, also states that children exclusively breastfed experienced age-appropriate developmental 5.474 times greater than children who are not exclusively breastfed.

Parenting is the attitude of parents to interact with their children. Parenting system by parents determine the development of children. Candrasari explains that the pattern of positive parenting can help the development of children be better. Based on the description above, it is necessary to do an analysis of birth spacing, exclusive breastfeeding and parenting with development at the first 1000 days of life.

**Materials and Method**

This study was an observational analytical with case-control approach. The subject was 390 mothers of toddlers ages 2 to 2.5 years that live in Klaten, Sragen and Karanganyar. This study was conducted in February 2018 to June 2018. This study was using cluster random sampling, where all members of a population has an equal opportunity to be a subject of research. The sampling techniques used are Multi Stage Random Sampling. Birth spacing, exclusive breastfeeding, parenting and child development data were obtained through interviews using questionnaire. Data analysis was done with the Appropriate measuring scale test bivariate analysis with variables and objective analysis of the chi-square test and alpha 0.05, the next Obtained results narration and clarified with the display of the graph and table.

**Findings**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
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</thead>
<tbody>
<tr>
<td>Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is not in accordance with</td>
<td>92</td>
<td>23.6</td>
</tr>
<tr>
<td>Corresponding</td>
<td>298</td>
<td>76.4</td>
</tr>
<tr>
<td>Child spacing (Heading)</td>
<td></td>
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</tr>
<tr>
<td>&lt;2 years</td>
<td>156</td>
<td>40.0</td>
</tr>
<tr>
<td>≥ 2 years</td>
<td>234</td>
<td>60.0</td>
</tr>
<tr>
<td>Exclusive breastfeeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not</td>
<td>97</td>
<td>24.9</td>
</tr>
<tr>
<td>Yes</td>
<td>293</td>
<td>75.1</td>
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<tr>
<td>Parenting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>151</td>
<td>38.7</td>
</tr>
<tr>
<td>Well</td>
<td>239</td>
<td>61.3</td>
</tr>
</tbody>
</table>

Table 1 shows that most of the study subjects with appropriate developments as much as 298 or 76.4%; most of the child spacing ≥ 2 years is 234 or as much as 60.0% and those with a header from a child spacing <2 years of as much as 40%. 293 Children who are breastfed Exclusively with a percentage of 75.1%. While children with a good Parenting are 239 with a percentage of 61.3%. 

| Table 1. Distribution of study subjects according to developments, child spacing, exclusive breastfeeding and parenting. |
Table 2. Test chi-square the relationship between development, child spacing, exclusive breastfeeding and parenting.

<table>
<thead>
<tr>
<th>Group variables</th>
<th>Development</th>
<th>OR</th>
<th>CI (95%)</th>
<th>p</th>
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<tbody>
<tr>
<td></td>
<td>It is not in accordance with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Child spacing</td>
<td></td>
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<tr>
<td>&lt;2 years</td>
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<td>(29.5)</td>
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<td>(70.5)</td>
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<td>≥ 2 years</td>
<td>46</td>
<td>(19.7)</td>
<td>188</td>
<td>(80.3)</td>
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<td>Total</td>
<td>92</td>
<td>(23.6)</td>
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<td>(76.4)</td>
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<tr>
<td>Exclusive breastfeeding</td>
<td></td>
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<tr>
<td>Not</td>
<td>43</td>
<td>(48.3)</td>
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<td>Yes</td>
<td>49</td>
<td>(16.3)</td>
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<td>Total</td>
<td>92</td>
<td>(23.6)</td>
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<td>(76.4)</td>
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<tr>
<td>Parenting</td>
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<td>Less</td>
<td>66</td>
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<td>Total</td>
<td>92</td>
<td>(23.6)</td>
<td>298</td>
<td>(76.4)</td>
</tr>
</tbody>
</table>

Table 2 presents the bivariate analysis of the relationship between child spacing and the development, obtain chi-square value is calculated by Odds Ratio (OR) of 1.71 and p <0.001; CI (95%) = 1.07 to 2.74. Based on these results can be interpreted that the mothers of child spacing of ≥ 2 years children have the possibility of 1.71 times to have a child with appropriate development than the child spacing <2 years (Heading). This shows that there is a significant relationship between the child spacing and the development.

The bivariate analysis of the relationship between exclusive breastfeeding and development, obtained chi-square value is calculated by Odds Ratio (OR) of 4.81 and p <0.001; CI (95%) = 2.87 to 8.06. Based on these results can be interpreted that children exclusively breastfed had 4.81 times the possibility to have an appropriate development compared with exclusive breastfeeding. This shows that there is a significant relationship between exclusive breastfeeding and development.

The bivariate analysis of the relationship between parenting and development, obtained chi-square value is calculated by Odds Ratio (OR) of 6.36 and p <0.001; CI (95%) = 3.79 to 10.69. Based on these results can be interpreted that children with good parenting have the possibility of 6.36 times to have appropriate development than children with less parenting. This shows that there is a significant relationship between parenting and development.

Discussion

Distance relationship of children with toddlers developmental

National Family Planning Coordinating Board (BKKBN) states that a good pregnancy spacing is between 2 to 3 years. Hardinsyah and Supariasa states that pregnancy spacing of less than 2 years (Heading) can cause babies born with LBW that can eventually interfere with growth and development of children.9

The results showed that most respondents (60%) birth spacing> 2 years. Child spacing significantly associated with toddler (p = <0.001). With the existence of birth spacing, it lowers the risk of malnutrition because mothers are relatively healthy and have enough time to take care for the children, it is likely the child will live in an environment that is rich in stimulation can be optimally growth physically, mentally and psychologists.16

Additionally mothers of children with a child spacing less than 2 years (Heading) have the possibility for breastfeeding and giving attention to the children
who were born before, so that weak maternal conditions will impact on the health of the fetus in the uterus and can cause babies have developmental disorders.\textsuperscript{17,18}

**Exclusive breastfeeding relationship with the toddlers developmental**

Exclusive breastfeeding is breastfeeding without additional other fluids either formula, water, juice, or other supplementary foods until the age of 6 months old baby. Before reaching the age of 6 months, baby’s digestive system is not able to function perfectly, so he has not been able to digest food other than breast milk.\textsuperscript{17}

The results showed that most respondents (77.2\%) gives exclusive breastfeeding. Exclusive breastfeeding significantly associated with the development of toddler (p = <0.001). Children who are exclusively breastfed will be healthier, improve gross motor development to the children and children can avoid obesity.\textsuperscript{19} Data obtained from the Demographic and Health Survey in 2012, stated that the children growth disorder in Indonesia because it does not obey to exclusive breastfeeding in infancy.\textsuperscript{20}

This is according to research conducted by Ali &Dhaded that children who are given exclusively breastfed have better development than children who are not breastfed exclusively, especially in gross motor skills sectors.\textsuperscript{21}

**Correlation between parenting and toddler developmental**

Parenting is the interaction between children and parents in educating, guide and discipline as well as protecting the child reaches maturity with the norms that exist in society.\textsuperscript{22} Application of parents’ parenting is very important because a mother is the first environment and the early forming interpersonal relationships with children.\textsuperscript{23} Child development is influenced by internal and external factors.\textsuperscript{24} Parenting system and the child’s environment are one of the external factors that influence the development of toddler.\textsuperscript{25}

The results showed that most of respondents (61.0\%) have a good parenting. Parenting related to toddler development significantly (p = <=0.001). Good parenting will also impact on children’s development.\textsuperscript{24} Parenting is influenced by several factor such as; culture, education, socioeconomic status and age.\textsuperscript{14}

**Conclusion**

Birth spacing (Heading), exclusive breastfeeding and parenting shown to be associated with the development of children in the first 1000 days of life. Child spacing with less than 2 years is known to interfere the child development process. While exclusive breastfeeding and good parenting can support children’s development better. Education about exclusive breastfeeding and good parenting to the mother can be done as an attempt to improve child’s development in the period of first 1000 days of life.

**Acknowledgment**

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**Conflict of interest**

There are no conflicts interest related to publication of this journal.

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**Ethical clearance**

The research subject has obtained an explanation of the research being carried out. All data taken is based on the approval of the subject of the research and confidentiality of information is maintained by the researcher

**References**


Mismatch between workstation and body dimensions among computer users in Ibadan, Nigeria

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Abstract

This study investigated user-furniture (chairs and tables) compatibility among computer users in Ibadan, Nigeria. Participants were 95 male and 105 female computer users. Participants’ anthropometric variables and their workstation furniture were measured using a broad blade anthropometer and a metallic tape respectively. Male participants had significantly higher (p < 0.05) popliteal height, knee height, buttock-popliteal length and eye height than the females. User-furniture mismatches in sitting elbow height/table top height (male: 100%, female: 100%), popliteal height/seat height (male: 68.75%, female: 86.54%), buttock-popliteal length/seat length (male: 53.13%, female: 50%) and knee height/table bottom height (male: 9.38%, female: 5.77%) relationships were observed among the participants. Popliteal height/seat height mismatch was significantly associated (p=0.002) with gender. Computer users’ workstation furniture may be designed with adjustable heights using different percentiles of users’ anthropometric dimensions to minimize the incidence of work-related musculoskeletal disorders among computer users.

Keywords: Mismatch, Workstation, Body dimension, Computer users, Ibadan, Nigeria.

Introduction

The modern day office and business worlds rely extensively on the usage of computers and this makes computer workstations common globally¹. A working environment that confines the user to awkward postures due to poorly designed furniture over a prolonged time may result in psychophysiological stress²,³. When workstations are not well designed, workers often use the furniture not in the manner for which it is designed or adapt the workstation potentially resulting in a mismatch. Ergonomic considerations are imperative to reduce health-related deleterious consequences such as work-related musculoskeletal disorders (WRMSDs)⁴.

A crucial stress-generating factor for workers is a mismatch between the demands placed on them and the control they have over the physical environment.
A mismatch between the anthropometric characteristics of computer users and the computer workstation design will likely result in WRMSDs especially those associated with poor posture. The occurrence of WRMSDs is linked with physical workplace factors that include prolonged static muscle load and poorly designed work stations. Variations in body size from one person to another is large. Consequently, the body dimensions should match with the furniture in a particular workstation. Any mismatch can lead to industrial hazards and low productivity. To have workstation furniture that fits the majority of the workforce, measurement of relevant population-based anthropometric dimensions is recommended for optimal dynamic sitting using validated guidelines. Ergonomics recommendations for design of workstations seem not strictly adhered to in low-to-middle income countries like Nigeria and studies on workstation-user compatibility among computer users also appear limited. Adedoyin et al. reported high prevalence of low back pain and other musculoskeletal disorders among a cohort of computer users in six Nigerian universities. Assessment of workstations and musculoskeletal pain among computer users in a similar Nigerian environment documented by Johnson et al. did not assess users’ anthropometrics. Therefore, this study was designed to explore the compatibility between furniture dimensions and anthropometric variables of computer users in Ibadan, Nigeria.

**Material and Method**

Two hundred desktop computer users (male = 95, female = 105) from private, public and commercial establishments in Ibadan, Nigeria participated in this cross-sectional survey. The study was conducted in compliance with Helsinki Declaration. Participants gave their informed consent once the procedure was explained to them. Permission was also obtained from the managers of all establishments involved.

**Procedure**

Participants were seated normally with clothes, while the anthropometric data (sitting elbow height, popliteal height, knee height, thigh depth, buttock-popliteal length and eye height) were measured using an anthropometer (locally designed and calibrated by the Instruments Department, University College Hospital, Ibadan, Nigeria) and following the procedures described by Bridger and Parcells et al.

The chairs and tables dimensions (seat height, seat length, seat width, backrest top height, backrest bottom height, table top height and table bottom height) were also measured as described by Chaffin et al. and Parcells et al. using a retractable metallic tape measure (Master Class Tools, South Africa). Measurements were taken over the participants’ normal clothing to the nearest centimeters using the procedure described by Lavender et al. Participants’ clothing were reasonably light considering the prevailing temperature in Nigeria.

**Data Analysis**

The data were analysed using SPSS 25.0 version software (SPSS Inc., Chicago, Illinois, USA). The mean and standard deviation of the anthropometric variables and the furniture dimensions were calculated. Independent t-test was used to compare male and female anthropometric variables and furniture dimensions.

User-furniture mismatches were determined as follows:

- **Sitting elbow height/table top mismatch** - table top higher than sitting elbow height.
- **Popliteal height/seat height mismatch** - seat height below 88% or above 95% of popliteal height.
- **Buttock-popliteal length/seat depth mismatch** – seat depth below 80% or above 95% of buttock-popliteal length.
- **Knee height/table bottom height mismatch** – table bottom height higher than knee height by more than 2 cm.

Frequency tables were used to summarise mismatches and compatibility. Chi-square test was used to test the association of user-furniture compatibility and mismatches with sex.

**Findings**

Anthropometric dimensions of male and female participants are compared in Table 1. Males had significantly higher popliteal height (p < 0.001), knee height (p < 0.001), buttock-popliteal length (p = 0.013) and eye height (p < 0.001) than their female counterparts.
Table 1: Comparison of anthropometric dimensions of male and female participants.

<table>
<thead>
<tr>
<th>Variable (cm)</th>
<th>Male (n = 96) Mean (± SD)</th>
<th>95% CI</th>
<th>Female (n = 104) Mean (± SD)</th>
<th>95% CI</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHE</td>
<td>23.51 (± 2.34)</td>
<td>23.03 - 23.98</td>
<td>23.50 (± 2.60)</td>
<td>22.99 - 24.01</td>
<td>0.023</td>
<td>0.981</td>
</tr>
<tr>
<td>PH</td>
<td>46.19 (± 3.29)</td>
<td>45.52 - 46.85</td>
<td>44.22 (± 2.40)</td>
<td>43.75 - 44.69</td>
<td>4.855</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>KH</td>
<td>54.68 (± 3.97)</td>
<td>53.88 - 55.48</td>
<td>52.82 (± 3.54)</td>
<td>52.13 - 53.51</td>
<td>3.496</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>TH</td>
<td>59.47 (± 2.96)</td>
<td>58.87 - 60.07</td>
<td>58.65 (± 3.84)</td>
<td>57.90 - 59.40</td>
<td>1.681</td>
<td>0.094</td>
</tr>
<tr>
<td>BPL</td>
<td>48.52 (± 3.68)</td>
<td>47.78 - 49.27</td>
<td>47.35 (± 2.88)</td>
<td>46.79 - 47.91</td>
<td>2.513</td>
<td>0.013*</td>
</tr>
<tr>
<td>EH</td>
<td>69.05 (± 6.09)</td>
<td>67.81 - 70.28</td>
<td>65.32 (± 5.27)</td>
<td>64.30 - 66.35</td>
<td>4.634</td>
<td>&lt; 0.001*</td>
</tr>
</tbody>
</table>

SEH - Sitting elbow height, PH - Popliteal height, KH - Knee height, TH - Thigh height, BPL Buttock popliteal length, EH - Eye height
*denotes significant difference at p < 0.05

Table 2 displays the comparison of the dimensions of the furniture used by male and female participants. The dimensions of the furniture used by male and female participants most of the measures were comparable. Women had significantly higher seat height (p < 0.001) and lower back rest bottom height (p < 0.001) than men while men’s backrest width are significantly wider (p = 0.033) than women’s.

Summaries of selected furniture dimensions (seat height, seat length, seat width, backrest top height, backrest bottom height, table top height, table bottom height) are highlighted and displayed in Table 3.

Table 4 shows that all participants had sitting elbow height/table top height mismatch (male: 100%, female: 100%). User-furniture mismatches were also observed in popliteal height/seat height (male: 68.75%, female: 86.54%), buttock-popliteal length/seat length (male: 53.13%, female: 50%) and knee height/table bottom height (male: 9.38%, female: 5.77%) relationships.

Table 2: Dimensions of furniture used by male and female participants

<table>
<thead>
<tr>
<th>Variables (cm)</th>
<th>Male (n = 96) Mean (± SD)</th>
<th>95% CI</th>
<th>Female (n = 104) Mean (± SD)</th>
<th>95% CI</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STH</td>
<td>43.75 (± 3.30)</td>
<td>43.08 - 44.41</td>
<td>45.64 (± 3.40)</td>
<td>44.97 - 46.30</td>
<td>-3.983</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>STD</td>
<td>44.82 (± 4.69)</td>
<td>43.87 - 45.77</td>
<td>43.51 (± 5.36)</td>
<td>42.47 - 44.56</td>
<td>1.825</td>
<td>0.070</td>
</tr>
<tr>
<td>TBH</td>
<td>63.32 (± 4.00)</td>
<td>62.51 - 64.13</td>
<td>62.96 (± 2.77)</td>
<td>62.42 - 63.50</td>
<td>0.747</td>
<td>0.456</td>
</tr>
<tr>
<td>TTH</td>
<td>75.15 (± 1.67)</td>
<td>75.15 - 75.81</td>
<td>74.93 (± 1.47)</td>
<td>74.93 - 75.21</td>
<td>1.005</td>
<td>0.316</td>
</tr>
<tr>
<td>STW</td>
<td>43.79 (± 3.37)</td>
<td>43.10 - 44.47</td>
<td>44.16 (± 5.98)</td>
<td>43.00 - 45.33</td>
<td>0.543</td>
<td>0.588</td>
</tr>
<tr>
<td>BRTH</td>
<td>39.95 (± 9.45)</td>
<td>38.03 - 41.86</td>
<td>38.66 (± 9.67)</td>
<td>36.73 - 40.60</td>
<td>1.936</td>
<td>0.351</td>
</tr>
<tr>
<td>BRBH</td>
<td>19.01 (± 7.57)</td>
<td>17.23 - 20.79</td>
<td>10.90 (± 6.78)</td>
<td>9.31 - 12.50</td>
<td>6.769</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>BRW</td>
<td>43.38 (± 3.69)</td>
<td>42.63 - 44.13</td>
<td>41.39 (± 8.35)</td>
<td>39.71 - 43.06</td>
<td>2.142</td>
<td>0.033*</td>
</tr>
</tbody>
</table>

TTH-Table top height, TBH- Table bottom height, STH- Seat height, STD- Seat depth, STW- Seat width, BRTH- Back rest top height, BRBH- Back rest bottom height, BRW- Backrest width
*denotes significance at p < 0.05

Table 3: Furniture dimensions

<table>
<thead>
<tr>
<th>Variable (cm)</th>
<th>Mean (± SD)</th>
<th>95% CI</th>
<th>Percentiles 5th</th>
<th>25th</th>
<th>75th</th>
<th>95th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table top height</td>
<td>75.04 (± 1.57)</td>
<td>74.82 - 75.25</td>
<td>72.00</td>
<td>74.00</td>
<td>76.00</td>
<td>78.00</td>
</tr>
<tr>
<td>Table bottom height</td>
<td>63.13 (± 3.41)</td>
<td>62.65 - 63.61</td>
<td>56.00</td>
<td>62.00</td>
<td>64.50</td>
<td>69.50</td>
</tr>
<tr>
<td>Seat height</td>
<td>44.73 (± 3.47)</td>
<td>44.24 - 45.21</td>
<td>38.50</td>
<td>42.00</td>
<td>46.00</td>
<td>51.00</td>
</tr>
</tbody>
</table>
### Table 4: Distribution of user-furniture compatibility and mismatches among the participants.

<table>
<thead>
<tr>
<th>Anthropometric/furniture dimension relationship</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male (n= 96)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEH/TTH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>96</td>
<td>100</td>
</tr>
<tr>
<td>Fit</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PH/SH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>66</td>
<td>68.75</td>
</tr>
<tr>
<td>Fit</td>
<td>30</td>
<td>31.25</td>
</tr>
<tr>
<td>BPL/SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>51</td>
<td>53.13</td>
</tr>
<tr>
<td>Fit</td>
<td>45</td>
<td>46.87</td>
</tr>
<tr>
<td>KH/TBH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>9</td>
<td>9.38</td>
</tr>
<tr>
<td>Fit</td>
<td>87</td>
<td>90.62</td>
</tr>
<tr>
<td><strong>Female (n = 104)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEH/TTH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Fit</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PH/SH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>90</td>
<td>86.54</td>
</tr>
<tr>
<td>Fit</td>
<td>14</td>
<td>13.46</td>
</tr>
<tr>
<td>BPL/SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>52</td>
<td>50.00</td>
</tr>
<tr>
<td>Fit</td>
<td>52</td>
<td>50.00</td>
</tr>
<tr>
<td>KH/TBH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>6</td>
<td>5.77</td>
</tr>
<tr>
<td>Fit</td>
<td>98</td>
<td>94.23</td>
</tr>
</tbody>
</table>

&emsp;&emsp;&emsp;SEH – sitting elbow height, TTH – table top height, PH - popliteal height, SH - seat height, B-PL - buttock-popliteal length, SL- seat length, KH - Knee height, TBH - table bottom height

Association between sex and workstation-user mismatch is presented in Table 5. Popliteal height/seat height mismatch was significantly associated [OR (95% CI): 0.34 (0.17 -1.70) p = 0.002] with sex.
Table 5: Association between sex and mismatch among participants (N = 200)

<table>
<thead>
<tr>
<th>Mismatch</th>
<th>Male</th>
<th>Female</th>
<th>χ2</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH/SH</td>
<td></td>
<td></td>
<td>9.205</td>
<td>0.34 (0.17-0.70)</td>
<td>0.002</td>
</tr>
<tr>
<td>Yes</td>
<td>66</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BPL/SD</td>
<td></td>
<td></td>
<td>0.195</td>
<td>1.13 (0.65 - 1.98)</td>
<td>0.659</td>
</tr>
<tr>
<td>Yes</td>
<td>51</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>45</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KH/TBH</td>
<td></td>
<td></td>
<td>0.333</td>
<td>1.69 (0.58 – 4.94)</td>
<td>0.333</td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p ≤ 0.05; CI – confidence interval, OR – odds ratio; PH - popliteal height, SH - seat height, B-L - buttock-popliteal length, SL-seat length, KH - Knee height, TBH - table bottom height

Discussion

The importance of adjustable workstations is highlighted by the sex related differences. This was an expected finding, as men are anatomically known to be different from women in terms of their height, thigh length and hip width. All computer users (100%) were working with tables that were too high for their sitting elbow height. It is therefore necessary for working arm to be raised to compensate for this and that the shoulder be raised or abducted stressing the deeper posterior neck musculature to provide stabilization for the neck. The mean table top height in this study was about 51.5 cm higher than participants’ sitting elbow height (75.04 vs 23.50 cm) which is contrary to the recommendation that they should be at the same level.

One hundred and fifty-six participants (78%) with 90 of them being females had a popliteal height/seat height mismatch. The majority of sitting surfaces were too high meaning that the underside of the thigh would become compressed causing discomfort. Previous research has shown that users usually compensate for this by moving their buttocks forward on the chair.

Approximately half (52%) had a mismatch in their buttock-popliteal length/seat depth relationship with the seats too deep resulting in the front edge of the seat pressing on the area just behind the knee cutting off blood circulation to the legs and feet. Users compensate for this by sliding forwards which then results in poor lumbar and upper backrest support with the likelihood of a slumped, kyphotic posture.

For knee height/table bottom height relationship, only a few workers (7.5%) had a mismatch with the thigh and knee lower than the corresponding table bottom height. As a result, there was enough room for the table clearance while the patella and the uppermost part of the thigh are accommodated conveniently without any stress.

Customarily, Nigerian workers in public and private offices work for 40 hours per week (8 hours daily for 5 days) while those in commercial establishments work for 54 hours per week (9 hours per day for 6 days). It is therefore logical to assume that spending these number of hours using mismatched workstation will predispose the workers to varying degrees of WRMSDs. Increased prevalence of WRMDs among computer users is linked to poor workstation design and incorrect working postures. Hence, the need for good workstation design. Ergonomic intervention is reportedly capable of achieving significant reduction in the prevalence of musculoskeletal symptoms and consequent increase in productivity. Bridger recommended that ergonomically designed workplaces must be flexible enough in order to avoid postural fixity, causing static loading of the musculoskeletal system. This implies that workers can carry out their tasks, most times, in more than one working posture in a well-designed workstation without undue stress. The postures an individual adopts at work should involve minimal energy expenditure, stress and strain and is expected to be conducive for maximum efficiency of the worker.

Conclusion/Recommendation

There was little compatibility between computer users’ body dimensions and their workstation highlighting the need for adjustable workstations. In view of unaffordability of this, it is recommended that workstations furniture be designed to allow adjustability and at low costs to fit the majority. If employers are to continue procuring traditionally designed furniture, employers are encouraged to at least buy as much variety in furniture sizes possibly using the 5th, 25th, 75th and 95th percentiles of the population’s anthropometrics. This could possibly accommodate the variety of users’ sizes. This would go a long way in minimizing/reducing the incidence of work-related musculoskeletal disorders.
and consequently increase productivity among computer users.

Future studies may improve on sample size and probably include more detail such as Rapid Office Strain Assessment which would provide more ergonomic information regarding computer use.

Conflict of Interest: None declared by the authors

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Ethical Clearance: Taken from Health Research Ethics Committee of the University of Ibadan and University College Hospital

References

Medical Image Analysis for TB Diagnosis System

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Abstract

Tuberculosis (TB) is a disease caused by bacteria called Mycobacterium tuberculosis. It usually spreads through the air & attacks low immune bodies. Recently, several techniques are applied to diagnosis the TB diseases. Unfortunately, diagnosing TB is still a major challenge. In recent years, a variety of techniques have been developed. In this paper, texture feature set is obtained using three different categories like statistical, structural and gray level dependent features. After that, the feature selection scheme is carried out and TB classification is done using GANN classifier. In GA-NN, genetic algorithm and neural network are combined to do the classification process. Once the abnormal TB is classified via GA-NN classifier, the TB region is identified via morphological operator. Experimental results demonstrate that the proposed method outperforms than the existing method.

Keywords: Tuberculosis, GA-NN, Kernel FCM.

Background

Less than half of all TB cases worldwide are ever diagnosed, and fewer than 60% of those diagnosed are cured and TB is projected to remain one of the world’s top 10 causes of adult mortality by the year 2020¹. Tuberculosis (TB) is the second leading cause of death from a contagious disease worldwide, after HIV. With about one-third of the world’s population containing latent TB, and an estimated nine million novel cases happening every year, TB is a main global health problem². TB is a contagious disease caused by the bacillus Mycobacterium tuberculosis, which naturally affects the lungs. It stretches through the air when people with vigorous TB cough, sneeze, or else expel infectious bacteria. TB is most common in sub-Saharan Africa and Southeast Asia, where extensive poverty and malnutrition decrease resistance to the disease. In addition, opportunistic infections in immune-compromised HIV/AIDS patients have worsened the problem³. The subsequent method are employed to analyse TB: thorax radiography⁴; biological culture⁵; ⁶; the Mantoux (tuberculin sensitivity/skin) test⁷; interferon-γ tests⁸; amplified nucleic acids-based tests⁹ (which allow lab-on-chip platforms⁹,¹⁰); and sputum smear microscopy¹¹⁰,¹¹. Of these tests the two most normally employed to make sure whether a subject is infectious are biological culture and sputum smear microscopy¹². To fragment the TB region, kinds of literature have been proposed in the latest years. In ¹³,¹⁴, the author offered a segmentation and classification method for TB bacteria identification. Besides, Feature extraction and selection are imperative steps in TB detection and classification. The best feature set should have efficient and discriminating characteristics; while mostly diminish the redundancy of features space to avoid the “curse of dimensionality” problem¹⁵. Frequent features comprise mean, variance, skewness, kurtosis, energy, and entropy¹⁶.

The test of TB bacteria all this time is prepared physically, so that is necessary a long time enough and coached laboratory staff. As a result of this research is a developed system which can identify TB bacteria by employed microscope imaging. Quite a lot of researchers in the world have prepared very much research about the examination of TB diagnosis by employing image processing technique¹⁷. Artificial Neural Network
(ANN) is one of the most employed medical data classification method to remove patterns in an intelligent and dependable way and has been very much employed to find models that explain data relationship\textsuperscript{18,19}. On the other hand, neural networks are recognized to generate highly precise results in practical applications. Moreover, Neural networks have been effectively used to medical data classification, diagnosis aides, biomedical study and drug development\textsuperscript{20}.

**Proposed TB Diagnosis System**

After HIV/AIDS Tuberculosis is the second top infectious killer. Tuberculosis, as well called TB, is a contagious disease caused by Mycobacterium tuberculosis. The fast advance in computer capabilities, image processing algorithms and artificial intelligence techniques had supported the research and improvement of computer-aided tuberculosis diagnosis system. The system plans to help medical technologist and develop the precision of clinical diagnosis. In this article, a TB diagnosis system is suggested mixture of Rough-Set Theory Based Feature Selection and CBGA-NN Classifier. The suggested method contains three significant phases, (1) Feature extraction, (2) feature selection (3) TB classification and (4) Region identification. The simple block diagram of proposed approach is presented in figure 1.

![Block diagram of proposed system](image)

**Table 1. Extracted features from the TB- CT image**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Extracted Feature</th>
<th>Feature Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dispersion</td>
<td>1.541016</td>
</tr>
<tr>
<td>2</td>
<td>Variance</td>
<td>5.10E+03</td>
</tr>
<tr>
<td>3</td>
<td>Energy</td>
<td>7.66E-06</td>
</tr>
<tr>
<td>4</td>
<td>Average_Energy</td>
<td>7.66E-06</td>
</tr>
<tr>
<td>5</td>
<td>Skewness</td>
<td>1.1518</td>
</tr>
<tr>
<td>6</td>
<td>Kurtosis</td>
<td>4.4111</td>
</tr>
<tr>
<td>7</td>
<td>Angular_Second_Moment</td>
<td>199.4276</td>
</tr>
<tr>
<td>8</td>
<td>Inverse_Difference_Moment</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Sum_Average</td>
<td>3.93E+04</td>
</tr>
<tr>
<td>10</td>
<td>Sum_Entropy</td>
<td>5.919</td>
</tr>
<tr>
<td>11</td>
<td>Maximum_Correlation_Coefficient</td>
<td>NaN</td>
</tr>
<tr>
<td>12</td>
<td>Horizontal_Weighted_Sum</td>
<td>20100412</td>
</tr>
<tr>
<td>13</td>
<td>Vertical_Weighted_Sum</td>
<td>20100412</td>
</tr>
<tr>
<td>14</td>
<td>Diagonal_Weighted_Sum</td>
<td>0.5037</td>
</tr>
<tr>
<td>15</td>
<td>Grid_Weighted_Sum</td>
<td>0.503</td>
</tr>
<tr>
<td>16</td>
<td>Short_run_Emphasis</td>
<td>1.75E-04</td>
</tr>
<tr>
<td>17</td>
<td>Long_run_Emphasis</td>
<td>8.05E+04</td>
</tr>
<tr>
<td>18</td>
<td>Gray_level_Non_uniformity</td>
<td>4.48E+04</td>
</tr>
<tr>
<td>19</td>
<td>Run_length_Non_uniformity</td>
<td>5.63E+04</td>
</tr>
<tr>
<td>20</td>
<td>Run_Percentage</td>
<td>7.67E+01</td>
</tr>
</tbody>
</table>

**Results and Discussion**

The proposed TB diagnosis process discussed in the previous section is implemented. The proposed technique for TB diagnosis is implemented in MATLAB. This section presents the results obtained from the experimentation and its detailed discussion about the results. The proposed approach of TB diagnosis is experimented with the CT images and the result is compared with accuracy, sensitivity and specificity curve. Simulation experiments were carried out with medical CT image dataset, which is publically available dataset. size of 512×512 Test images are used in the proposed method of TB diagnosis.

**Classification using KFCM classifier**

The fundamental plan of this section is to decrease the dimension of the features by means of kernel fuzzy c-means (KFCM ) clustering in order to improve the classification. KFCM minimized the following objective function
cluster centers and membership functions are obtained and specified by:

\[ c_j = \frac{\sum_{j=1}^{n} u_j K_H(x_i, c_j) x_i}{\sum_{j=1}^{n} u_j K_H(x_i, c_j)} \]

\[ u_{ij} = \frac{(1 - K_H(x_i, c_j))^{-1/m - 1}}{\sum_{k=1}^{c} (1 - K_H(x_i, c_j))^{-1/m - 1}} \]

Where,

\[ K_H(x_j, c_i) = K_1(x_j, c_i) + K_2(x_j, c_i) \]

\[ K_1(x_j, c_i) \rightarrow \text{Linear kernel} \]

\[ K_2(x_j, c_i) \rightarrow \text{Quadratic kernel} \]

\[ \phi_{\text{comb}} \rightarrow \text{defined as a combination of multiple kernels} \]

\[ N \rightarrow \text{the d-dimension center of the cluster} \]

\[ N \rightarrow \text{is the measured data,} \]

\[ m \rightarrow \text{is the any real number greater than 1,} \]

**Classification using GANN classifier**

Genetic algorithm begins with solution encoding process, which symbolizes set of weights (input and output layer). A solution is stated as a \( SL_k \) dimensions vector and each dimension (position) symbolized as a weight. A solution \( SL_k \) points out the weight allocation information (for neural network structure). \( k \) is from 1 to \( z \), which indicates the number of solutions in the population. A solution \( SL_k \) contains \( w[i] \) and \( w[j] \), which point out the information of input and output weight allocation. The length of the solution is similar as the number of weights allocated in the NN structure. The search ends when the maximum number of iterations is attained.

**Performance matrices:**

\[ \text{Sensitivity} = \frac{\text{Number of true positives}}{\text{Number of true positives} + \text{Number of false negatives}} \times 100 \]

\[ \text{Specificity} = \frac{\text{Number of true negatives}}{\text{Number of true negatives} + \text{Number of false positives}} \times 100 \]

**Conclusions**

In this paper, we developed a Tuberculosis (TB) diagnosis system combining GA-NN and KFCM.
Initially, texture feature set is obtained using three different categories like statistical, structural and gray level dependent features. Feature selection was applied to improve the classification performance. The classification was done by two important phases, like training and testing phase. Extensive experimental results have clearly demonstrated the proposed TB diagnosis system can achieve the state-of-the-art performances on standard TB dataset.

**Source of Funding:** Self

**Ethical Clearance:** Taken from the department chair of Pragathi Engineering College, Surempalem and DDC members to publish this work.

No Conflict of Interest.

**References**


The Smoking Behavior of Adolescents and Impact to the Psychological Health

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Abstract

Smoking behavior mostly occur in adolescence which is characterized by increased frequency and intensity of smoking. Smoking can cause various diseases and deaths. There are internal factors and external factors that influence smoking behavior. The study aims to determine the influence of adults, peers, advertisements, and curiosity motive and the psychological impact on adolescents in Tinggede Village, Sigi Regency. This study uses a mix method research type. The sample size and informants involved were 46 respondents and 6 informants. Quantitative research data were analyzed univariat using the chi-square test. The results showed there was a relationship between the influence of parents (\(\rho = 0.039\)), peers (\(\rho = 0.039\)) and curiosity motive (\(\rho = 0.018\)) with adolescent smoking behavior and there was no relationship between advertisement and adolescent smoking behavior (\(\rho = 0.238\)). As well as the perceived psychological impact of informants feeling more confident, feeling calm and feeling fine. The conclusion of this study is that there is a relationship between the influence of adults and peers, and motive of curiosity with adolescent smoking behavior and there is no relationship between advertisement and the smoking behavior and psychological impact on adolescents in Tinggede Village, Marawola District, Sigi Regency. It is recommended for adolescents to be able to be selective in facing the influence of adults, peers and positive or negative advertisements in everyday life.

Keywords: Smoking, Adolescent, Impact, Psychological.

Introduction

The increasing prevalence of smoking causes the problem of smoking to become increasingly serious. According to the WHO\textsuperscript{(1)}, the number of world smokers reached 1.35 billion people. About 1 billion men in the world are smokers, 35% of them are from developed countries and 50% from developing countries. On the average of 435,000 residents in the United States have died from diseases related to smoking habits each year (1 of 5 deaths).

Based on 2008 Global Youth Tobacco Survey (GYTS) data, 30.1% of the population of Southeast Asia are smokers. In Indonesia, 57,563,866 adult residents are smokers, making it the fifth highest cigarette consumer country in the world\textsuperscript{1}.

According to WHO\textsuperscript{1}, it can be concluded that Indonesia ranks third after China and India in the ten largest smokers in the world. The number of smokers
in Indonesia reaches 65 million. Meanwhile, China has 390 million smokers and India 144 million smokers. Tobacco kills more than 5 million people every year, and in 2020, it is projected to reach 10 million people.

The data from the Health Promotion Technical Implementation Unit of the Central Sulawesi Provincial Health Office, it is known that there are 172 (57.14%) households that smoke in Palu City from the 301 monitored households. In 2012, 63.34% of them smoked. Then, it increased in 2013 as many as 57.14% of them smoked\(^2\).

Smoking is a health problem because it can cause various diseases and even death. Smoking is a major factor in cardiovascular disease and hypertension. Cigarettes contain hundreds of chemical components that are toxic and oxidative. Smoking habits allow toxic substances in cigarettes to accumulate in the blood, one of which is nicotine\(^3\).

Based on the results of Basic Health Research in 2010, most smokers started smoking when they were children or adolescents. Adolescence is a period of transition from childhood to adulthood, and at this age, teenagers or adolescents do a lot of smoking behavior. Smoking behavior in adolescents continues in accordance with the stages of development that will increase which is marked by increasing frequency and intensity of smoking\(^4\). Smoking habits in adolescents are influenced by several factors such as adults, peers, personality, and information media that display cigarette advertisements\(^5\).

**Method**

The type of research used was quantitative research with a cross sectional study approach, conducted in September 2015. The research was conducted in Tingggede Village, Marawola District, Sigi Regency. The population of the study was 83 adolescents and there were 46 respondents taken as samples with Simple Random Sampling technique.

**Data Collection**

The research data used are primary data and secondary data. The primary data were obtained from the results of observations and interviews with adolescent smokers. The process of data collection is done by using a questionnaire to describe the variables studied. While the secondary data was obtained from the Office of the Village Head of Tingggede, Marawola District, Sigi Regency, in the form of data on the number of teenagers. The variables in this study consist of dependent variables and independent variables. The dependent variable is smoking behavior in adolescents. While the independent variables include the influence of adults, peers, the influence of advertisements, and the motives of curiosity. After data collection was done, the data was processed and analyzed. Then, the results of the analysis were presented in the form of a frequency distribution table that explains everything related to this research.

**Results**

**The Factor of Smoking Behavior**

Table 1 showed that smoking teenagers who imitate adult smokers are as many as 16 people or 34.8% while those who do not imitate adult smokers are as many as 30 people or 65.2%. Chi Square test results obtained a value of \(\rho < 0.05\) or \(X^2\) calculate value \((4,261) > X^2\) table \((3,841)\) so that Ho in this study was rejected, meaning that there is a relationship between the effect of imitating adults and adolescent smoking behavior. This table 1 showed that adolescents who smoke because they imitate their peers are as many as 16 people or 34.8%, while adolescents who do not imitate their peers are 30 people or 65.2%. Chi Square test results obtained a value of \(\rho < 0.05\) or \(X^2\) calculate value \((4,261) > X^2\) table \((3,841)\) so that Ho in this study was rejected, meaning that there is a relationship between the effect of imitating peers and adolescent smoking behavior.

Table 1 shows that there are 19 adolescents or 41.3% who smoke because of the effect of advertisements, while adolescents who smoke not because advertisements are as many as 58.7%. Chi Square test results obtained a value of \(\rho < 0.05\) or \(X^2\) calculate value \((1,391) > X^2\) table \((3,841)\) so that Ho in this study was accepted, meaning that there is no relationship between the effect of imitating advertising and adolescent smoking behavior. Table 1 shows that adolescents who smoke because of the motive of curiosity are as many as 15 people or 32.6%, while adolescents who smoke not because of the motive of curiosity are as many as 31 people or 67.4%. Chi Square test results obtained a value of \(\rho < 0.05\) or \(X^2\) calculate \((0,018) > X^2\) table \((3,841)\) so that Ho in this study was rejected, meaning that there is a relationship between the effect of curiosity and adolescent smoking behavior.
Table 1. The Analysis of the Influence of Adults, Peers, Advertisements and Curiosity Motive on Smoking Behavior in Adolescents

<table>
<thead>
<tr>
<th>Smoking Behavior in Adolescents</th>
<th>n</th>
<th>%</th>
<th>X²</th>
<th>ρ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>Yes</td>
<td>16</td>
<td>34,8</td>
<td>4,261</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>30</td>
<td>65,2</td>
<td></td>
</tr>
<tr>
<td>Peers</td>
<td>Yes</td>
<td>16</td>
<td>34,8</td>
<td>4,261</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>30</td>
<td>65,2</td>
<td></td>
</tr>
<tr>
<td>Advertisements</td>
<td>Yes</td>
<td>19</td>
<td>41,3</td>
<td>1,391</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27</td>
<td>58,7</td>
<td></td>
</tr>
<tr>
<td>Curiosity Motive</td>
<td>Yes</td>
<td>15</td>
<td>32,6</td>
<td>5,565</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>31</td>
<td>67,4</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The Relationship of the Effect of Imitating Adults and Adolescent Smoking Behavior

Adults are examples and models for teenagers, but for adults who do not concern the importance of health, they have indirectly taught unhealthy behavior or lifestyle. One reason that makes many adolescents smoke is their parents’ poor parenting style, for example, the behavior of parents who smoke and the behavior emulated by their children from generation to generation. The results of the analysis show that the value of ρ = 0.039 which means that there is a relationship between imitating adults and adolescent smoking behavior. This can happen because the permissive parenting of parents usually provides very loose supervision. It provides opportunities for children to do things without sufficient supervision. Parents tend not to reprimand or warn their children when they are in danger and very little guidance is given by them. If parents provide good parenting, it is possible for children to follow good behavior from their parents. However, if parents have bad habits or behaviors such as father or mother who also have smoking habits, children will follow the example of their parents' behavior. This study is in accordance with research, based on the results of the chi-square test, the value of ρ = 0.013 was obtained. It means that there is a relationship between the influence of peers and the smoking behavior of adolescents in Slongohimo Wonogiri 1 Public Middle School, because ρ < of α or 0.013 < 0.05. Peers can be interpreted as groups of people who have the same background, age, education and social status, and they can usually influence the behavior and beliefs of each member. In addition to the same age level, peers also have the same level of maturity.

The Relationships between the Influence of Imitating Advertisements and the Adolescent Smoking Behavior

Advertising is a medium to convey information to public about a product and it has a function to persuade public about cigarette products. The results of the analysis show that the value of ρ = 0.238 which means that there is a relationship between the action of imitating advertisements and smoking behavior of parents become exemplary figures as smokers. Their children will naturally have a greater chance to imitate and become smokers like them. Parents who smoke will influence their teenagers to smoke more than parents who don’t smoke. Adolescents whose both parents and older siblings smoke will be four times more likely to be smokers compared to them whose parents do not smoke.
adolescents. This is because cigarette advertising does not stop influencing teenagers to consume cigarettes. Teenagers cannot avoid the invasion of thousands of advertisements in electronic media and printed media. Mass or electronic media that often display a picture that smokers are the symbol of manliness, triggered teenagers to imitate or follow the behaviors which are performed by the models in the advertisement. This research is similar to Ariani’s research (14). Based on the results of the research’ data analysis using chi-square, the value of $\rho = 0.311$ was obtained. This means that there is no relationship between advertising and smoking behavior of Semarang State Senior School 4 students, because $\rho < \alpha$ or $0.311 < 0.05$. It also explains that risk factors for the emergence of smoking behavior in adolescents are influenced by several factors, one of which is environmental factors.

The Relationship between the Effect of Curiosity Motive and Adolescent Smoking Behavior

The curiosity motive is a strong desire that emerges from the adolescents to try a new thing that they have not known its positive and negative effects. The results of the analysis show that the value of $\rho = 0.018$ which means that there is a relationship between the motive of curiosity and the smoking behavior of teenagers. There are several psychological reasons that cause a person to smoke. It is for the sake of relaxation and to reduce anxiety or tension. In most smokers, the psychological bond with cigarettes is due to the need to deal with oneself easily and effectively. Cigarettes are needed as a balance tool. This is the reason that makes teens dare to try smoking. The desire to know and being predictive of the influence of drugs including smoking tend to be the reason for a smoker. Being curious is teenagers’ nature. They always want to know everything that they still do not know and its negative effects. This research is similar to Ariani’s research. Based on the results of data analysis using chi-square, the value of $\rho = 0.000$ was obtained. This means that there is a relationship between the motive to try smoking and smoking behavior in students of Tangerang City Junior High School 3, because $\rho < \alpha$ or $0.000 < 0.05$. The authors declare no potential conflict of interest in this research.

Conclusion

The conclusion of this study is that there is no significant relationship between the factors imitating the models in an advertisement and smoking behavior in adolescents. However, there are three factors that have a significant relationship to smoking behavior in adolescents in Tinggede Village, namely the factor of imitating adults, imitating peers and motive of curiosity. Adolescents are expected to be able to increase their knowledge and be able to filter the negative and positive influence of adults, peers and advertisements so that they can be selective and careful in choosing a social environment. There should be parents’ attention and control towards the behavior of their children who have started smoking from an early age.

Funding

This research was funded by the Public Health Faculty Tadulako University in fiscal year 2018.

Research Permit

This study did not require ethical clearance because there is no treatment on the respondent. research only equipped with a research permit from the campus (Public Health Faculty Tadulako University ) with the number 2712/UN28.1.30/KP/2018. and from the Sigi Regional Goverment.

Acknowledgement

The authors grateful to all of those whom have had pleasure participated and supported this research.

Conflict of Interest

The authors declare no potential conflict of interest in this research.

References

Stress and Conversion of Type 2 Diabetes Mellitus Among People with Prediabetes in Bogor, West Java, Indonesia

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Abstract

Background: The study aim was to knowing the impact of stress on the conversion of prediabetes to type 2 diabetes mellitus in adults.

Method: This study used a prospective cohort design. The data used are secondary data from the Cohort Study of Risk Factors for Non-Communicable Diseases in Bogor, Indonesia. Data collection in this study was carried out since 2011 until 2015 with a total population of 5890. Based on the exclusion and inclusion criteria, the total of study participants were 1059.

Results: During 5 years of follow-up, among prediabetic adults there were 169 subjects categorized as T2DM and 219 subjects categorized as stressed. Bivariate analysis shows that stress and age at baseline is a risk factor on the conversion of prediabetes to T2DM (p < 0.05). Final model on multivariate analysis, shows the hazard ratio of stress was 1.815 (95% CI: 1.307 - 2.520) with p < 0.05.

Conclusion: This findings, expected to be used as information and motivation in an effort to make prevention and control of T2DM. Especially in individuals with prediabetes who suffer from stress because it has an impact with conversion of prediabetes to T2DM.

Keywords: Type 2 diabetes mellitus, Prediabetes, Stress, Prospective study.

Introduction

Diabetes mellitus has become a global epidemic with 220 million worldwide prevalence in 2004 and it is estimated that by 2030 it will increase to 366 million and will be ranked 7th as the cause of death (¹). In adults, based on data from WHO states that 422 million people were diagnosed with type 2 diabetes mellitus in 2014. This number is increasing compared with year 1980, from 4.7% to 8.5% in the adult population (²). The initial stage of the emergence of type 2 diabetes mellitus is an increase in blood glucose levels in the body that exceeds the normal limit but still not enough to meet the criteria for type 2 diabetes mellitus or what is called prediabetes or known as intermediate hyperglycemia (⁴–⁷).

According to the CDC, individuals with prediabetes can increase their risk of developing type 2 diabetes mellitus, heart disease and stroke (⁸). Research from De-Vegh, et al (2011) states that within a period of 2-7 years, around 30-70% of people with prediabetes will develop type 2 diabetes mellitus (⁹). Prediabetes is a serious problem that must be treated immediately, because in addition to being able to increasing risk but on the other hand according to ADA can prevent and inhibit the occurrence of type 2 diabetes mellitus (¹⁰).

Risk factors of type 2 diabetes mellitus according to WHO, ADA, and Ministry of Health of Indonesia (³,⁷,¹⁰) consist of risk factors that cannot be modified and modifiable risk factors. As one of the modifiable risk factors, several studies have been carried out, and there is any association between stress and type 2
diabetes mellitus. In general, stress is vulnerable to adulthood. According to Pearlin and Skaff (1996) stressors that are often encountered in adulthood are problems in marriage, divorce, job changes, and problems that arise due to children. Based on these descriptions, we were interested in knowing the impact of stress on the conversion of prediabetes to type 2 diabetes mellitus in adults in Bogor, Indonesia.

Materials and Method

This study used a prospective cohort design. The data used are secondary data from the Cohort Study of Risk Factors for Non-Communicable Diseases in Bogor, Indonesia. Data is not publicly, the use of data for research must be with permission from the Health Research and Development, Ministry of Health of Indonesia. Data collection in this study was carried out since 2011 until 2015 with a total population of 5890 adults. The focus of this study is on adults, so that the inclusion criteria used are individuals aged 25-65 years and have complete blood glucose examination data. The exclusion criteria were diagnosed with type 2 diabetes mellitus before the study and had blood glucose levels that met the criteria for type 2 diabetes mellitus at the baseline.

At the baseline, there were 5209 adults with complete blood glucose measurements. Then, we excluded samples that had blood glucose levels that met the diagnostic criteria for type 2 diabetes mellitus (n = 433) and samples that had normal blood glucose level (n = 3717). The focus of this study is adults with prediabetes. Diagnostic criteria for prediabetes are if fasting glucose levels <126 mg / dL and 2 hours plasma glucose on OGTT are in the range 140-199 mg / dL are categorized as Impaired Glucose Tolerance (IGT) and or if fasting blood glucose levels are in the range ≥ 110 <126 mg / dL and 2 hours plasma glucose on OGTT are in the range 75 <140 mg / dL was categorized as Impaired Fasting Glucose (IFG). Based on the exclusion criteria, with only by taking individuals diagnosed with prediabetes, the total of study participants were 1059.

The study was conducted through interview method, laboratory measurements and examinations on individuals selected as samples. The instruments used in data collection in surveillance activities are questionnaires and the Step Approach Method from WHO. The dependent variable in this study was type 2 diabetes mellitus, while the independent variable was stress. The covariate variables in this study were age, sex, educational level, economic status, marital status, family history of diabetes mellitus, and physical activity. Measurements on stress and physical activity in this study used the SRQ (Self Reporting Questionnaire) and IPAQ (International Physical Activity Questionnaire). Blood glucose levels were only measured in observations in the 3rd and 5th year. Censored if loss to follow up and blood glucose measurements are not diagnosed with type 2 diabetes mellitus. Data analysis performed was Cox Proportional Hazards.

Results

Descriptive statistics

Table 1 shows that during 5 years of follow-up, there were censored subjects (n = 890) consist of loss to follow-up in 320 subjects and non T2DM in 570 subjects. Categorized as event (T2DM) in 169 subjects. Stress was the main independent variable in a total of 1059 subjects, there were 219 stressed subjects with 52 subjects categorized as T2DM or 23.7% of stressed subjects were T2DM. Sex as covariates showed that the majority of the subjects in the study were 781 women with T2DM patients at the end of the observation period were 136 subjects (17.4%) while in men from the total number, only 33 subjects (11.9 %) had T2DM. A total of 606 subjects were ≥ 45 years old and as many as 20% had T2DM at the end of the observation period, 29% loss to follow up, and 51% were categorized non-T2DM subjects.

There were 181 subjects with a family history of diabetes mellitus with 18.8% had T2DM and 49.7% subjects who were not categorized as T2DM. Whereas in 878 subjects who did not have a family history of diabetes mellitus, 15.4% had T2DM and 54.7% were not categorized as T2DM. In economic status, there were 923 subjects with low economic status and 16.1% had T2DM while in 136 subjects with middle/high economic status there were 14% had T2DM. Based on educational level, there were 634 subjects belonging to the low educational level and 16.1% had T2DM whereas in the high educational level there were 15.8% had T2DM. The subjects in this study were more married subjects with a total of 904 subjects, 15.6% had T2DM whereas in single subjects as many as 18.1% had T2DM. In the physical activity it was found that the majority of subjects had sufficient physical activity and as many as 15.5% had T2DM whereas in subjects who lacked of
Table 1. Descriptive statistics and bivariate analysis after 5 years follow up

<table>
<thead>
<tr>
<th>Variables</th>
<th>Status n (%)</th>
<th>Bivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Censored (n = 890)</td>
<td>Event (n = 169)</td>
</tr>
<tr>
<td>Stress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>723 (86.1)</td>
<td>117 (13.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>167 (76.3)</td>
<td>52 (23.7)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>245 (88.1)</td>
<td>33 (11.9)</td>
</tr>
<tr>
<td>Women</td>
<td>645 (82.6)</td>
<td>136 (17.4)</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 45</td>
<td>405 (89.4)</td>
<td>48 (10.6)</td>
</tr>
<tr>
<td>≥ 45</td>
<td>485 (80)</td>
<td>121 (20)</td>
</tr>
<tr>
<td>Family history of DM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>743 (84.6)</td>
<td>135 (15.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>147 (81.2)</td>
<td>34 (18.8)</td>
</tr>
<tr>
<td>Economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle/High</td>
<td>117 (86)</td>
<td>19 (14)</td>
</tr>
<tr>
<td>Low</td>
<td>773 (83.7)</td>
<td>150 (16.3)</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>358 (84.2)</td>
<td>67 (15.8)</td>
</tr>
<tr>
<td>Low</td>
<td>532 (83.9)</td>
<td>102 (16.1)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>763 (84.4)</td>
<td>141 (15.6)</td>
</tr>
<tr>
<td>Single</td>
<td>127 (81.9)</td>
<td>28 (18.1)</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>813 (84.5)</td>
<td>149 (15.5)</td>
</tr>
<tr>
<td>Inactive</td>
<td>77 (79.4)</td>
<td>20 (20.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bivariate and multivariate analysis

Table 1 showed that 7 of the 8 independent variables have an influence on the conversion of prediabetes to T2DM. Stress variables, sex, age, physical activity, family history of DM, economic status, and marital status have HR values > 1 although only stress variables and age have p-value < 0.05. Stress in bivariate analysis has the value of HR 1.917 (1.382 - 2.659). In addition, age significantly affected the conversion of prediabetes to type 2 diabetes mellitus. Age had an HR value of 1.931 (1.382 – 2.697). In the multivariate analysis, it was found that sex and age is a confounder between stress and conversion of prediabetes to T2DM. The final model showed that stress has an impact on the conversion of prediabetes to type 2 diabetes mellitus with a value of HR 1.815 (1.307 - 2.520) with p-value < 0.05. It can be concluded that prediabetic individuals who suffer from stress have a 1.8 times greater risk of becoming T2DM compared to individuals who do not suffer from stress.

Table 2. Results of multivariate analysis using Cox Proportional Hazards Models

<table>
<thead>
<tr>
<th>Variables</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR (95% CI)</td>
</tr>
<tr>
<td>Stress</td>
<td>1.815 (1.307 – 2.520)</td>
</tr>
<tr>
<td>Sex (covariates)</td>
<td>1.590 (1.082 – 2.334)</td>
</tr>
<tr>
<td>Age (covariates)</td>
<td>2.007 (1.432 – 2.814)</td>
</tr>
</tbody>
</table>

Discussion

The total subjects in this study were 5890 and 1059 subjects (18%) had criteria for prediabetes. From 1059 subjects as the study participants, during the 5-year follow-up 16% were diagnosed with T2DM. This result is higher than the prevalence of T2DM in Indonesia in 2018 (10.9%) (17). The main results in this study were the effect of stress on the conversion of prediabetes to T2DM. The incidence of T2DM in subjects who had stress was 23.7% with HR 1.815 (1.307 - 2.520) in multivariate analysis after controlling confounder. This result is relatively high and the hazards ratio indicate a strong association of stress on the conversion of prediabetes to T2DM. A narrow range of confidence intervals indicates there is no chance variation on the results of the analysis.

The results in line with the study from Arroyo, et al. in 2004 which produced an RR value of 1.22 for the association between depression and type 2 diabetes mellitus with a 4-year cohort study (18). In addition, there are other studies conducted by Everson, et al. in 2004 which produced RR values of 1.46 for associations between depression and type 2 diabetes mellitus with a 3-year cohort study (19). The study we conducted can strengthen the results of other studies regarding the effect of stress on the occurrence of T2DM, especially in Indonesia. Stress is the beginning of depression which is estimated to be number 2 on the main cause of burden of disease in Indonesia in 2020. There is a lot of evidence that diabetes and depression are related. Depressed
adults have a 37% increased risk of developing type 2 diabetes mellitus \(^{20}\). Stressors that are the beginning of the onset of stress in adults are usually economic problems, marriage, and problems that occur when having children \(^{16}\).

The covariates in this study are sex, age, physical activity, family history of DM, economic status, educational level, and marital status. Based on sex, women had an incidence of T2DM of 17.4% with HR 1.590 (1.082 - 2.334) which indicated that women were more at risk of becoming T2DM in line with previous studies \(^{2,21}\). The same thing applies to the age variable where subjects aged \(\geq 45\) years old had an incidence of T2DM of 20% with HR 2.007 (1.432 – 2.814) indicating that individuals of older age would be at risk of becoming T2DM accordance with the theory and previous studies \(^{22}\).

Sex and age is a confounder so it must include in the final model to get the pure effect of stress on the conversion of prediabetes to T2DM. Confounder is a bias in research that we can control its influence. In addition, researchers also cannot control the quality of data and do not know the conditions in the field when retrieving data so that the possibility of other biases that occur do not we known.

**Conclusion**

The incidence of T2DM in subjects who had stress was 23.7% with HR 1.815 (1.307 - 2.520) in multivariate analysis after controlling confounder. This result is relatively high and the hazards ratio indicate a strong association of stress on the conversion of prediabetes to T2DM. The final results of the study are expected to be used as information and motivation in effort to prevent and control type 2 diabetes mellitus, especially in individuals with stress and have been diagnosed with prediabetes.

**Limitations**

This study is a secondary data analysis, not all covariate variables were examined.

**Funding**

This research received no external funding.

**Conflicts of Interest**

The authors declare no conflict of interest.

**Ethical Considerations**

Ethical clearance conducted by the Health Research and Development, Ministry of Health of Indonesia Ethics Committee. Written informed consent was obtained from all respondents before data collection was carried out.

**References**


Study of Effect of zinc in the diarrhea of breast feeding babies, (aged between 6 months to 2 years) of North Karnataka population

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³Professor, Department of Paediatrics, JNMC, Belgaum.

Abstract

Background: Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc.¹ Children in developing countries are frequently affected by diarrhea, which causes excess fecal loss of zinc. In such settings, zinc supplementation has been shown to reduce the rates of diarrhea and enhance the physical growth.²

Aims and Objectives: To study the effect of zinc supplementation on the incidence of diarrhea among healthy breast fed babies of age group 6months to 2 years.

Materials and Method: The present study was a randomized controlled trial from May 2016 to September 2017 with both control and interventional group having 100 patients. A total of three follow ups (6, 9 and 12 months) were performed during the study period and the anthropometric measurements and data regarding morbidity with respect to number of episodes of diarrhea were recorded and results analyzed.

Results: A total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The overall incidence of acute diarrheal illness in the interventional group was less (42.2% Vs 62.8%) when compared with the control group and a statistically significant difference in the incidence between the two groups was observed at six to nine months only (p = 0.007).

Conclusion: Zinc supplementation significantly reduces the morbidity associated with diarrhea in breast fed babies.

Keywords: Diarrhea, Zinc, Infants, North Karnataka.

Introduction

The World Health Organization (WHO) estimates that malnutrition is associated with over 55% childhood deaths in developing countries including India.¹ According to National Family and Health Survey (NFHS) 3 data, 43% of malnutrition is found in infants between 6 to 11 months which could be due to inadequate breast feeding and inappropriate complementary food. Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc.¹ Approximately 30% to 50% of children in developing countries have low serum and plasma levels of zinc, again putting them at high risk for malnutrition and associated illness.²

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e-mail: ******
Cereal based weaning food is often recommended as the first complementary food is an important source of dietary iron but is very low in zinc. Therefore zinc supplementation may be important to meet the older infants zinc requirements particularly in less protected environments with the high infectious burden and limited dietary options. Children in developing countries are frequently affected by diarrhea, which causes excess fecal loss of zinc. In such settings, zinc supplementation has been shown to reduce the rates of diarrhea and enhance the physical growth.

**Methodology**

This study, randomized double blind placebo controlled trial was conducted during the period of April-2007 to August-2008 in the department of Pediatrics, KLES Dr. PrabhakarKore Hospital and Medical Research Centre, Belgaum. Exclusively breast fed (EBF) healthy term babies of five months of age with birth weight ≥ 2.5 kgs visiting the under five clinic of Pediatric Out Patient Department (OPD) were enrolled. The sample size was 200 (100 each group). The participants were randomized into the interventional and the control group using computer generated randomization list. Preterm and IUGR babies, babies with metabolic disorders, congenital malformations (Cleft lip palate, congenital heart disease), severe or protracted illness requiring hospitalization for more than one week in the past and top fed babies were excluded.

**Method of collection of data**

An informed consent of the participants fulfilling the above criteria was taken before enrolling in the study. The study was approved by the Ethical and Research Committee of J. N. M. C, Belgaum. The participants were enrolled in the study at five months of age. The period of enrollment was from April-2007 to Jan-2008. At enrollment, after assigning an identity digit number to the mother-infant pair, the data regarding the demographic profile and breast feeding practices were collected and entered in a pre-designed semi structured questionnaire. Mothers were counseled regarding the importance and benefits of EBF and about complementary feeding practices.

The study intervention was initiated at six months of age after recording the baseline anthropometry (weight, length and head circumference). The infants in the interventional group received zinc supplement (zinc gluconate) in the form of an oral syrup in the dose of 10 mg/day (2.5 ml once daily) and the control group received 2.5 ml/day of placebo. The placebo was sugar syrup prepared from a reputed pharmaceutical company which was similar to the zinc supplement with respect to appearance, color and taste. Mothers were instructed to administer the drug dose by the measuring cup every day morning one hour before feeding. To know the compliance of the drug, mothers were provided with a calendar to mark each day that the drug was administered. These calendars were reviewed during the monthly visits and the number of days that the drug doses were missed was recorded. Mothers were also asked to return the bottles each month so that any unused portion could be measured. The intervention was continued up to twelve months in both the groups. Mothers were also asked to record on the calendar provided, the date when a new complementary food was introduced and to keep a detailed every day diet record of the amounts (using standard household measures) of non breast-milk foods and fluids consumed.

A total of three follow ups (at six, nine and 12 months) were performed during the study period. The anthropometric measurements and data regarding morbidity with respect to number of episodes of diarrhea were recorded. Infants were also assessed for compliance of the drug in terms of any adverse effects, number of missed doses and the reason for the same was noted done. Any co-incidental administration of other supplements (multivitamins, iron, and calcium) by physicians was also noted during these visits. Throughout the study, mothers were asked to record on the calendar any symptoms of infant illness; using standardized guidelines for the description of symptoms. Mothers were asked to record on the calendar any symptoms of infant illness; using standardized guidelines for the description of symptoms and also diagnosis made by other physicians. Data of number of episodes of diarrhea was used for analysis in both the groups.

**Statistical Analysis**

The effect of zinc on the incidence diarrhea was studied. The incidence of diarrhea in the two groups was compared with Chi square test. ‘p’ value of less than 0.05 was considered statistically significant. Results are presented as means (± S.D.) unless otherwise indicated.
Definitions used in the study: Diarrhea: Passage of three or more loose or watery stools during a 24 hour period for at least two days where there is change in consistency of stools. An episode of diarrhea was defined as at least one day of diarrhea, with the final day of the episode being the last day meeting the diarrhea definition followed by at least 48 hours without diarrhea.5

Results
The present study was conducted from April-2007 to August-2008 during, total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The general demographic data was well matched between the groups. Of the 200 babies enrolled, 49.5% (99) were males and 50.5% (101) were females. In the interventional group, males and females were 50% each and 49% were males and 51.0% females in the control group. Mean birth weight of the babies was similar in both the groups (2.82 ± 0.26 Vs 2.83 ± 0.27). Among the total 168 babies who completed all the three follow up visits, at 12 months majority (93.3% Vs 91.0%) were completely immunized in both the interventional and control groups. At nine months (94.4% Vs 97.8%) continued breast feeding, were as only 83.3% were breast feeding at 12 months in both the groups. Duration of breast feeding was also well matched between the two groups. Therefore the baseline characteristics of the study population were similar and well matched between the two groups. In both the interventional and control groups supplement was consumed for complete 180 days (77.8% Vs 89.7%), and less than 180 days (22.2% Vs 10.3%) with no statistically significant difference between the groups. There was a high level of adherence to the supplementation protocol, with mean number of days being similar between the groups (178.51 ± 9.65 Vs 176.0 ±17.22).

The overall incidence of acute diarrheal illness in the interventional group was less (42.2% Vs 62.8%) when compared with the control group and a statistically significant difference in the incidence between the two groups was observed at six to nine months only (p = 0.007).

Discussion
Inadequate breast feeding and inappropriate complementary food are the important causes (up to 43%) of malnutrition in infants which predisposes to micronutrient deficiencies especially iron and zinc.1 Zinc deficiency is associated with growth retardation and increased rates of diarrhea and pneumonia in children. Current recommendations for zinc intake during infancy are based on the assumption that breastfed babies usually meet their zinc requirement during the first six months of life6 and zinc status is likely to become marginal beyond this age.7 The studies in developed countries have observed a variable effect of zinc supplementation on incidence of diarrhea and majority of these trials have been conducted in infants more than one year old or on formula feeds.8 Therefore, the present study was conducted to know the effect of zinc supplementation on incidence of diarrhea on healthy breast fed infants.

The socio demographic characteristics in our study were well matched between the two groups and is similar to another study.8 The mean birth weight of the babies was 2.8 kgs in the study, which is well within the standard birth weight for Indian babies.

Zinc deficiency, a prevalent condition of young children in developing countries, is associated with decreased immunocompetence5 and increased rates of serious infectious diseases5 also evident from the recent randomized controlled trials of zinc supplementation in

Table 1. Incidence of acute diarrhea in two groups

<table>
<thead>
<tr>
<th>No. of episodes</th>
<th>6 to 9 months</th>
<th>9 to 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interventional</td>
<td>Control</td>
</tr>
<tr>
<td>Nil</td>
<td>60</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>68.90%</td>
<td>45.60%</td>
</tr>
<tr>
<td>Once</td>
<td>31</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>34.00%</td>
<td>41.90%</td>
</tr>
<tr>
<td>≥ 2</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>00.00%</td>
<td>12.30%</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>p value</td>
<td>*0.007</td>
<td>0.201</td>
</tr>
</tbody>
</table>
poor children in developing countries. These trials have demonstrated that zinc supplementation can substantially reduce the incidence of diarrhea. Most trials reported to date have varied with regard to the magnitude of the effect demonstrated and the presence of a differential effect by sex, age, nutritional status, or baseline plasma zinc concentration.  

A stronger reduction in morbidity after zinc supplementation has been observed at 9 to 12 months and above, possibly because of the higher incidence of diseases in older age groups, were exposure to antigens is usually higher and the protective effect of maternal antibodies is waning. Hence, our study was planned to know the effect of zinc supplementation on morbidity during this period of life. In our study the Interventional group had a lower incidence of diarrhea.

### Table 2. Comparative Studies

<table>
<thead>
<tr>
<th>Study (year) (Ref no)</th>
<th>Diarrhea (% lower incidence)</th>
<th>‘p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sazawal (1998)93</td>
<td>08</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Penny (1999)94</td>
<td>12</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Brooks (2005)95</td>
<td>06</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Present study (2008)</td>
<td>20</td>
<td>&lt; 0.05*</td>
</tr>
</tbody>
</table>

On the contrary, another study reported no effect of zinc supplementation on diarrheal infections. The possible reasons for this lack of effect were, the preventive effect of zinc on diarrheal disease was shown to be more pronounced in children aged more than 12 months than in younger ones and a high proportion of infants were still being breastfed, together with high accessibility to safe water and family factors such as the relatively high educational level of the mothers, might have added a protective effect. No effect of zinc supplementation on diarrhea was also observed in Indian children 6 to 11 months of age, in contrast to strong beneficial effects observed among older ones. The different prevalence’s of zinc deficiency caused by varying rates of prematurity, IUGR, exclusive breast feeding and early morbidity may explain the varying responses to zinc supplementation in very young infants.

### Summary and conclusion

A total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The overall incidence of acute diarrheal illness in the interventional group was less (42.2% Vs 62.8%) when compared with the control group and a statistically significant difference in the incidence between the two groups was observed at six to nine months only (p = 0.007) From the present study it is evident zinc supplementation did have a positive effect on reduction of diarrheal episodes in exclusively breast infants suggesting that most of the infants in developing countries like ours are zinc deficient and would certainly benefit from zinc supplementation especially during complementary feeding.

This research paper was approved by ethical committee of KBN medical college Gulbarga – 585101. Karnataka state

No conflict of interest

No funding

### References


Study of Estimation of Serum Zinc Levels in Breast Feeding Infants, Aged between (6 to 12 Months) of North Karnataka

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²Senior Resident, Department of Paediatrics, KBNIMS, Gulbarga-585101.
³Professor, Department of Paediatrics, JNMC, Belgaum.

Abstract

Background: Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc. Approximately 30% to 50% of children in developing countries are at high risk for malnutrition and associated illness and have low serum and plasma levels of zinc.

Aims of the Study: To study the effect of zinc supplementation on serum zinc levels among healthy breast fed babies aged between 6 months to 12 months.

Materials and Method: The present study was a randomized controlled trial from May 2016 to September 2017 with both control and interventional group having 100 patients. A total of three follow ups (6, 9 and 12 months) were performed during the study period and mean serum zinc levels were measured.

Results: A total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The mean serum Zn level of the interventional group was higher 198.9 ± 47.19 compared to the controls 133.90 ± 68.65 highly significant statistically with an effect size was 65.025 (CI 95%, 21.38 to 108.66, p = 0.005).

Conclusion: The mean serum zinc levels are significantly higher in children with who were given zinc supplement.

Keywords: Serum zinc, Breast feeding, Malnutrition, North Karnataka.

Introduction

Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc. Approximately 30% to 50% of children in developing countries are at high risk for malnutrition and associated illness and have low serum and plasma levels of zinc. Zinc requirements of breast fed infants are generally met with exclusive breast feeding (EBF) until five to six months of age, due to the favorable bioavailability of the zinc in human milk. Hence, zinc status in exclusively breast fed infants is likely to become marginal beyond six months of age.

Cereal based weaning food is often recommended as the first complementary food is very low in zinc. Therefore zinc supplementation may be important to meet the older infants zinc requirements. Children in developing countries are frequently affected by diarrhea, which causes excess fecal loss of zinc. Nearly one third of child deaths could be prevented by a combination of exclusive breast feeding for six months, optimal complementary feeding practices and zinc and vitamin supplementation. Various studies have been conducted on zinc supplementation in preterm, low birth weight infants but there are very few studies in on
zinc supplementation in healthy term infants during the period of introduction of complementary feeding. Hence the present study was conducted to evaluate the effect of zinc supplementation on serum zinc levels in healthy term breast fed infants.

**Aim of the Study**

To study the effect of zinc supplementation on serum zinc levels among healthy breast fed babies aged between 6 months to 12 months.

**Methodology**

This study was conducted in the Department of Pediatrics, KBN teaching and general hospital, Gulbarga during the period of May-2016 to September-2017. It was a randomized double blind placebo controlled trial. Exclusively breast fed (EBF) healthy term babies of five months of age with birth weight ≥ 2.5 kgs visiting the underfive clinic of Pediatric Out Patient Department (OPD) were enrolled. Sample size was 200 (100 each group). The participants were randomized into the interventional and the control group using computer generated randomization list. Preterm babies and IUGR babies, babies with metabolic or neurodegenerative diseases, congenital malformations, severe or protracted illness requiring hospitalization, top fed babies were excluded.

**Method of collection of data**

The study was approved by the ethical committee. An informed consent was taken. The participants were enrolled in the study at five months of age. The period of enrollment was from May-2016 to Feb-2017. At enrollment, an identity digit number to the mother-infant pair was assigned.

The study intervention was initiated at six months of age. The infants in the interventional group received zinc supplement in the form of an oral syrup in the dose of 10 mg/day (2.5ml once daily) and the control group received 2.5 ml/day of placebo. The placebo was sugar syrup prepared from a reputed pharmaceutical company which was similar to the zinc supplement with respect to appearance, color and taste. Mothers were instructed to administer the drug dose by the measuring cup every day morning one hour before feeding. To know the compliance of the drug, mothers were provided with a calendar to mark each day that the drug was administered. These calendars were reviewed during the monthly visits and the number of days that the drug doses were missed was recorded. Mothers were also asked to return the bottles each month so that any unused portion could be measured. The intervention was continued up to twelve months in both the groups. A total of three follow ups (6, 9 and 12 months) were performed during the study period. During each follow up visits, mothers were reinforced to continue breast feeding and advised regarding complementary feeding. Infant also assessed for compliance of the drug in terms of any adverse effects, number of missed doses and the reason for the same was noted. Any co- incidental administration of other supplements (multivitamins, iron, and calcium) by physicians was also noted during these visits. Throughout the study, mothers were asked to record on the calendar any symptoms of infant illness; using standardized guidelines for the description of symptoms.

**Serum Zinc level estimation**

Non fasting venous blood was drawn with use of plastic syringes. Blood samples were taken only when infants were free of symptoms of any illness for more than 10 days before the procedure at 12 months of age. To minimize the influence of diurnal and post prandial variation on plasma zinc, all of the samples were collected in the morning (09:00 AM and 11:00 AM), approximately two hours after a feeding. Serum was separated and aliquots were stored in mineral free, plastic vials at -20°C centigrade until processed. The materials and procedures were checked to rule out possible zinc contamination before sampling started. Serum zinc concentrations were estimated.

**Statistical Analysis**

Serum zinc outcomes were converted to effect sizes, which were calculated as the difference between the means of the zinc and control groups divided by their pooled standard deviation (S.D.). Effect sizes of 0.2 are considered of small magnitude, effect sizes of 0.5 are considered moderately large, and those of 0.8 are considered large.68

‘p’ value of less than 0.05 was considered statistically significant. Results are presented as means (± S.D.) unless otherwise indicated.

**Results**

The present study was conducted from May 2016 to September 2017 during which a total of 200 babies were
enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The general demographic data was well matched between the groups.

Consumption of the supplement

In both the interventional and control groups supplement was consumed for complete 180 days (77.8% Vs 89.7%), and less than 180 days (22.2% Vs 10.3%) with no statistically significant difference between the groups. There was a high level of adherence to the supplementation protocol, with mean number of days being similar between the groups (178.51 ± 9.65 Vs 176.0 ± 17.22). Vomiting (regurgitation excluded), within 15 minutes of ingestion of the supplement was the commonest side effect observed in both groups but more in the Zinc group.

Other supplements

Majority (76.6% Vs 61.5%) in both the groups received no supplements other than the study intervention. Among those who received other supplements, multivitamins was the commonest in both the groups (12.64% Vs 21.79%), followed by iron (4.59% Vs 3.84%), and calcium (6.89% Vs 12.82%). No significant difference was observed between the groups with respect to consumption of other supplements.

Serum Zinc Levels in the Two Groups

The serum zinc estimation was done in a convenient, random sample of 30 of which 20 belonged to interventional and 10 to the control group. The mean serum Zn level of the interventional group was higher 198.9 ± 47.19 compared to the controls 133.90 ± 68.65 highly significant statistically with an effect size was 65.025 (CI 95%, 21.38 to 108.66, p = 0.005).

Discussion

Zinc supplementation and serum zinc levels

Serum zinc concentration was significantly higher at the end of the study in infants who received zinc supplementation, with a highly significant effect size of 65.025 were the compliance was also good, indicating that the zinc supplementation was successful in improving the zinc status of these infants. Similar observations were noted in other studies with varied effect sizes. The increase in mean plasma zinc concentrations were significantly more in the interventional group compared to placebo in another study (27.3 Vs 6.1 µg). However, in the present study the mean increase in serum zinc concentrations from enrollment could not be assessed because of lack of baseline serum zinc levels.

Serum zinc concentrations are generally maintained within the normal range with small or moderate reductions in zinc intake. Moreover, factors unrelated to the level of zinc nutrition, (recent meals, time of day, infection, tissue catabolism) can also affect serum zinc concentrations. Thus, the serum zinc concentration may not always be a reliable indicator of an individual’s true zinc status. Although the population’s mean serum zinc concentration has been proposed as a useful indicator of the zinc status of groups of individuals, little information is available on the ability of this indicator to predict the population’s functional responses to zinc supplementation.

Moreover, information is needed to assess the responsiveness of the mean serum zinc concentration to zinc supplementation to determine whether this measure could be used as an indicator of successful delivery and absorption of supplemental zinc in public health intervention programs. Given the current limitations of zinc status determination with plasma or other biologic samples, it would be helpful to have simple assessment method that could be used to decide which populations would benefit from interventions to improve zinc nutriture.

Summary and conclusion

A total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. A total of 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The mean serum Zn level of the interventional group was higher 198.9 ± 47.19 compared to the controls 133.90 ± 68.65 highly significant statistically with an effect size was 65.025 (CI 95%, 21.38 to 108.66, p = 0.005). The mean serum zinc levels are significantly higher in children with who were given zinc supplement.

This research paper was approved by ethical committee of KBN medical college Gulbarga –585101, Karnataka state
No conflict of interest:

No funding:

References


Study of Incidence of acute respiratory infections in breast feeding babies (aged between 6 months to 2yrs of age) of North Karnataka population

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²Senior Resident, Department of Paediatrics, KBNIMS, Gulbarga-585101.
³Professor, Department of Paediatrics, JNMC, Belgaum.

Abstract

Background: Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc. Children in developing countries are frequently affected by ARI. In such settings, zinc supplementation has been shown to reduce the rates of pneumonia and enhance the physical growth.

Aims of the Study: To study the effect of zinc supplementation on the incidence of pneumonia among healthy breast fed babies aged between 6 months to 2years.

Materials and Method: The present study was a randomized controlled trial from april 2017 to august 2018 with both control and interventional group having 100 patients. The patient were followed up at six, nine and twelve months for anthroprometry and number of episodes of ARI and results analysed.

Results: A total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively, with significant reduction in the incidence of ARI in the zinc supplemented group.

Conclusion: Supplementation of zinc had a significant reduction in the incidence and prevalence of acute lower respiratory tract infections.

Keywords: Respiratory, Zinc, Breast feed, North Karnataka.

Introduction

Malnutrition is associated with over 55% childhood deaths in developing countries including India as estimated by World Health Organization (WHO). Malnutrition especially during the early few years of life predisposes to micronutrient deficiencies such as iron and zinc. Approximately 30% to 50% of children in developing countries have low serum and plasma levels of zinc, again putting them at high risk for malnutrition and associated illness.

Cereal based weaning food is often recommended as the first complementary food and it provides an important source of dietary iron but is very low in zinc. Therefore zinc supplementation may be important to meet the older infants zinc requirements particularly in less protected environments with the high infectious burden and limited dietary options. Children in developing countries are frequently affected by ARI(Acute respiratory infections). In such settings, zinc supplementation has
been shown to reduce the rates of pneumonia and enhance the physical growth.²

**Aim of the Study**

To study the effect of zinc supplementation on the incidence of pneumonia among healthy breast fed babies aged between 6 months to 2 years.

**Methodology**

This study was conducted in the Department of Pediatrics, KLES Dr.PrabhakarKore Hospital and Medical Research Centre, Belgaum during the period of April-2007 to August-2008. Study design was randomized double blind placebo controlled trial. Source of data: Exclusively breast fed (EBF) healthy term babies of five months of age with birth weight ≥ 2.5 kgs visiting the under five clinic of Pediatric Out Patient Department (OPD). Sample size was 200 (100 each group). The participants were randomized into the interventional and the control group using computer generated randomization list. Selection criteria: Inclusion criteria was all the healthy term babies appropriate for gestational age (AGA) with birth weight ≥ 2.5 kgs visiting the under five clinic of Pediatric OPD and babies of mothers who were willing to come for follow-up regularly. Preterm babies and IUGR babies, babies with metabolic or neurodegenerative diseases, congenital malformations (Cleft lip palate, congenital heart disease), severe or protracted illness requiring hospitalization for more than one week in the past, top fed babies were excluded.

**Method of Collection of Data**

An informed consent of the participants fulfilling the above criteria was taken before enrolling in the study. The study was approved by the Ethical and Research Committee of J. N. Medical College, Belgaum. The participants were enrolled in the study at five months of age. The period of enrollment was from April-2007 to Jan-2008. At enrollment, after assigning an identity digit number to the mother-infant pair, the data regarding the demographic profile and breast feeding practices were collected and entered in a pre-designed semi structured questionnaire. Mothers were counseled regarding the importance and benefits of EBF.

The study intervention was initiated at six months of age after recording the baseline anthropometry (weight, length and head circumference). The infants in the interventional group received zinc supplement (zinc gluconate) in the form of an oral syrup in the dose of 10 mg/day (2.5ml once daily) and the control group received 2.5 ml/day of placebo. The placebo was sugar syrup prepared from a reputed pharmaceutical company which was similar to the zinc supplement with respect to appearance, color and taste. Mothers were instructed to administer the drug dose by the measuring cup every day morning one hour before feeding. To know the compliance of the drug, mothers were provided with a calendar to mark each day that the drug was administered. These calendars were reviewed during the monthly visits and the number of days that the drug doses were missed was recorded. Mothers were also asked to return the bottles each month so that any unused portion could be measured. The intervention was continued up to twelve months in both the groups. Mothers were also asked to record on the calendar provided, the date when a new complementary food was introduced and to keep a detailed every day diet record of the amounts (using standard household measures) of non breast-milk foods and fluids consumed.

A total of three follow ups (at six, nine and 12 months) were performed during the study period. First visit was at six months, when the baseline anthropometry [weight for age, length for age, head circumference] was recorded and the intervention was started. During the second follow up at nine months, the data regarding morbidity with respect to number of episodes of ARI was recorded. Third follow up was at 12 months when, along with morbidity and anthropometry data was also collected.

During each follow up visits, mothers were reinforced to continue breast feeding and advised regarding complementary feeding. Infants were also assessed for compliance of the drug in terms of any adverse effects, number of missed doses and the reason for the same was noted. Any co-incidental administration of other supplements (multivitamins, iron, and calcium) by physicians was also noted during these visits. Throughout the study, mothers were asked to record on the calendar any symptoms of infant illness; using standardized guidelines for the description of symptoms.

**Outcome measures**

a) Anthropometric measurements:

**Weight:** The infant was weighed nude. Weight was recorded on weighing scale for infants with an accuracy
of ± 10 gms.

**Length:** The length was measured in terms of crown heel length, to the nearest of 0.1 cms. To measure the crown heel length, the infant was placed supine on an infantometer and mother was asked to keep the vertex snugly touching the fixed vertical plank. Legs were fully extended by pressing over the knees and feet kept vertical at 90°. The movable pedal plank was snugly applied against the soles and length was read from the scale.

**Head circumference:** The occipito-frontal head circumference was measured with a tape. Tape was encircled over the most prominent part of occiput and supra orbital areas and was measured to the nearest of 0.1 cms. The mean of two measurements were recorded as the observed values for all indexes.

**Morbidity data**

Mothers were asked to record on the calendar any symptoms of infant illness; using standardized guidelines for the description of symptoms and also diagnosis made by other physicians. Data were collected and grouped into two major categories: acute respiratory infection, and other illness. Data of number of episodes of ARI was used for analysis of morbidity in both the groups.

**Statistical Analysis**

The incidence of ARI in the two groups was compared with Chi square test. ‘p’ value of less than 0.05 was considered statistically significant. Results are presented as means (± S.D.) unless otherwise indicated.

**Definitions used in the study**

1. **Exclusive breast feeding:** An infant receives only breast milk and no other liquids or solid not even water, with the exception of drops or syrups consisting of vitamin, mineral supplements or medicine.

2. **Complementary feeding:** Defined as the transition from exclusive breast feeding to family food, which typically covers the period from 6 – 18 to 24 months of age and is a very vulnerable period.

3. **ARI:** Upper respiratory tract infection was defined as history of cough or difficulty in breathing with or without fever for more than one day not associated with rapid breathing and/or chest indrawing (or) a cough of more than one day with nasal discharge. Lower respiratory tract infection was defined as history of cough or difficult breathing with or without fever, lasting more than one day and accompanied by rapid breathing, chest indrawing, or both.

**Results**

The present study was conducted from April-2007 to August-2008 during which a total of 200 babies were enrolled in the study. First and second follow up visits were done in 186 and 172 babies respectively. 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively. The general demographic data was well matched between the groups.

### Morbidity in the Two Groups

<table>
<thead>
<tr>
<th>No. of episodes</th>
<th>6 to 9 months</th>
<th>9 to 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interv</td>
<td>Control</td>
</tr>
<tr>
<td>Nil</td>
<td>84</td>
<td>92.30%</td>
</tr>
<tr>
<td>Once</td>
<td>07</td>
<td>7.60%</td>
</tr>
<tr>
<td>≥ 2</td>
<td>00</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>100%</td>
</tr>
<tr>
<td>p value</td>
<td>0.001*</td>
<td>0.014</td>
</tr>
</tbody>
</table>

**Discussion**

Inadequate breast feeding and inappropriate complementary food are the important causes (upto 43%) of malnutrition in infants which predisposes to micronutrient deficiencies especially iron and zinc. Zinc deficiency is associated with growth retardation and increased rates of diarrhea and pneumonia in children. Current recommendations for zinc intake during infancy
are based on the assumption that breastfed babies usually meet their zinc requirement (through breast milk and initial stores) during the first six months of life\textsuperscript{9} and zinc status is likely to become marginal beyond this age.\textsuperscript{10}

Therefore, the present study was conducted to know the effect of zinc supplementation on the incidences of ARI in healthy term exclusively breast infants with a standard recommended complementary feeding pattern.

The socio demographic characteristics (maternal age, literacy, and socioeconomic status) were similar in both the groups. The baseline parameters of the study population (gender distribution, birth weight, immunization status, duration of breast feeding) were well matched between the two groups and is similar to another study.\textsuperscript{11} The mean birth weight of the babies was 2.8 kgs in the study.

### Zinc and Morbidity

Zinc deficiency, a prevalent condition of young children in developing countries, is associated with decreased immunocompetence\textsuperscript{12} and increased rates of serious infectious diseases,\textsuperscript{12} also evident from the recent randomized controlled trials of zinc supplementation in poor children in developing countries. These trials have demonstrated that zinc supplementation can substantially reduce the incidence of acute lower respiratory infections. Most trials reported to date have varied with regard to the magnitude of the effect demonstrated and the presence of a differential effect by sex, age, nutritional status, or baseline plasma zinc concentration.\textsuperscript{12}

A stronger reduction in morbidity after zinc supplementation has been observed at 9 to 12 months and above, possibly because of the higher incidence of diseases in older age groups, were exposure to antigens is usually higher and the protective effect of maternal antibodies is waning.\textsuperscript{12} Hence, our study was planned to know the effect of zinc supplementation on morbidity during this period of life. In our study the Interventional group had a lower incidence of morbidity from ARI and diarrhea.

### Table 2. Comparative Studies

<table>
<thead>
<tr>
<th>Study (year) (Ref no)</th>
<th>ALRI (% lower incidence)</th>
<th>‘p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sazawal (1998)\textsuperscript{14}</td>
<td>43</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Brooks (2005)\textsuperscript{18}</td>
<td>17</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Present study (2008)</td>
<td>26</td>
<td>&lt; 0.05*</td>
</tr>
</tbody>
</table>

A study reported 40% lower risk of severe acute lower respiratory tract infection (ALRTI) in less well nourished infants with weekly supplementation of iron and zinc from 6 to 12 months of age, suggesting intermittent simultaneous supplementation with Iron and zinc would give promising results.\textsuperscript{13}

### Zinc and ARI

In our study there was a significant reduction in the incidence of ARI in the zinc supplemented group which is similar to observations of other studies.\textsuperscript{14} A number of studies in developing countries have demonstrated a substantial reduction in the prevalence of pneumonia in children supplemented with zinc.\textsuperscript{15} Zinc supplementation reduced the incidence but not duration of pneumonia or respiratory tract illnesses in children under five years of age as reported in a meta-analysis.\textsuperscript{16}

Supplementation of zinc with vitamin A had a significant reduction in the incidence and prevalence of acute lower respiratory tract infections. However, the incidence and prevalence was more in the group who received zinc alone.\textsuperscript{17} Contrary to this, two studies reported no increased incidence of respiratory morbidity with zinc given alone.\textsuperscript{12} Routine zinc supplementation in children aged six months to three years in an urban slum resulted in a lower incidence of pneumonia.\textsuperscript{12} Zinc when given together with antimicrobial therapy to young children with pneumonia was associated with a significant reduction in the duration of pneumonia when compared with controls, who received the same antibiotic but no zinc.\textsuperscript{18} Another study reported that zinc supplementation had no effect on the duration of hospitalisation or clinical signs associated with severe infections.\textsuperscript{19}

### Summary and Conclusion

A total of 168 babies completed all the three follow-up visits of which, 53.6% (90) and 46.3% (78) belonged to the interventional and control groups respectively.

A significant reduction of the number of episodes of ARI was noted in the interventional group at 9 and 12 months both with p value being < 0.001. Supplementation of zinc had a significant reduction in the incidence and prevalence of acute lower respiratory tract infections.

This research paper was approved by ethical committee of KBN medical college Gulbarga –585101 Karnataka.
No conflict of interest

No funding

References

Independent Family Group Model Improving Health Status and Quality of Life of Elderly in the Community

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²Faculty of Nursing, Universitas Indonesia.

Abstract

Increasing number of elderly population impact in the problems faced, especially degenerative diseases, so that elderly are vulnerable groups. Family support as an importany source of support for improving the welfare of elderly. The development of an independent family group model is a family empowerment model which is an integration of self-help groups and support groups is expected to increase health status and quality of life in the community. A quasi-experimental study of non-equivalent pretest-posttest control group design was used in this research with 196 respondents from 5 (five) regions in Jakarta with random selection. Analysis of data used General Linier Model Repeated Measure (GLM-RM) test. The results showed the existence increased health status and quality of life of the elderly before and after the implementation of an independent family group model (at 3 and 6 months after intervention). The conclusion was independent family group model effectively improves the health status and quality of life the elderly in the community.

Keywords: Health status on elderly, Independent family group model, Quality of life on elderly.

Introduction

The elderly people are vulnerable groups in the community, at risk and more sensitive groups exposed to various risk factors, including economic, social, physical, biologic, genetic factors. The vulnerability condition of the elderly can affect the role of the family so that it becomes a burden for families, communities and the government.¹ In developing countries, the rapid demographic transition cause drastic changes in population structure with a rapidly increasing population in the world. The elderly population in Indonesia increase from 2010 equal to 7.5% becomes 8.49% in 2015. The prediction for 2035 is 15.77%. This is in line with the increase in life expectancy 70.1 years in 2010-2015 increased to 72.2 years in 2030-2035. The high life expectancy is one indicator of the success of achieving national development, especially in the health sector.²

The morbidity rate is one indicator used to measure the health status of the population. The lower as morbidity rate, the better their health status of the population. When viewed from 2005-2014, the health status of the elderly population has increased which is marked by a decrease in morbidity in the elderly.³ Even though morbidity is declining, but the elderly are still experiencing degenerative diseases. Health problems such as COPD, cancer, hypertension, heart failure, and arthritis that disease is a major cause of disability in the elderly so that it becomes a burden for families, communities and the government.⁴ Various problems occur in the elderly will have an impact on various aspects of social, economic and health. An increasing number of elderly people with disabilities or dysfunction or a lack support systems related to the development of the family, women work so that it will increase the elderly’s need for long term care and a decrease in quality of life.⁵ Therefore, it is necessary to prepare the elderly from an early age through a life cycle approach, so that quality elderly can be reached.

In Indonesia, government policies and programs that deal with the problems of the elderly from various departments already include social welfare and social
security, health care systems, family and community support, quality of life and special facilities and infrastructure for the elderly, but still not reaching the essence of empowerment efforts for the elderly which are integrated. Meanwhile, with increasing life expectancy, it is possible for older people to be in the family and community environment. Therefore, it is necessary to empower the elderly to improve the independence and quality of life of the elderly so as to reduce the burden on families and communities that have an impact on reducing long-term care costs.6

Improving the quality of life of the elderly is one indicator of success in overcoming various problems of the elderly. Quality of life is a state of well-being that includes the ability to carry out daily activities that reflect physical, psychological and social well-being and client satisfaction with the level of functioning and its ability to control disease and helplessness.7 Improving the quality of life of the elderly can be done through empowering the potential of the elderly in carrying out daily living activities by supporting independence in carrying out various activities that are capable of doing it.8 In addition to support from family and outside the family such as friends, neighbors, community members, as well as government, private and elderly observe groups in providing services in a comprehensive and holistic manner.9

The Indonesian government has developed an elderly empowerment program through the elderly groups at the district level, but has not reached the essence of empowerment of the elderly as a whole. Family empowerment programs through elderly family development as well as community-based approaches through Family Empowerment Posts (Posdaya) have also been developed to overcome various problems in handling the elderly, but there is no place for families that can be used as a gathering place to share experiences in caring for elderly and an effective strategy is not yet known to improve the quality of life of the elderly. Therefore, an independent family group model can be developed as one of the models of family empowerment.

Material and Method

The design used in this study is the quasi-experiment pre-post test with control group design. This design uses three times measurements, namely before the model intervention, at 3 months and 6 months after the model intervention. The population in this study is families who have elderly in the Jakarta region. While the sample in this study are families who have the elderly at home, with the following criteria: 1) adults to pre-elderly (20-59 years), 2) living with the elderly in one house, 3) As primary caregivers in the family. While the elderly with the criteria: 1) aged 60 years and over, 2) have physical or psychological problems but not bed rest, 3) do not experience visual and auditory disability. The sampling strategy uses a cluster multi stage method with a total sample of 196 caregivers (98 the intervention group and 98 the control group). Data analysis with statistical tests, namely the General Linier Model Repeated Measure (GLM-RM) and Canonical Test.

Independent Family Group Model

The model developed is an independent family group model which is a model of integration between support groups and self-help groups. The implementation stages of the model are: 1) Conduct training for health workers, elderly cadres and caregivers; 2) Form 10 independent family groups in 5 (five) Jakarta regions; 3) Conduct group activities through meetings that are held routinely which is 2 weeks in the first 3 months with assistance, then once a month for the next 3 months independently; 4) After 3 months of intervention, then the data collection was carried out (1st post-test). At 6 months after the intervention (2nd post-test).

Measurement Tools

The health status data collection tool uses the Short Form Health Survey/ SF-12SF-12 questionnaire consisting of 12 items using 1-5 likert scale. SF-12 is calculated with the value of physical component summary and mental component summary using scales 1-60. The quality of life of the elderly is measured using modifications from WHOQOL-BREF and WHOQOL-OLD(using a likert scale (0-4), consisting of 15 items including the autonomy domain, personal relationships, social relations, activities, physical and psychological adaptation.21 The instrument has been tested on 30 respondents with Alpha Cronbach above 0.7.
Findings

Table 1. Characteristics of elderly in the intervention and control groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intervention (n=98)</th>
<th>Control (n=98)</th>
<th>Value p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td><strong>1. Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60th-64th years</td>
<td>25</td>
<td>25.5</td>
<td>32</td>
</tr>
<tr>
<td>65th-69th years</td>
<td>28</td>
<td>28.6</td>
<td>16</td>
</tr>
<tr>
<td>70th-74th years</td>
<td>24</td>
<td>24.5</td>
<td>27</td>
</tr>
<tr>
<td>≥75 tahun</td>
<td>21</td>
<td>21.4</td>
<td>23</td>
</tr>
<tr>
<td><strong>2. Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>17.3</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>81</td>
<td>82.7</td>
<td>73</td>
</tr>
<tr>
<td><strong>3. Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>32</td>
<td>32.7</td>
<td>29</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>66</td>
<td>67.3</td>
<td>69</td>
</tr>
<tr>
<td><strong>4. Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Educated</td>
<td>21</td>
<td>21.4</td>
<td>26</td>
</tr>
<tr>
<td>&lt;High School</td>
<td>64</td>
<td>65.3</td>
<td>59</td>
</tr>
<tr>
<td>≥High School</td>
<td>13</td>
<td>13.3</td>
<td>13</td>
</tr>
<tr>
<td><strong>5. Job Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>20</td>
<td>20.4</td>
<td>22</td>
</tr>
<tr>
<td>Jobless</td>
<td>78</td>
<td>79.6</td>
<td>76</td>
</tr>
</tbody>
</table>

*Chi-Square Test

Table 2. Health status of the elderly before and after the intervention of independent family group models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention (n=98)</th>
<th>Control (n=98)</th>
<th>Value p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>95% CI</td>
</tr>
<tr>
<td>Health Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>36.52</td>
<td>37.00</td>
<td>35.57-37.46</td>
</tr>
<tr>
<td>After (3 months)</td>
<td>45.35</td>
<td>45.00</td>
<td>44.48-46.22</td>
</tr>
<tr>
<td>After (6 months)</td>
<td>45.58</td>
<td>45.00</td>
<td>44.43-46.73</td>
</tr>
<tr>
<td><strong>p interaction</strong>&lt; 0.001</td>
<td>R(^2) = 0.257</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Health status before intervention and 3 months after intervention (p<0.001, R\(^2\) = 0.421)
- Health status on 3 months and 6 months after intervention (p=0.083)

*General Linier Model Repeated Measures Test

Table 3. The elderly quality of life before and after intervention the independent family group model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention (n=98)</th>
<th>Control (n=98)</th>
<th>Value p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>95% CI</td>
</tr>
<tr>
<td>Quality of life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>35.75</td>
<td>36.00</td>
<td>34.43-37.08</td>
</tr>
<tr>
<td>After (3 months)</td>
<td>43.48</td>
<td>45.00</td>
<td>42.33-44.64</td>
</tr>
<tr>
<td>After (6 months)</td>
<td>44.20</td>
<td>45.00</td>
<td>43.03-45.37</td>
</tr>
<tr>
<td><strong>p interaksi</strong>&lt; 0.001</td>
<td>R(^2) = 0.234</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Quality of life before intervention and 3 months after intervention (p=0.001, R\(^2\) = 0.350)
- Quality of life on 3 months and 6 months after intervention (p=0.585)

*General Linier Model Repeated Measures Test
The results showed that there was a difference in the health status of the elderly before and after the intervention of the independent family group model (3 months and 6 months after the intervention). The results of research which shows that the elderly health status scores were significantly different in the intervention group after 6 months of family carers’ training program intervention compared to the control group. The research on family care for the elderly through support groups illustrates that families benefit in caring for the elderly through counseling and support systems. Important factors that determine how families cope with stress in caring are their ability to obtain social support and social interaction through support groups. Support groups help families acquire caring skills, education about diseases and ways to deal with stress so that it can be applied in caring for elderly at home. Several studies have found that family support and social support can improve the physical and mental health of the elderly. The level of family support is significantly related to the health status of the elderly. Social support from the family is beneficial for the health and well-being of the elderly and can protect the elderly from dangerous situations and life events that are full of stress.

The results of interviews with caregivers after following the activities of independent family groups found that caregivers felt the benefits of increasing knowledge, insight, and experience in caring for the elderly so as to be able to care for the elderly properly, be able to be more patient, be wiser and be able to understand the needs of the elderly and able to care for the elderly if sick. This shows that the intervention of independent family groups can improve the ability of caregivers in caring for the elderly who experience health problems both physically and psychologically so as to have an impact on improving the health status of the elderly. This is consistent with the study that social support is significantly related to the physical and mental health of the elderly.

The model of an independent family group is effective in improving the ability of the family to be independent of the elderly and to improve the harmony of family relationships with the elderly which has an impact on improving the quality of life of the elderly. This is important for the elderly due to warmth, openness in the family can provide a feeling of security, acceptance and love and provide happiness in their lives so as to improve their quality of life. Supported by the results of research that elderly people who live in a family environment have a better quality of life than older people who do not live in a family environment. Families who care for the elderly also need a variety of support and health services that can maintain the quality of life of the elderly such as emotional support, social integration support, and reward support, assistance in decision making related to health services, financial needs, life planning for the elderly, assistance in carrying out physical tasks, support in accessing and negotiating with health and social services, assistance in managing the household. Similar with there is a relationship between the role of cadres with the growth and development of toddlers by KPSP. Its needed involve the active participation of the parents in the early detection of toddler growth and development.

Similar result the health training program related to the quality of life of the elderly is based on the ability to do Basic ADL and Instrumental ADL. Improving the quality of life of the elderly can be done through empowering the elderly’s potential in carrying out daily living activities by supporting independence in carrying out various activities that are capable of doing it, in addition to support from family and outside the family such as friends, neighbors, community members also support government, the private sector and the elderly observer group in providing services in a comprehensive and holistic manner.

There is a positive correlation between the quality of life of the elderly and social support from family, friends and meaningful people. Supportive family behavior is an important source of social support for elderly. This results of studies based on the canonical test that there is a strong relationship between the intervention of the independent family group model for the elderly. The social support provided through this model contributes to health improvement behavior in the family by strengthening the sources of support and it has an impact on improving the health status of the elderly and ultimately can improve the quality of life.

Conclusion

An independent family group model has been tested to be effective in improving the health status and quality of life of the elderly, so that it can be used as a model of family empowerment that can be applied in the community. Sustainability models require support groups that are able to provide assistance and move families to participate in group activities regularly. The
application of this model focuses on caregivers who care for the elderly at home. Through training and group meetings routinely able to increase the knowledge, attitudes and skills of caregivers in caring for the elderly.

Conflict of interests

The authors have no conflict of interests to declare.

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Ethical clearance

Ethical approval taken from Faculty of Nursing Universitas Indonesia committee.

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Self Help Group Activity in Improving Knowledge Onelderly with Hypertension in Jakarta, Indonesia

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Abstract

Background: Self-help group is one of the intervention groups with activities including exchanging ideas, overcoming problems, and mutual support among older people. Elderly people with hypertension are a vulnerable group and it is important to improve their health so they can maintain greater independence.

Objective: This study aims to determine differences in knowledge, attitude, and behavior in older people with hypertension by self-help group intervention.

Method: The research method used is non-equivalent pretest-posttest with the control group. Including intervention trainings and meetings for elderly hypertensive respondents. The samples were older people suffered from hypertension (45-59 and >60 y.o). Sampling method used random sampling resulted 44 respondents group as the intervention group and 42 respondents in the control group. Statistical test used independent t-test.

Results: There are differences in hypertension knowledge between the intervention group and the control group after the intervention of self-help group (0.66 ± 3.27; p value 0.001).

Conclusion: Self-help group’s intervention can serve as an important tool for health workers to implement education change that can empower elderly hypertension in the community.

Keywords: Education change, Older people with hypertension, Self-help group activity.

Introduction

Hypertension is a disease which suffers most of elders, marked with high blood pressure, yet generally the symptom is not noticeable, so it is often called the silent killer. It is estimated that 76% hypertension cases are not entirely diagnosed within the nation, so in this case, the person who already contracted with hypertension may not realized. According to WHO, the proportion of the people who are suffered from hypertension caused by ageing are 1 out of 10 people aged between 20-30 years old and 5 out of 10 people aged 50 years old or higher. Therefore, early detection is important, and it is important as well to always check their blood pressure and keep it within the normal level.

Health Profile in Indonesia in 2010 describes the increasing hypertension cases, in the form of essential hypertension, which requires hospitalization are 19,874 cases and 955 among them are died, while new cases in 2010 are approximately 80,615 which require outpatient treatment care. The prevalence of hypertension sufferer in Indonesia obtained through measurement of age within> 18 years old is 25.8% and the chance will increase on elderlies. Hypertension is the third leading cause of mortality (6.8%) for all ages after stroke.
(15.4%) and pulmonary tuberculosis (7.5%). Women between 45-54 years old are more likely (8.6%) to suffer hypertension than men which is 8%.6

The high incidence of hypertension requires more attention and all supports from all parties, especially the family as a closest support system to the client. Family support cooperated with participation from society can improve the elders’ ability in addressing their problem as well as to generate new intervention strategies for sustainability of health care system23. One intervention that can be done is through Self-Help Group (SHG). SHG is a group of people that help each other in which they provide support for each member of the group or mutually beneficial for each member. They share common problems, share feelings, and experiences about the disease and dependency problems.7

SHG is the group’s activities which empower its whole members to resolve their own problems. Through all participation within the group, each member will feel more open, more useful, and more empowered to make decision to reduce the burden on families, loneliness and guilt.8 SHG can reduce the symptoms of the disease, lower the crisis and hospitalization, improve social skills and extend social networks, and increase healthy behaviors and perception of good health.9

Some of the results of other relevant researches find significant differences in knowledge, attitudes and behavior of pre-elderly before and after intervention psychoeducation models.10 The frequency and strength of bond with friends or people who matter on their life are associated with lower somatic symptoms and blood pressure, in which social support and social networks have a profound effect on the lives of the older people to improve physical and psychological function.11 Through the intervention, it is expected that they are able to maintain their health on their own in order to reach healthy, active and productive old age.

Material and Method

This research used a quasi-experimental design with nonequivalent pretest-posttest on a control group. The random sampling was used in the intervention group in three Rusunawa which are subsidized apartments or vertical housing provided by the provincial government. The sample size for intervention group was 44 elderlies and for the control group was 42, so the total was 86 elderlies. The intervention group did pre-test and health education activities related to health development and treatment of hypertension on elderlies as well as things that must be considered by the older people.

The group activity was conducted once a week within a month. The first meeting of the self-help group activities included sharing experiences on hypertension treatment that had been done recently (written in workbook for elderlies). The second meeting, the activities were to share experiences on the proper treatment for hypertension between elderlies and facilitators, to discuss herbal therapies for hypertension and how to make a proper herbal medicine, and to practice the deep breath relaxation technique. The third meeting was to share experiences, to try the herbal therapies, and to practice acupressure to treat high blood pressure. The fourth meeting activities were to share the experiences of doing at least 2 acupressure techniques, deep breath relaxation, and then do the post-test. Meanwhile, the control group did the pre-test and measured the blood pressure, and then did post-test and re-measured their blood pressure.

Findings

Based on the characteristics of the elderlies, both the intervention and control groups are similar characteristics, for example, the majority of respondents are female, married, and have poor educational background (only attended elementary school). Both groups are nearly equal in hypertension medical record in which they have suffered for around 1-5 years, have taken prescribed antihypertensive medication, and performing routine blood pressure check. The intervention group never receives any health education or counseling about hypertension before. Both groups own mobile phones and can operate them well.

The characteristic of hypertension before intervention on both groups shows that the intervention group have moderate hypertension ranged from 160-179 mmHg for systolic and 100-109 mmHg for diastolic. Meanwhile, the control group have mild hypertension ranged from 140-159 mmHg for systolic and 90-99 mmHg for diastolic. Both groups’ hypertension statuses are improved or changed after intervention of self-help groups in which their blood pressure became normal ranged from 120-139 mmHg for systolic and 80-89 mmHg for diastolic based on 30 respondents’ test results.

The result of the equality test analysis shows that there is no difference on all variables between intervention and control groups (p value > 0.05). Thus all the variables between the two groups are equal.
Table 1. Analysis of older people's knowledge, attitude, and behavior on hypertension among intervention and control groups

<table>
<thead>
<tr>
<th>Variable(s)</th>
<th>Group(s)</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Intervention</td>
<td>44</td>
<td>0.66</td>
<td>3.27</td>
<td>-2.208 – 0.097</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>42</td>
<td>1.71</td>
<td>1.89</td>
<td>-2.198 – 0.088</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>Intervention</td>
<td>44</td>
<td>0.64</td>
<td>5.29</td>
<td>-2.970 – 1.052</td>
<td>0.065</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>42</td>
<td>1.60</td>
<td>3.96</td>
<td>-2.958 – 1.041</td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td>Intervention</td>
<td>44</td>
<td>1.36</td>
<td>6.44</td>
<td>-2.361 – 2.707</td>
<td>0.244</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>42</td>
<td>1.19</td>
<td>5.29</td>
<td>-2.350 – 2.696</td>
<td></td>
</tr>
</tbody>
</table>

The analysis also shows that there is significant difference in mean value of elderlies’ knowledge on treating hypertension after intervention in the intervention group compared to the control group (Table 1). Formed SHG and its activities including to share experiences, health counseling, and coping skills of elderlies with hypertension can increase knowledge about hypertension. This is in accordance with that the provision of effective health education can influence on the improvement of knowledge of individuals or groups.\(^{15}\) This is in line with a research statement that sharing knowledge and coping skills can help the members of the group to choose a suitable strategy for them.\(^{16}\) The involvement of a person in the group is an empowerment process that provides an opportunity to work with others, to learn about decision-making skills, and problem solving as well as to manage the resources available in the community.\(^ {17}\)

This program can be conducted because the support from all parties, from the health center, the KPLDH (Ketuk Pintu Layani Dengan Hati) organization of Rusunawa in cooperation with ‘Kader Kesehatan’ to identify and collect the data related to the elderlies with hypertension and self-help group. This is suppoted with previous research that some activities can be done at the meeting of SHG such as the announcement of events, sharing feeling (may be positive or negative), the opening of the meeting by the facilitator, the disclosure feelings of group members, discussion, question and answer session, ended with the closing in which there is a reward and suggestions or criticism.\(^ {18}\) SHG uses workbook and guidelines which help each member to do self-health monitoring and management, reduction of the incidence of negligence, and improving social support.\(^ {19}\) The SHG can teach someone to understand others through sharing experiences, providing an opportunity to meet regularly, mutual support and exchange coping skills with each member.\(^ {20}\) Another research said there is a relationship between the role of cadres with the growth and development of toddlers by KPSP as pre-screening questionnaire.\(^ {27}\)

Activities in SHG have been agreed upon beforehand and implemented in a sustainable manner through the workbook. The workbook must be filled with positive and negative behaviors related to the efforts done to control blood pressure and to cope when problems or symptoms of hypertension appearing. It is expected that through the workbook, those activities can become a habit that is done continuously which creates healthy lifestyle. This is in accordance with a statement that if the behavior was integrated with health promotion in lifestyle, it can produce a positive health experience throughout life\(^ {21}\), and there was a significant increase in knowledge after the use of booklet media and modules on prevention of anemia in peer education in teenagers girls.\(^ {25}\)

Experiencing healthy life becomes one of the purposes of the implementation of the SHG as it is expected after attending SHG can enhance healthy behaviors and perceptions about the healthy state in which the client will accept the disease, will know proper treatment, will know better coping mechanisms and disease management, will improve the quality of life and sense to maintain health, will have higher self esteem, accept the problem without blaming, will be more creative, and can spend most of the time with their families. Noise as a part of environment variable could interfere with correct hearing and potential error in measurement of blood pressure.\(^ {22}\) According to research there were significant results which are noise, age, hereditary factors, physical activity to hypertension.\(^ {26}\)

**Conclusion**

Based on this research, both groups have hypertension record and have regularly check the blood pressure as well as having mobilephone as communication media,
and most of the control group members have received health education or counseling on hypertension compared to the intervention group. The staff of Puskesmas and Rusunawa are expected to enhance and sustain the activities conducted in ‘Posyandu Lansia’ or Hypertension Clinic through providing health education or counseling on hypertension treatment focusing on the skills or practices; blood pressure routine check for those who cannot come to ‘Posyandu Lansia’ or the Clinic; and take the benefit of Mobile Phone to form a Whatsapp (WA) group as a media to inform and remind each others to come when the activities are scheduled as well as to knowledge and positive or negative experiences.

Conflict of interests

The authors have no conflict of interests to declare.

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Ethical clearance

Ethical approval taken from Health Polytechnic Jakarta II committee with reference number LB.02.01/KE/L/148/2016.

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Association between Work Motivation and Job Satisfaction among Nurses in the Clinical Settings in India

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Abstract

Background: Motivation of health workers is necessary to generate the organizational commitment towards the patients and the hospital. Therefore the knowledge about what motivates and satisfies them is very essential.

Objective: The primary objective of the study was to explore the relationship between Work Motivation and Job Satisfaction among Nurses in the Clinical Settings

Method: The study is conducted through online survey, target being nurses of Government or a private run hospitals. Sample size was 100.

Results: The study shows majority of the study population belonged to age group between 25-30 years (55%). Gender-wise distribution showed 48% males and 52% females. Female Nurses were more as compared to males. More than half of the study population (68.3%) were poorly motivated and their job satisfaction level is very poor. Work motivation is highly significantly associated with job satisfaction (p=0.001), (p value is less than 0.005).

Conclusion: There should be an effective Human resource management system for nursing community in every higher level hospital.

Keywords: Motivation, Job satisfaction

Introduction

Motivation can be defined as the processes which account for an individual’s intensity, direction and persistence of effort toward achieving the goal. There are two kinds of motivation, intrinsic or extrinsic. The former are derived from within the individual, e.g. taking pride and feeling good about a job well-done, whereas the latter pertain to rewards given by another person. Job satisfaction, on the other hand, is defined as a pleasurable or positive emotional state, resulting from the appraisal of one’s job or job experiences. Job satisfaction is only achieved if the person is motivated to complete his job successfully.

Psychologists conducted various studies on human motivation extensively and have prepare methodically a variety of theories about what motivates people. Needs-based theories include Maslow’s hierarchy of need, Aldersfer’s theory, Herzberg’s two factor theory and McClelland’s acquired needs theory. Another approach focuses on external factors and their role in

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understanding employee motivation (e.g. Skinner’s reinforcement theory). Theories based on intrinsic factors focus on internal thought processes and perceptions about motivation (e.g. Adam’s equity theory, Vroom’s expectancy theory, Locke’s goal setting theory) ¹

The workforce in the health sector has specific features that cannot be ignored and motivation can play an integral role in many of the compelling challenges facing healthcare today ². Most of the studies have been carried out on a combined sample including doctors, nurses including paramedical staff together. Since, the social network varies geographically, hence; the generalization made in developed systems of care can’t be used in India, and ³. Also there is much attrition rate of young nurses in India in both public and private sector, as most of them are going abroad within five years after completing their course. Nurses are called the backbone of health care system, they cannot be ignored and their motivation can play an integral role in many of the compelling challenges facing healthcare today. Employee satisfaction and patient satisfaction both are important from the hospital point of view. Overall work motivation and job satisfaction are important factors to retain hospital employees in the long run specially the nurses. This Quantitative study was designed to assess the work motivation and job satisfaction among nurses in the clinical setting.

**Methodology**

The study is conducted through online survey, target being nurses of Government or a private run hospitals, having minimum bed capacity of more than 500 and staff nurse capacity more than 300 in India. Purposive sampling technique was used to select the study population. A semi structured pre tested questionnaire was used to collect required information. The questionnaire was divided in to 3 parts demographic characteristics, work motivation and job satisfaction.

The questionnaire was sent and randomly selected 100 respondents from the nurse’s community the online questionnaires (prepared in Google Docs) were sent to the nurses through email and Whatsapp. One month time span was given for them to reply to the questionnaire. Further data collected was numerically coded in SPSS software version 16. The data was summarized using descriptive statistics, frequencies and percentages. Statistical differences between categorical variables were assessed using the Chi-square or Fischer exact test (if cell value was less than 5). Means were compared using the Student’s T-test P-value <0.05 was considered statistically significant.

**Result**

Descriptive statistics method and regression analysis were used to analyse the data, the obtained results are being presented in the following tables.

### 1) Demographic Background Characteristics of Respondents (N=100)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Below 25</td>
<td>2(2)</td>
</tr>
<tr>
<td></td>
<td>25-30</td>
<td>55(55)</td>
</tr>
<tr>
<td></td>
<td>30-35</td>
<td>37(37)</td>
</tr>
<tr>
<td></td>
<td>35-40</td>
<td>6(6)</td>
</tr>
<tr>
<td></td>
<td>Above-40</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(mean ± standard deviation)</td>
<td>29±4</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>48(48)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>52(52)</td>
</tr>
<tr>
<td>Management</td>
<td>Higher</td>
<td>10(10)</td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>72(72)</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>18(18)</td>
</tr>
<tr>
<td>Qualification</td>
<td>BSC Nursing</td>
<td>67(67)</td>
</tr>
<tr>
<td></td>
<td>Msc Nursing</td>
<td>6(6)</td>
</tr>
<tr>
<td></td>
<td>GNM</td>
<td>27(27)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

### 2) Association between Work Motivation and Job Satisfaction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Poorly satisfied</th>
<th>Moderately satisfied</th>
<th>Highly satisfied</th>
<th>Total</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorly motivated</td>
<td>28(68.3)</td>
<td>14(31.8)</td>
<td>4(26.7)</td>
<td>46(46)</td>
<td>P = 0.001</td>
</tr>
<tr>
<td>Work motivation</td>
<td>13(31.7)</td>
<td>21(47.7)</td>
<td>10(66.7)</td>
<td>44(44)</td>
<td>(\chi^2 = 19.9)</td>
</tr>
<tr>
<td>Highly Motivated</td>
<td>9(20.5)</td>
<td>9(20.5)</td>
<td>1(6.7)</td>
<td>10(10)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41(41)</td>
<td>44(44)</td>
<td>15(15)</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The present study was to explore Work Motivation and Job Satisfaction among Nurses in the Clinical Settings. Sample size was 100. The study shows that Work motivation is highly significantly associated with job satisfaction (p=0.001), (p value is less than 0.005). More than half of the study population (68.3%) were poorly motivated and their job satisfaction level is very poor. Only 6.7% of nurses have high motivation and they are having high job satisfaction. 31.8 % of study population were moderately motivated and satisfied with their job. The similar finding had been reported by Lu H et al, Singh Rajkumar G, Hegney, Plank, Parker, Nick Kontodimopoulos and Wangal. Nurses are called back bone of the health care system, they cannot be ignored and their motivation can play an integral role in many of the compelling challenges facing health care today. Nurses will have difficulties in meeing the needs of patients if their own needs are not met. In the present study only the young nurses are taken as samples who are working in patient bedside.

According to Sukhminder Singh Bajwa, Sandeep Singh in the study “In depth analysis of motivational factors at work in the health industry” shows that the demographic profile of all the employees showed only minor differences which were statistically non-significant. Skills, task -identity, task significance, autonomy, feedback, environment, job security and compensation were observed to be the important factors for the motivation of employees. The study were conducted on 100 employees (doctors-40, nurses-40, paramedical-20) by ranking of motivational factors ranging from 0-5. Akambi study showed positive relationship between intrinsic motivation, extrinsic motivation and the workers performance having variables such as intrinsic motivation, extrinsic motivation and employee job satisfaction by taking sample of 100 workers of flour mill of Nigeria. Leshabari MT study on Healthcare Employee Satisfaction Survey reveals they were unmotivated as a result of dissatisfaction with remuneration; opportunities for growth and promotion; working conditions; recognition, rewards and appreciation; as well as benefits and allowances. Research findings indicate that there is a relationship between lack of motivation and stress using Yes or No questions on 106 nursing staffs. The study in Tanzanian health industry reveals that almost half of both doctors and nurses were not satisfied with their jobs, as was the case for 67% of auxiliary clinical staff and 39% of supporting staff.

Most of the studies have been carried out on a combined sample including doctors, nurses including paramedical staff together. They have again been done abroad. Since, the socio-cultural network of abroad is very different, hence; the generalization made abroad can’t be used in India. Also there is much attrition rate of young nurses in India in both public and private sector, as most of them are going abroad within five years after completing their course.

Conclusion

People are always the vital resource of organization. And at times, they are often neglected at their jobs which leads to their failure to perform. Thus here we need to understand what motivates people and how they get satisfied from their job that leads to organizational performance. The present study revealed that more than half of the study population (68.3%) were poorly motivated and their job 39% satisfaction level is very poor. Work motivation is highly significantly associated with job satisfaction (p=0.001), (p value is less than 0.005). There should be an effective Human resource management system for nursing community in every higher level hospital. Top level management will be governed by persons having good knowledge in nursing administration. To increase the job satisfaction level of the employees the Organization should concentrate mainly on the incentive and reward structure besides the motivational session. There should be adequate Rewarding and promotion system to those employees who deserve it. Overall work motivation and job satisfaction are important factors to retain hospital employees in the long run specially the nurses.

Limitation

Lack of time and other resources as it was not possible to conduct survey at large level. While collection of the data many consumers were unwilling to fill the questionnaire. The area for study was limited to specific organizations that are quite a small area to judge job satisfaction level. Online survey.

Recommendation

There should be an effective Human resource management system for nursing community in every higher level hospital. Top level management will be governed by persons having good knowledge in nursing
administration or MBA in hospital management or MHA. To increase the job satisfaction level of the employees the Organization should concentrate mainly on the incentive and reward structure besides the motivational session. There should be adequate Rewarding and promotion system to those employees who deserve it.

**Funding**

Self

**Conflict of Interest**

None

**Ethical Clearance:** Informed consent from all the participants was taken before conducting the study.

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Physical Activity: Mine Workers’ Behavior Related With Metabolic Syndrome

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Abstract

Metabolic syndrome is a term for risk factors for heart disease and diabetes mellitus. Workers have different lifestyle behaviors and work patterns that can cause metabolic syndrome. Based on medical check-up data in 2016, there were found several cases of dyslipidemia (97.5%), visual impairment (47.8%), BMI> 25 (45.2%), abnormal audiometry (17%), liver enzyme disorder (1.7%), and hypertension (10 %). Among those cases, there are 3 problems which are identified as the components of the metabolic syndrome. This study was conducted to explain the factors related to metabolic syndrome in mine workers to make control and prevention programs. A cross-sectional design was used to obtain workers lifestyle data by analyzing lifestyle questionnaire results and medical check-up data which includes central obesity, triglycerides, HDL, blood pressure and fasting blood sugar. There were significant relationships between physical activities with metabolic syndrome. No significant relationship was found between diet pattern, sleep duration, and knowledge of metabolic syndrome. Promotion and preventive controls are needed to prevent the metabolic syndrome in population, and screening of metabolic syndrome in all workers need to perform by the company to find out the magnitude of the problems.

Keywords: Metabolic syndrome, occupational health, coal mining

Introduction

The metabolic syndrome (METS) consists of five factors for Atherosclerotic Cardiovascular Disease (ASCVD), that is atherogenic dyslipidemia, high blood pressure, dysglycemia, pro-thrombotic state, and inflammatory state, which occurs most often in obese people. The contribution of each component to cardiovascular risk necessarily varies between individuals but, in combination, both multiply the risk of ASCVD\textsuperscript{(1)}.

According to the American Heart Association / National Heart, Lung, Blood Institute update ATP III MS and IDF report, the main purpose for diagnosing METS is to identify patients at high risk of heart disease and type 2 diabetes mellitus who require lifestyle therapy to reduce this risk\textsuperscript{(2)}. Most people with METS are obese and do not settle. Urbanization and access to cheap food create a pandemic of METS. Thus, primary interventions should be lifestyle changes, ie calorie restriction, improved food quality, and increased physical activity\textsuperscript{(1)}.

Some research on METS of International Diabetes Federation (IDF) decided to use the definition of ATP III 2001 as a starting point and modify and update it to reflect the current goals\textsuperscript{(3)}. According to a new definition, a person suffering from METS, they should have central obesity plus two of the other four additional factors. These four factors were elevated triglyceride levels $\geq$ 1.7 mmol / l (150 mg/dl), decreased HDL cholesterol:
<1.03 mmol / l (40 mg/dl) in men and <1.29 mmol / l (50 mg/dl), in women (or specific treatment for these lipid abnormalities), elevated blood pressure (systolic ≥ 130 or diastolic 85 mmHg) or treatment of previously diagnosed hypertension, fasting blood glucose ≥ 5.6 mmol / l (100 mg/dl) or previously diagnosed type 2 diabetes.

METS was found in 22.8% and 22.6% of US men and women. METS was found in 4.6%, 22.4%, and 59.6% of men of normal weight, overweight, and obese, respectively, and a similar distribution was observed in women. Older age, postmenopausal status, Mexican American ethnicity, higher body mass index, smoking, low household income, high carbohydrate intake, and physical inactivity were associated with increased likelihood of METS.(4)

A METS-related study conducted on executive workers in Jakarta in 2011 showed that in general, the prevalence of METS was high (21.6%). The prevalence of METS in male executives (24.7%) was higher than for female executives (11.8%). Demographic, lifestyle, sex, and physical activity characteristics are associated with METS(5).

XYZ is a coal mining company, where the mining processing environment takes place has a health impact. Based on preliminary research by reviewing HIRADC (Hazard Identification Risk Assessment and Determining Control), medical check-up result and clinic visit found that disease that occurs among workers not only related to work environment but related to work behavior and healthy lifestyle.

Material and Method

This cross-sectional study used questionnaire and medical check-up in 2017. This study aimed to describe the prevalence and factors related to METS in coal mining company XYZ. Hypothesis test using Chi-Square test and T-test to see the relation between dietary pattern, physical activity, sleep duration and knowledge with METS. Research conducted at XYZ, a coal mining company operating in South Kalimantan. The study was conducted in January - May 2018. The population study is the workers of XYZ coal mining site of South Kalimantan. From the total of 196 workers, 105 workers selected after adjusting with inclusion criteria. This research was using FFQ to get dietary pattern information, GPAQ for physical activity and questionnaire that develop by the researcher for sleep duration and knowledge.

Findings

Table 1. Prevalence of METS From 2012-2017

<table>
<thead>
<tr>
<th>Year</th>
<th>METS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2012</td>
<td>6</td>
<td>74</td>
</tr>
</tbody>
</table>
|      | 7.5% | 92.5% | 100.0%
| 2013 | 6    | 92    | 98    |
|      | 6.1% | 93.9% | 100.0%
| 2014 | 17   | 81    | 98    |
|      | 17.3%| 82.7% | 100.0%
| 2015 | 16   | 83    | 99    |
|      | 16.2%| 83.8% | 100.0%
| 2016 | 20   | 77    | 97    |
|      | 20.6%| 79.4% | 100.0%
| 2017 | 44   | 48    | 92    |
|      | 47.8%| 52.2% | 100%  |

The prevalence of METS obtained by analyzing medical check-up result. It was found that METS in miners increase from 2012-2017. In 2017, employees with METS were 47.8%, while those without METS were 52.2%.

Table 2. Distribution of Component METS in 2017

<table>
<thead>
<tr>
<th>Component</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Central Obesity</td>
<td>58</td>
<td>63%</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>33</td>
<td>35.9%</td>
</tr>
<tr>
<td>HDL</td>
<td>50</td>
<td>54.3%</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>11</td>
<td>12%</td>
</tr>
<tr>
<td>Fasting Blood Sugar</td>
<td>84</td>
<td>91.3%</td>
</tr>
</tbody>
</table>

The METS component which many respondents had is a high blood pressure of (88%), followed by triglycerides, HDL, central obesity, and fasting blood sugar respectively:

Table 3. Distribution of METS Based on Numeric Independent Variable

<table>
<thead>
<tr>
<th>METS</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Score</td>
<td>33,30</td>
<td>100,00</td>
<td>68,76</td>
<td>15,616</td>
<td>2,254</td>
<td></td>
</tr>
<tr>
<td>METS</td>
<td>69,89</td>
<td>16,49</td>
<td>16,49</td>
<td>2,485</td>
<td>0,736</td>
<td></td>
</tr>
</tbody>
</table>
It was found that there was no difference in the mean score of knowledge in the group who had METS and did not have METS (p-value = 0.736). In the group with METS, the mean score was 68.76, whereas in the group with no METS the mean score was 69.89.

### Table 4. Distribution of METS Based on Categoric Independent Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yes</th>
<th>No</th>
<th>P-value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short sleep duration (&lt;6 hours)</td>
<td>57.1%</td>
<td>42.9%</td>
<td>0.364</td>
<td>1.600 (0.580-4.412)</td>
</tr>
<tr>
<td>Long sleep duration (&gt;8 hours)</td>
<td>43.8%</td>
<td>56.3%</td>
<td>0.904</td>
<td>0.933 (0.304-2.864)</td>
</tr>
<tr>
<td>Normal sleep duration (6-8 hours)</td>
<td>45.5%</td>
<td>54.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet Pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often</td>
<td>2 (33.3%)</td>
<td>4 (66.7%)</td>
<td>0.469</td>
<td>0.524 (0.091-3.012)</td>
</tr>
<tr>
<td>Rare</td>
<td>42 (48.8%)</td>
<td>44 (51.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive (&lt;600 METs-min per week)</td>
<td>15 (68.2%)</td>
<td>7 (31.8%)</td>
<td>0.032</td>
<td>3.030 (1.097-8.363)</td>
</tr>
<tr>
<td>Active (≥600 METs-min per week)</td>
<td>29 (41.4%)</td>
<td>41 (58.6%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bivariate analysis showed that there was no difference in the proportion of metabolic syndrome in the type of food consumed rarely and often consumed. In the diet often groups as much as 48.8% had METS and on rare diet groups as much as 33.3% had METS. The odds ratio (OR) value obtained at 0.524 (95% CI 0.091-3.012); it means that diet often has a risk for METS of 0.524 times compared with rare diet. The results showed that there was no significant relationship between frequent food intake with METS (p-value = 0.469).

In variable sleep duration, the group that had the highest percentage of METS was the short sleep duration group, which was 57.1% with an OR value of 1,600 (95% CI 0.580-4,412). The OR value for the long sleep duration group was obtained at 0.933 (95% CI 0.304-2.864). However, it can be seen from the p-value, both short sleep duration and long sleep duration are not related to the METS (p-value = 0.364; p-value = 0.904).

The results of data analysis demonstrated that there is a difference in the proportion of METS in both groups of physical activity. The OR value was obtained at 3,030 (95% CI 1.097-8,363); it mean that less physical activity had a risk of METS of 3,030 times compared to active physical activity. P-value showed that there was a significant relationship between physical activity with METS (p-value = 0.032).

### Discussion

Based on the results of research on 92 mining workers XYZ coal mining company located in South Kalimantan found the prevalence of METS in 2017 amounted to 47.8%. When compared with previous research on METS in Indonesia, this result higher than result from Soewondo’s study 28.4%⁶.⁷ According to the consensus of the definition of METS, there was the fact that METS was a progressive disease and increases the risks of ASCVD, for example, some components tend to worsen over time. Some things that usually increase annually are weight gain, gradual loss of muscle mass, stiffness in the arteries, decreased capacity of pancreatic beta cell secretion, mitochondrial dysfunction, and increased inflammatory changes in adipose tissue, and age-related¹.

The largest component of the METS contributing to this study was high blood pressure obtained in 88% of respondents.

### Dietary Pattern

Food intake is a determinant factor in the diet, which is described in the frequency of eating, skips breakfast and eating habits outside the home associated with obesity. It has been agreed that a high-fat diet will increase total energy intake and increase the likelihood of obesity⁷. Assessment of the frequency of food consumption was done using the Food Frequency Questionnaire (FFQ). Food consumption was divided into carbohydrates, animal protein, vegetable protein, vegetables, fruit,
milk and its products, fast food, snacks and soft drinks. After obtaining the overall food frequency data, then the food ingredients are determined which are at risk of causing METS. In this study, diet pattern was not related with METS. This result was not in line with several studies that suggest that diet was related with METS. Dietary patterns characterized by high consumption of fish and foods with whole grains and low consumption of processed products, sugar and sweets and preserved meat are associated with a lower risk of METS with a reduced risk of lower HDL cholesterol concentrations and increased glucose concentration. This might be happening because there was no difference in the variety of food consumed by each worker because the company has provided canteen facilities and meal menu settings.

Physical Activity

Physical inactivity increases the risk of CVD and types 2 diabetes mellitus and other can worsen other risk factors. Increased physical activity promotes weight loss and maintenance in obese people and modifies obesity-related risk factors, including increasing visceral adipose tissue loss, improving insulin sensitivity, increasing HDL cholesterol, and decreasing triglyceride levels. The results of this study showed that workers who were an inactive category (<600 METs-minutes per week) 3 times (OR = 3.030) were at risk of having METS compared with workers who were an inactive category and statistical tests showed that physical activity significantly related with the incidence of METS. These findings are in line with studies showing that the percentage of adults who do most of the sedentary activity was more at risk of developing METS. 21.4% of the participants studied had 3 or more risk factors for METS with low HDL levels as the most risk factor, Moderate-Vigorous Physical Activity (MVPA) with at least 10 minutes per session, Low Physical Activity (LPA) and body mass index explained 16% HDL variation.

Sleep Duration

Sleep duration was not significantly related with METS. Sleep was recognized as an important mediator in an individual’s health status. Given that the number of short and long sleep gradually increases. The results of this study are not in line with some studies that have reported that short sleep hours (generally less than 6 hours per day) or long (generally more than 8-9 hours per day) sleep duration was associated with an increased risk of chronic diseases such as obesity, hypertension, diabetes, and METS. Several studies have reported that short sleep duration was associated with an increased risk of METS, but conversely, long sleep duration was not associated with METS.

In this study, there was no association between short sleep hours and long sleep hours with METS. This was due to the working hours arranged by the company so that very few workers work overtime or leave early. Workers who live in the company accommodation can go straight back home to rest, and workers living outside the company accommodation are provided with shuttle buses so that they return home on time. With a working system like this, it was very possible for a person to return to his place of residence and immediately rest.

Knowledge

Worker’s knowledge was measured using a questionnaire that contained several questions about METS. None of this research results are suitable for groups that are not with METS. The results show that no difference in the scores of knowledge in the group who had METS and did not have METS. This was in line with Kamso et al (2011) research on the groups in Jakarta who see the level of education as the uniqueness of the METS. In the study, there was no significant relationship between education and METS. This was in contrast to several studies that have shown that the level of education has a significant relationship with METS.

Previous studies show that women have a lack of understanding of diet and exercise in reducing CVD. One way to reduce CVD incidence was to improve adherence to healthy lifestyles by educating, filtering, detecting and treating the modifiable risk factors because women do not practice heart-healthy behavior on a regular basis. This attributed to their limited knowledge and lack of attention and knowledge to CVD which can lead to poor motivation to change behavior.

Conclusion

Dietary pattern, sleep duration, and knowledge were not related to METS. Factor contributed to METS in miners based on the results of was physical activity. Promotion and preventive controls are needed to prevent the METS in population. The researcher suggests performing screening of METS in all workers to find out the magnitude of the problems that occur in the company. It is necessary to improve physical activity and exercise.
programs for workers who had METSand all workers.

Conflict of Interest

Hereby the authors declared that there is no conflict of interest in this research with any other parties.

Ethical Clearance

This research has been approved by Ethical Board Committee, Faculty of Public Health University Indonesia and has been approved for ethical clearance by Ethical Board Committee, Faculty of Public Health University Indonesia.

Acknowledgment

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References


Analysis Of Employee Performance Appraisal System In Primary Health Care

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Abstract

Performance appraisal is an important tool used in measuring the framework established by the organization along with employees. Performance appraisals are useful for monitoring individual performance in order to stay on track to meet organizational goals and to identify individual development capabilities and opportunities. In addition, performance appraisal is also to assess whether organizational goals are achieved and function as future organizational planning and development. A study on the evaluation of performance appraisal system was conducted at Cukir Primary health care, Jombang District. Respondents in this study were all Civil Servants working in primary health care. The instruments used were questionnaires and interviews. The results showed that the performance appraisal system at Cukir Primary health care has been carried out periodically, in accordance with the vision and mission of the institution, and has accurate content and objectives. Respondents identified a gap in the performance appraisal system that no appropriate rewards were given to employees, the appraisal system was not fully explained to the employee, no feedback was given to the employee and the employee was not involved in the formulation of standards and performance targets. It is suggested that the leadership must review the implementation of performance appraisal system at Cukir Primary health care. Performance appraisal should have a positive impact on organizational well-being. If the performance appraisal is done well, then the productivity and performance of employees will increase.

Keywords: Performance Appraisal, Employee Performance Indicators, Primary health care

Introduction

The success of the organization depends on the quality and characteristics of the employees. Employees become an important factor in any organization because without employees, a simple organization can not achieve its goals and objectives1. The long-term success of an organization or company depends on its ability to measure its employee’s performance and use the measurement information for the basis of performing performance improvement efforts in order to always conform to the established standards and the changing demands of the business environment. So the strategic approach of human resource management is to link the organization’s goals with employee performance. Organizational strategic goals are part of the performance management process and implemented in the performance appraisal process. Performance appraisal is a stage of job evaluation that can improve the quality of work for the continuity of organizational activity in it4. Performance appraisal is an important task of the organization, so that the organization knows the extent to which employees are successful or not in the work during the specified period.
From the results of the assessment can be seen organizational performance is reflected by the performance of employees because the performance is a real behavior that displayed each person as work performance generated by employees in accordance with its role in the organization.

Many organizations have implemented performance appraisal systems as key method of development and performance improvement. However, it should also be evaluated whether the performance appraisal system implemented is accurate, effective and of good quality and in line with the organization’s objectives. It is also important to identify the weaknesses or weaknesses of the performance appraisal system and to make continuous improvement efforts to meet organizational goals.

The Government regulates the performance appraisal system for civil servants in Government Regulation Republic of Indonesia number 46 of 2011 on Performance Appraisal of Civil Servants. In the regulation mentioned that the performance appraisal of civil servants is a systematic assessment process undertaken by the appraisal officer against employee work sasarn and employment behavior of civil servants. Employee Work Objectives, hereinafter abbreviated job performance indicators is the work plan and targets to be achieved by a civil servant.

Target is the amount of work load to be achieved from every job performance. Assessment of the performance of civil servants aims to ensure the objectivity of coaching.

Cukir Primary health care is the operational technical officer of Jombang District Health Service in the field of public health services led by a head of the primary health care responsible to the head of the department. The number of human resources at Cukir Primary health care is 80 people, with details of 40 civil servants and 40 non-civil servants.

Performance appraisal is conducted regularly at Cukir Primary health care that is once a year. However, the implementation of performance appraisal applies only to civil servants. Non-civil servants have never conducted performance appraisals. Implementation of performance appraisal is still many shortcomings, among others: employees are not involved in the preparation of standards and performance targets, not monitored in the performance appraisal process, employees do not get feedback or feedback performance appraisal results, and performance appraisals are not used as a basis of reward, training and development needs, planning analysis of human resource needs.

Material and Method

This method of this research was an observational study with cross sectional study design used questionnaires analyzed descriptively. The case study was conducted at Cukir Primary Health Care of Jombang Regency using total sample of all Civil Servants working in Cukir Primary health care which amounted to 40 people.

Researchers distributed questionnaires about performance appraisal system to all civil servants at Cukir Primary health care. The results of the data from the questionnaire were analyzed to determine the knowledge of civil servants (employees) on the performance appraisal system that has been implemented in Cukir Primary health care.

Results and Discussion

Cukir is one of 34 Primary health care in Jombang district. In accordance with the Regent Regulation of Jombang No. 21 of 2012 Cukir Primary Health Care is located as an operational technical implementer of Jombang District Health Office in the field of public health services led by a head of the primary health care responsible to the head of the department. The number of human resources at Cukir Primary health care is 80 people with details of 40 civil servants and 40 local contract workers and puskesmas contracts.

Performance appraisal has been done at puskesmas but only for civil servant. Every civil servant has an employee performance indicator that is evaluated at the end of each year. For non civil servants, there is no performance appraisal method conducted by the head of primary health care. So in this study the questionnaire only provided for civil servants who numbered 40 people. The results are shown in the table below:
Table 1. Knowledge and The Importance of Performance Appraisal in Cukir Primary Health Care in 2018

<table>
<thead>
<tr>
<th>KNOWLEDGE AND IMPORTANCE OF PERFORMANCE APPRAISAL</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of PA</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Participation on PA</td>
<td>4</td>
<td>10.0</td>
<td>2</td>
<td>5.0</td>
<td>7</td>
</tr>
<tr>
<td>Evaluate employee performance over a certain period</td>
<td>7</td>
<td>17.5</td>
<td>6</td>
<td>15.0</td>
<td>4</td>
</tr>
<tr>
<td>Decisions the gap between actual and expected performance targets</td>
<td>17</td>
<td>42.5</td>
<td>16</td>
<td>40.0</td>
<td>3</td>
</tr>
<tr>
<td>Helps management in organizational control</td>
<td>12</td>
<td>30.0</td>
<td>18</td>
<td>45.0</td>
<td>2</td>
</tr>
<tr>
<td>Used to achieve organizational goals and objectives</td>
<td>9</td>
<td>22.5</td>
<td>16</td>
<td>40.0</td>
<td>6</td>
</tr>
<tr>
<td>Building strength and communication with leaders</td>
<td>7</td>
<td>17.5</td>
<td>20</td>
<td>50.0</td>
<td>5</td>
</tr>
<tr>
<td>Planning training and development needs</td>
<td>5</td>
<td>12.5</td>
<td>8</td>
<td>20.0</td>
<td>18</td>
</tr>
<tr>
<td>Effectiveness of human resource management, employee recruitment, selection and training</td>
<td>6</td>
<td>15.0</td>
<td>4</td>
<td>10.0</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 1 shows the results of knowledge and the importance of performance appraisal for the respondents. More than 80% of respondents stated that they are neutral, disagree, and strongly disagree that respondents have understood the performance appraisal system held at Cukir Primary health care. Approximately 67.5% of respondents also disagree and strongly disagree that respondents participate actively in performance appraisal conducted.

Approximately 82.5% of respondents agreed and strongly agreed that performance evaluation was conducted over a period of time, 75% strongly agreed and agreed that performance appraisals were used to determine the gap between performance performed against expected targets. 62.5% agreed and strongly agreed that performance appraisal assisted management in organizational control, 67.5% agreed that performance appraisal was a tool to achieve organizational goals and objectives, 45% of respondents stated neutral on the statement of the importance of performance appraisal in building strength and communication with leaders.

A total of 75% of respondents stated neutral, disagree and strongly disagree about the importance of performance appraisal in planning training and development needs as well as human resource planning, employee recruitment, selection and training. From the table above obtained the picture that most employees have not understood and play an active role in the implementation of performance appraisal at Puskesmas Cukir.

In addition, employees also do not know clearly about the importance of performance appraisal system is implemented periodically. This may be because performance appraisal results have not been used as a basis for training planning, development or human resource needs.

Table 2. Effect of Performance Appraisal Systems in Cukir Primary Health Care in 2018

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease of competency</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Negative stigma on employees</td>
<td>1</td>
<td>2.5</td>
<td>4</td>
<td>10.0</td>
<td>7</td>
</tr>
<tr>
<td>Decrease in salary, demotion, and dismissal of employees</td>
<td>1</td>
<td>2.5</td>
<td>2</td>
<td>5.0</td>
<td>3</td>
</tr>
<tr>
<td>Indicates the employee's weakness and failure</td>
<td>2</td>
<td>5.0</td>
<td>1</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>Subyektifitas of manager</td>
<td>10</td>
<td>25.0</td>
<td>17</td>
<td>42.5</td>
<td>4</td>
</tr>
</tbody>
</table>
Table 2 illustrates the effect of performance appraisal system on staff at Cukir Primary health care. More than 80% of employees said they disagree and strongly disagree if performance appraisals lead to a decrease in employee competence, 90% of respondents also disagree if this performance appraisal gives a negative stigma to employees.

Performance appraisal also does not provide the effect of decreasing salary, demotion, and dismissal of employees. Respondents also largely disagree if performance appraisals indicate employee weakness. However, as many as 67.5% of respondents agree and strongly agree if in the implementation of performance appraisal there is subjectivity of the leadership.

From table 2 can be obtained information that some respondents already know the effects of performance appraisal system.

The results of the performance appraisal should be used as the basis for payroll, promotion and dismissal of employees, but this has not been done in Cukir Primary health care, so some respondents still do not understand it. Performance appraisal conducted also there is still subjectivity from the leadership. This is because in the performance appraisal system of civil servants there is a performance quality assessment given by the leadership. During this time the value of the quality element is not followed by the evidence of the search used as the basis of the assessment.

Table 3 illustrates employee behavior towards performance appraisal. Approximately 75% of respondents disagree and strongly disagree with the statement that employees are afraid of performance appraisals. Most respondents also disagree on the statement that employees do not like performance appraisals. More than 75% of respondents agreed and strongly agree that poor performance appraisal is done at Cukir Community Health Center.

However, the permanent employees want performance appraisal to be carried out continuously. Respondents also disagree if performance appraisal causes employees to be uninspired in their work. From the table above can be concluded that employees have different behavior on performance appraisal. There are employees who have positive behavior but there are those who behave negatively towards performance appraisal. This may be due to the subjective subjectivity in performance appraisal held at Cukir Primary health care.

Table 4. Contribution of Performance Appraisal of Employees in Cukir Primary Health Care in 2018

<table>
<thead>
<tr>
<th>GENERAL CONTRIBUTION OF PERFORMANCE APPRAISAL</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintains the organization</td>
<td>13</td>
<td>32.5</td>
<td>17</td>
<td>42.5</td>
<td>1</td>
</tr>
<tr>
<td>Checking and balance of the company</td>
<td>12</td>
<td>30.0</td>
<td>16</td>
<td>40.0</td>
<td>4</td>
</tr>
<tr>
<td>Improved efficiency and productivity</td>
<td>8</td>
<td>20.0</td>
<td>21</td>
<td>52.5</td>
<td>4</td>
</tr>
<tr>
<td>Increased employee salary</td>
<td>5</td>
<td>12.5</td>
<td>8</td>
<td>20.0</td>
<td>8</td>
</tr>
<tr>
<td>Understanding of the duties of each employee</td>
<td>10</td>
<td>25.0</td>
<td>10</td>
<td>25.0</td>
<td>7</td>
</tr>
</tbody>
</table>
Table 4 illustrates the contribution of performance appraisals to employees and community health centers. More than 70% of respondents agree and strongly agree if performance appraisals maintain the organization. 70% of respondents also agree that performance appraisals are used as a check and balance of the firm, a similar number of respondents also agree that performance appraisals contribute to increased efficiency and work productivity.

However, most respondents did not agree that performance appraisal conducted so far is used to increase employee salaries. Respondents also agree if the performance appraisal is a tool to improve pehamaman employees against their respective duties, but the number of respondents who do not agree is also quite a lot of about 42.5%. This may be caused by the inactivity of employees in setting SKP targets and targets at the beginning of the year.

Table 5 illustrates the problem of performance appraisal system at Cukir Primary health care. From the table it is known that 90% of respondents stated that there is subjective in performance appraisal, 82.5% stated that performance appraisal is determined without feedback, 70% dissatisfied with performance appraisal system, and 85% said monitoring is still low.

From the result of the research, it is very important to improve the performance appraisal system so that the performance assessment goes objectively, there is feedback given by the leadership to the employee, the employee feel satisfied and the periodic monitoring from the leader accompanied by the evidence of the performance achievement done by the employee.

Conclusions

From the results of simple research conducted at Cukir Primary health care, it is concluded that the performance appraisal system has not been implemented optimally. Employees have not been fully involved either in the process of planning performance standards or performance appraisal processes. The lack of feedback has caused the staff of the public health care to be unaware of the performance outcome for the specified time.

Monitoring of performance appraisal should be done continuously to ensure the quality of the performance appraisal system. The author recommends improvement of performance appraisal system with method “E-Performance based on LAN (Local Area Network) at Cukir Primary health care”.

Ethical Approval: Related departments should be assured about the confidentiality of the results of questionnaires.

Conflict of Interest: The authors report no conflict of interest.

Source of Funding: Self

References


Knowledge, Attitudes of Nurses with Implementation of Patient Safety in Undata General Hospital of Central Sulawesi Province

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Abstract

The American Hospital Association (AHA) Board of Trustees stated that patient safety is a strategic priority. In 2004, the World Health Organization (WHO) launched the World Alliance for Patient Safety, a joint program with various countries to improve patient safety in hospitals. The purpose of this study is to know the relationship between knowledge and attitudes of nurses with the implementation of patient safety in Undata General Hospital of Central Sulawesi Province. The type of this research is quantitative with cross sectional approach-based analytical design. The population in this study was the team leaders and implementing nurses in the rooms of Teratai and Catelia pavilions as many as 52 people. The results of Chi Square test with a confidence level of 95% showed the result of statistical test on the knowledge of nurses concerning the implementation of patient safety was \( p=0.021 \) (\( p \) value <0.05) and the result of statistical test on the attitudes of nurses concerning the implementation of patient safety was \( p=0.025 \) (\( p \) value < 0.05). The conclusion obtained is that there is a relationship between knowledge and attitude of nurses with the implementation of patient safety in Inpatient Wards of Central Sulawesi Province’s Undata General Hospital. The hospital is expected to continuously carry out socialization, organizing better in-depth training on the concept of patient safety by emphasizing the importance of the patient safety system.

Keywords: Knowledge, Attitude, Nurse, Patient Safety

INTRODUCTION

The American Hospital Association (AHA) Board of Trustees identified that patient safety is a strategic priority. A report from the Institute of Medicine stated that there were around 3-16% of adverse events in the service of inpatients in hospitals. WHO launched the World Alliance for Patient Safety, a joint program with various countries to improve patient safety in hospitals. Patients, as the users of health services, have the right to obtain security and safety for themselves while in the hospitals1. But there are aspects that also affect the quality of services in a hospital, and it should be a big concern for the hospital as a service provider. Those aspects are patient safety. Patients not only need quality services but also an assuring condition in which the services provided are safe and do not endanger themselves2.

One of the patient safety cultures is communicating mistakes, reporting errors by sticking to patient safety and learning from mistakes and redesigning a better
patient safety system. To solve the occurring problems, an idea of a proactive analysis system was initiated as a strategy to prevent errors. Safety culture is the dominant factor in the effort to succeed in safety and the key to realize quality and safe services. Almost every medical action holds potential risks. The large types of drugs, examinations and procedures, as well as the large number of patients and hospital staffs are potential factors for the occurrence of medical errors. The occurring errors in the process of medical treatment will result in or potentially cause injury to the patient, it can be in the form of Near Miss or Adverse Events\(^3\).

Undata General Hospital of Central Sulawesi Province is a government-owned hospital. It is a top referral hospital or central hospital which getting a Perfect Pass accreditation for Type B Education hospital. This hospital is able to provide specialist and limited subspecialist medical services. This hospital also accommodates referral services from district hospitals. Preliminary studies conducted in Inpatient Wards of Central Sulawesi Province’s Undata General Hospital on 29 April to 10 May 2016 found the number of nurses in catalia ward was 26 people, and the number of nurses in teratai ward was 28 people. As the results of interview with ward chiefs and team leaders, in terms of knowledge about patient safety, the respondents stated that: patient safety is to save patients from adverse events, two respondents stated to maintain patient safety at the hospital, three respondents stated patient safety is the safety of a patient while being treated at the hospital and it must be identified first. In terms of patient safety goals: they stated that it is to avoid unwanted things to happen in order to ensure the patient’s condition is safe, but the three respondents have not yet mentioned the overall objectives of patient safety.

Whereas in terms of attitude: one respondent stated that he/she had begun to implement even though not as a whole yet, two people stated that they had tried to perform but sometimes forgot the way to implement it, the others stated that they had started to improve but there were those who still did not carry it out due to the lack of understanding, so that continuous socialization is needed.

**Method**

The type of this research is quantitative with cross sectional approach-based analytical design. Data collection was carried out on 8 January 2018 in Undata General Hospital of Central Sulawesi Province. The study used total sampling with the number of respondents reaching as many as 54 people consisting of team leaders and implementing nurses in the Teratai and Catelia Wards. During the data collection process, two respondents were forced to leave because they were taking leave.

**Operational Definition and Objective Criteria**

a. Knowledge is everything that is known, understood and applied by nurses starting from the understanding of the goals and objectives of patient safety regarding the implementation of patient safety in Undata General Hospital. The knowledge falls into ‘good’ category if the score of respondents’ answer is \(> 76\%\).

b. Attitude is the response of acceptance given by nurses in the implementation of patient safety in Undata General Hospital. The attitude falls into ‘good’ category if the score of respondents’ answer is \(> 76\%\).

c. Implementation of patient safety is an effort carried out by responsible nurses related to the implementation of patient safety in Undata General Hospital. Implemented if the answer score is 100.

**Data Collection Techniques**

Data was collected by giving questionnaires to research respondents. The questionnaire in this study consisted of: Knowledge questionnaires using 6 points (32 question items) based on gutmen scale, correct answer was given a score of 2 and wrong answer was given a score of 1. Attitude questionnaires consisted of 15 statements based on Likert scale, the answer choices are \(SS = \text{Strongly Agree}, S = \text{Agree}, TS = \text{Disagree}, STS = \text{Strongly Disagree}\). Scoring for respondents’ answers was: given a score of 4 if answering SS, score 3 if answering S, score 2 if answering TS and score 1 if answering STS. The patient safety implementation questionnaires consisted of 5 questions using the checklist sheet, observation techniques were done according to the answers of the nurses related to their activity in the room.

**Results**

1. **Relationship between Level of Knowledge and Implementation of Patient Safety**

Data collection was carried out for 10 days in Inpatient Wards, namely Teratai Ward and Catelia
Ward of Central Sulawesi Province’s Undata General Hospital. Data collection used the technique of filling out questionnaires and observation sheets. This study used chi square test with 95% confidence level. The results of the research, according to the data collected, are presented in table 1.

<table>
<thead>
<tr>
<th>Level of Knowledge</th>
<th>Implementation of Patient Safety</th>
<th>Total</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Implemented</td>
<td>Implemented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Lacking</td>
<td>4</td>
<td>80</td>
<td>1</td>
</tr>
<tr>
<td>Good</td>
<td>11</td>
<td>23.4</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>28.8</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 1 shows that 80% (4 people) of respondents with lack of knowledge and 23.4% (11 people) of respondents with good knowledge did not implement patient safety. If analyzed based on the percentage, there were more respondents with lack of knowledge who did not implement patient safety than those with good knowledge. The statistical test results obtained $p = 0.021$ (p value $< 0.05$), so that $H_a$ is accepted. It means that there is a significant relationship between the level of knowledge and the implementation of patient safety.

2. Relationship between Attitudes and Implementation of Patient Safety

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>Implementation of Patient Safety</th>
<th>Total</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Implemented</td>
<td>Implemented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Lacking</td>
<td>7</td>
<td>58.3%</td>
<td>5</td>
</tr>
<tr>
<td>Good</td>
<td>8</td>
<td>20.0%</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>28.8</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 2 shows that 58.3% (7 people) of respondents with lack of good attitudes and 20.0% (8 people) of respondents with good attitudes did not implement patient safety. If analyzed based on the percentage, there were more respondents with lack of good attitudes who did not implement patient safety than those with good attitudes. The statistical test results obtained $p = 0.025$ (p value $< 0.05$), so that $H_a$ is accepted. It means that there is a significant relationship between the attitudes and the implementation of patient safety.

Discussions

Relationship between Knowledge and Implementation of Patient Safety in Inpatient Wards of Central Sulawesi Province’s Undata General Hospital

Table 1 shows that the knowledge of nurses regarding patient safety in inpatient wards was already good, as shown by the results of the study, in which the knowledge of each respondent has been good with a total of 76.6%. The results of the statistical test using the chi square test obtained the value of $p = 0.021$ (p value $< 0.05$), which means that there is a significant relationship between the level of knowledge and the implementation of patient safety.

The results of the study showed that, out of 52 respondents, only 5 people (9.6%) had low knowledge about patient safety. Knowledge is an important factor for someone in making a decision, but someone’s knowledge cannot always avoid them from the occurrence of adverse events. For example, a nurse who has good knowledge does not always carry out patient safety properly because all actions that will be taken are at risk of errors.

Based on the results of observation, such condition was influenced by the compliance of a nurse with the Standard Operating Procedure (SOP) that had been given, leadership role of the leader (Head of Hospital Nursing Division) who continued to monitor and evaluate the actions taken by each implementing nurse, as well as good communication between the ward chief and implementing nurses and also among the implementing nurses in each inpatient ward.

Knowledge is the result of “knowing” and it happens after someone has sensed a certain object. Knowledge is the dominant thing that is very important in the formation of one’s actions. According to the experience of several
studies, it turns out that actions which are not based on a good knowledge will not produce good results. Knowledge is obtained from a collection of information that is systematically connected to each other, so that it has a meaning. Information obtained from data that has been processed (sorted, analyzed and displayed in a form that can be communicated through words, graphics or tables), so that it has meaning. Furthermore, this data will be owned by someone and will be stored in the neurons (becoming a memory) of their brain.

In accordance with previous research by Bawelle, there is a relationship between knowledge of nurses and the implementation of patient safety in inpatient wards of Tahuna City’s Liun Kendage Hospital with \( p=0.014 \). According to the research, knowledge is an important factor for someone in making a decision. The results of another study, which also concerning the relationship between knowledge of nurses and the application of JCI standards regarding patient safety by Ginting (2014), showed a significant relationship between those variables, namely knowledge of nurses and the application of JCI standards regarding patient safety with research results of \( p=0.00 \).

Relationship between Attitudes and Implementation of Patient Safety in Inpatient Wards of Central Sulawesi Province’s Undata General Hospital

The results of the study in Table 2 show that the attitudes of nurses related to patient safety in inpatient wards have been good, as shown by the results of the study where the attitudes of each respondent has been good with an overall number of 80.0%. The results of statistical test using the chi square test obtained the value of \( p=0.025 \) (p value <0.05), which means that there is a significant relationship with the implementation of patient safety.

According to the analysis results, 80.0% of nurses have a good attitude towards the implementation of patient safety in the hospital. According to the researcher, there is a relationship between attitude and implementation of patient safety because it can be seen in the results of the study, in which less than half of the respondents or only 12 people (23.1%) had a good attitude regarding patient safety. Based on researcher’ observation, this condition is influenced by the compliance and responsibility of each implementing nurse over the patient’s safety itself.

An attitude does not necessarily manifest in an action (overt behavior) automatically. To actualize an attitude into a real action, it needs supporting factors or allowing conditions, among others is the facility.

According to Bogardus in Azwar, attitude is a kind of readiness to react to an object in certain ways. The readiness in question is a potential tendency to react in a certain way if an individual is faced with a stimulus that requires a response. Allport in Azwar explained that attitude has 3 main components, namely: Belief in ideas and concepts of an object, emotional life or evaluation of an object, and a tendency to behave. These three components together form a total attitude. This complete attitude determination, including knowledge, thoughts, beliefs, and emotions, plays an important role.

Patient safety is a procedure or process in a hospital that provides safer patient services. It is influenced by the knowledge and application of the implementing nurses who prioritize the interests and safety of the patients. This patient safety procedure greatly guarantees quality improvement of a hospital because a hospital can be assumed to be good if the service for patient safety is also good. The first step to improve quality services is safety, while the key to quality and safe services is by developing a patient safety culture. According to Mitchell in Hughes, nurses are a key in developing quality through patient safety. The effort to build patient safety requires commitment which is influenced by knowledge of the nurses. Nurses who have good knowledge of patient safety certainly have a good attitude in improving quality of health services. This is supported by Majid (2011) who argued that knowledge is the basis of attitude, while attitudes will lead to one’s actions.

Conclusion

This study concludes that there is a relationship between knowledge, attitudes and implementation of nurses with the implementation of patient safety in Central Sulawesi Province’s Undata General Hospital, in which all of them fall into ‘good’ category. The hospital is expected to continuously carry out socialization, organizing better in-depth training on the concept of patient safety by emphasizing the importance of the patient safety system. In addition, the responsible nurses are expected to be able to apply the procedures of patient safety targets in accordance with the Operational Standards of the hospital.
Research Permit

This study did not require ethical clearance because there is no treatment on the respondent. Research only equipped with a research permit from the campus (Public Health Faculty Tadulako University) with the number 2467/UN28.1.30/KP/2018 and from the Undata general hospital.

Conflict of Interest

The authors declare no potential conflict of interest in this research.

Acknowledgement

The authors grateful to all of those whom have had pleasure participated and supported this research.

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1. Indonesian Ministry of Health. Regulation Number 44 in 2009 Concerning Health and Hospital.
2. Indonesian Ministry of Health. Regulation Number 1691 in 2011 Concerning the Safety of Hospital Patients.
Evaluation Factors for Non Medical Treatment Failure Patients Tuberculosis Lung Health in Children on Makassar City

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2Department of Nutrition, Makassar Health Polytechnic, Indonesia

Abstract

The purpose of the study, known factors associated with treatment failure patients Tuberculosis in children. The method used is an observational design, cross-sectional study intended to determine the factors associated between the independent variables (independent) and dependent variable (dependent) with the identification of all the variables. Both of these variables can be seen at the time of execution simultaneously. The findings in this study found that low education, low knowledge and disobedience taking drugs is a factor that has a strong risk of treatment failure patients with pulmonary tuberculosis in children, while family support only protective factor (prevention) and not a risk factor for treatment failure patients with TB in children, The conclusion showed that the variables influencing the failure of treatment of TB patients is variable education and knowledge has a value of OR unchanged at 22.752 in CI 95% to the value of the lower limit (LL) = 1.032 and Upper limit (UL) = 501.786 with a significance level of 0.048 <0.05.

Keywords: pulmonary tuberculosis, failure, treatment, children.

Introduction

In 1993 the WHO to declare TB as a global health emergency, because it is a major health problem worldwide cause of morbidity in millions of people each year and recommends the DOTS strategy as a strategy to control TB. TB is regarded as a community health problem of the world despite efforts to control the DOTS strategy has been implemented since 1995 by the WHO report in 2015, in 2014 there were 9.6 million cases of pulmonary tuberculosis in the world, 58% of TB cases are in Southeast Asia and the Western Pacific Region and 28% of cases are African. In 2014, 1.5 million people worldwide die from TB. Tuberculosis is second only to Human immunodeficiency virus (HIV) as an infectious disease that causes most deaths in the world’s population. Indonesia is a country located in Southeast Asia with the second largest number of TB cases in the world after India14. In 2014 TB cases in India and Indonesia, respectively, are 23% and 10% of cases. Based on the WHO report in 2015, the prevalence of TB cases in Indonesia in 2014, including HIV, 647 per 100,000 population1,3.

According to the Global Tuberculosis Report WHO14, estimated the incidence of tuberculosis in Indonesia in 2015 amounted to 395 cases / 100,000 population and a mortality rate of 40 / 100,000 population (of HIV patients with TB are not counted) and 10 / 100,000 population in HIV patients with tuberculosis.models,according to calculations Prediction based on data tuberculosis prevalence survey 2013-2014. Estimates of the prevalence of tuberculosis in 2015 amounted to 643 per 100,000 population in 2016 and estimates as high as 628 per 100,000 populations1,5.

The incidence of pulmonary tuberculosis is still very high and difficult lowered, this was due to tissues non-medical such as; poverty, poor nutritional state, hygiene, low low purchasing power, low education cause
failures and delays in getting a diagnosis.

Although widely available in TB treatment, but current TB treatment failure remains a major health problem worldwide. Therefore, the objective of this study was to evaluate the non-medical factors that influence the rate of treatment failure patients with tuberculosis (TB) in children Lung Health Center.

Material and Method

This study is a quantitative research with cross sectional approach which has been conducted on June-September 2017 in four health centers in the region of Makassar. The population in this study was all mothers of children (aged 5-18 years) who received treatment of pulmonary tuberculosis at the sites. The samples of this study were all patients within 4-6 months of treatment. Our inclusion criteria are Sementra Tuberculosis patients in treatment, willing to become respondents and the age of 5 -18 years, so that a sample size of 42 respondents, taken by total sampling technique.

Data collection instrument was a questionnaire for respondents observe TB treatment failure. Questioners made by researchers and have tested the validity and reliability using the values of $r$ and $\alpha$ values obtained cronbach of 0.82-4. The method of data collection in this study with a total sampling where the entire population of the research sample4.

Data analysis was performed with the statistical test Ratio Prevalence (RP). RP is characterized by a value of the confidence interval (confidence interval) which will determine whether the ratio of the prevalence of significant or not with the parameters: if the confidence interval passes (not including) the number 1 on the starting point, then the risk factors are meaningfully and if the confidence interval below (cover) number 1 at the starting point, it is not a significant risk factor4. Interpretation of the results of the ratio of prevalence at a value confidence interval (CI) is also based on the value ratio Prevalence (RP) with the parameters: if $RP = 1$, meaning that the independent variable is not a risk factor, if $RP>1$ and CI does not include numbers 1, meaning that the independent variable is a risk factor and if $RP <1$, CI no caps a numeral 1, which means that the independent variable is a protective factor or a deterrent. Data processing was performed using SPSS for Windows.

Findings

This study aimed to evaluate the role of non-medical factors against TB treatment failure in Makassar City Regional Health Center. Of the 42 respondents, the majority were in the age group 16 to 18 years (40.5%). Distriubsi sexes, male 25 respondents (59.5%) and women 17 respondents (40.5%). Most of the respondents graduated from high school (junior and senior) of 27 respondents (64.3%).

Table 1. Distribution Compliance factors of Tuberculosis disease in children in the health center of Makassar City Period from June to September 2017

<table>
<thead>
<tr>
<th>Compliance Factors</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Drug Compliance</td>
<td>None obedient.</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Obedient.</td>
<td>25</td>
</tr>
<tr>
<td>Family support</td>
<td>Does not support</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Supports</td>
<td>25</td>
</tr>
<tr>
<td>Treatment failure</td>
<td>failure</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>No failure</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 2. Children Education Level on Tuberculosis Treatment failure at Puskesmas Minasa Upa, Batua Raya, Antang Perumnas and Antang Makassar City, Period June-September 2017

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Failure Treatment</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No School / Non Graduated</td>
<td>9</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Graduate and graduated of Elementary</td>
<td>21.4%</td>
<td>14.2%</td>
<td>35.7%</td>
</tr>
<tr>
<td>Secondary Education (junior and senior)</td>
<td>2.4%</td>
<td>61.9%</td>
<td>64.3%</td>
</tr>
</tbody>
</table>

Table 3. The level of knowledge of the Children on Tuberculosis Treatment Failure at Puskesmas Minasa Upa, Batua Raya, Antang Perumnas and Antang Makassar City, period June - September 2017

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Treatment Failure</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>21.4%</td>
<td>14.3%</td>
<td>35.7%</td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>2.4%</td>
<td>61.9%</td>
<td>64.3%</td>
</tr>
</tbody>
</table>
Table 4. Obedience with taking medication with Tuberculosis Treatment Failure Rate at Puskesmas Minasa Upa, Batua Raya, Antang Perumnas and Antang Makassar City, period June - September 2017

<table>
<thead>
<tr>
<th>Obedience Rate</th>
<th>Treatment Failure</th>
<th>Number</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Not obedient</td>
<td>9</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>21.4%</td>
<td>19%</td>
<td>40.5%</td>
</tr>
<tr>
<td>Obedient</td>
<td>1</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>2.4%</td>
<td>57.1%</td>
<td>59.5%</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>32</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>23.8%</td>
<td>76.2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 5. Support the family on the children with Failure rate Tuberculosis treatment at Puskesmas Minasa Upa, Batua Raya, Antang Perumnas and Antang Makassar City, period June - September 2017

<table>
<thead>
<tr>
<th>Failure treatment</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Support</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>16.7%</td>
<td>23.8%</td>
</tr>
<tr>
<td>No support</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>71%</td>
<td>52.4%</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>23.8%</td>
<td>76.2%</td>
</tr>
</tbody>
</table>

Table 6. Effect of Education, knowledge, not obedience, and family support to toward Tuberculosis Failure Treatment Rate at Puskesmas Minasa Upa, Batua Raya, Antang Perumnas and Antang Makassar City, period June - September 2017

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>B</th>
<th>p</th>
<th>Exp (B)</th>
<th>for Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>3,125</td>
<td>.048</td>
<td>22 752</td>
<td>1,032</td>
</tr>
<tr>
<td></td>
<td>501 786</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>3,125</td>
<td>.048</td>
<td>22 752</td>
<td>1,032</td>
</tr>
<tr>
<td></td>
<td>501 786</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obedience</td>
<td>2,920</td>
<td>.049</td>
<td>18 538</td>
<td>1,007</td>
</tr>
<tr>
<td></td>
<td>341 215</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>-.339</td>
<td>.823</td>
<td>0,712</td>
<td>0,036</td>
</tr>
<tr>
<td></td>
<td>13 964</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Data analysis of the 42 respondents obtained through data collection in the health center: Minasa, Batua, Antang and Housing Antang Makassar, the results are as follows:

a. Education Level

Table 9. Shows Bivariate analysis of test results that the value of OR = 39,000 with CI = 95%, P-Value = 0.001 < 0.05, and UL LL = 4.116 = 369.510. The value of RR = 16,200, LL = 2.266 and the value UL = 115.841 does not include the value of 1, then it is said to be meaningful and Ho rejected. Results of multivariate analysis showed the educational value of 22.752 with a level of 95% (P = 0.048 < 0.05) value LL = 1.032 and the value UL = 501.786 does not include the number 1. The test results of bivariate and multivariate test results both showed that education has an influence very strong against pulmonary TB treatment failure in children.

Research\(^1\) explains that the duration of TB treatment should be carried out for 6-8 months. Duration of time can cause the patient to become bored and impatient and cause undisciplined and disorganized to take medication that failed in the treatment, but for patients who have a good knowledge will continue to take medication appropriate treatment program. Further\(^10,11,12,13\) explains that the failure of the treatment and cure TB patients contribute directly to the knowledge acquired through education\(^9,14\).

Education can influence attitudes and behavior of someone who is a product of a learning process carried out consciously. Higher education for someone to be able to change the mindset formed a unified awareness in order to change a healthier lifestyle in everyday life. Although the level of education does not always directly Luru with TB disease yng enough education means not always a determinant of treatment success absoluteness of someone who is suffering from tuberculosis disease or illness Another\(^6,12,13\).

b. Level of knowledge

Shows the results of analysis test Bivariat that the value of OR = 39,000 with CI = 95%, P-Value = 0.001 > 0.05, the value LL = 4.116 and the value UL = 369.510, the value of RR = 16,200, the value LL = 2.266 and the value UL = 115.841 not menckup value of 1, then it is said to be meaningful and Ho rejected. Multiavriat test results show the value of the knowledge of 22.752 with a level of 95% (P = 0.048 < 0.05), values LL = 1.032 and the value UL = 501.786 does not include the number 1. Thus both bivariate and multivariate testing both show
that the level of knowledge has a very strong influence of treatment failure.

Knowledge is the result of the know and this occurred after people perform sensing on a particular object\(^9\),\(^11\). Knowledge is very important in shaping the mindset, attitudes and behavior and actions of a person. Health knowledge can help individuals to adapt to the disease, preventing complications and learn to solve problems when faced with a new situation.

Knowledge of TB patients about the disease are factors that affect the incidence of TB suffered by a patient, therefore, a good knowledge of the illness will make the patient aware and determined to do what should be done and so is what should not be done so as to maintain and avoid events worse, and when not protecting and maintaining health, in line with the research. Instead minimal knowledge about the illness, can not in itself raise awareness for the need for regular medical treatment. Within their health development goals to improve public health\(^5\),\(^7\),\(^8\).

c. Noncompliance Drink Drugs

Results show that the value of \(OR = 27.00\) with 95% CI, 0.004 P-Value, the value LL = 2.946 and the value UL = 247.487. The value of \(RR = 13.235\), value LL = 1.842, the value UL = 95.093 does not include the value of 1, then it is said to be meaningful and \(H_0\) rejected. Results of multivariate analysis showed noncompliance value of 18.538 with a level of 95% \((P = 0.049 <0.05)\) value LL = 1.007 and the value UL = 341.215 does not include the number 1. Both bivariate test results multivariate testing results show that the non-compliance has to take medicine strong influence on lung TB treatment failure in children while suffering from tuberculosis.

Compliance TB patients take medication regularly and on time is a crucial factor in the healing process Tuberculosis\(^13\). Compliance includes: schedule time to take medication, taking medications according to the number, type of drug, the dosage is in etiquette drug, drug spending, came to the health center regularly taking medication before the medicine runs out and always remember the advice of health officials. In line with the research that has been done by Muniroh et al that the results show the value of P-Value = 0.001 \((P <0.05)\).

The high rates of treatment compliance due to the high level of motivation, education and knowledge, and understand the importance of health; it is also inseparable from the patient’s awareness of the importance of healthy living. which says that the use of Anti-Tuberculosis Drugs (OAT) improper / irregular or interrupted treatment can lead to drug resistance of Mycobacterium tuberculosis\(^3\),\(^5\),\(^8\),\(^10\). The other variable factors cause patients do not regularly seek treatment even stopped the treatment prematurely, namely the emergence of drug side-effects such as vertigo, nausea, vomiting and headache, which eventually gives rise to non-compliance, trust factor, factor bustle and lacking / not understand the reaction of the drug in the body. TB treatment takes a long time (4-6 months) to achieve healing and with a guide (a combination of) several kinds of drugs, so it is not uncommon patients stop taking medication before the treatment is completed which resulted in treatment failure\(^1\),\(^6\),\(^10\),\(^12\).

Conclusion

There is a relationship with the education level of TB disease treatment failure in bivariate and multivariate analysis at 95% confidence showing OR value and the value of LL and UL> 1 so that the level of education is a risk factor for TB disease treatment failure in children.

There is a relationship with the knowledge level of TB disease treatment failure in bivariate and multivariate analysis at 95% confidence showing OR value and the value of LL and UL> 1 so that a low level of knowledge of a risk factor for TB disease treatment failure in children.

There is a relationship Take medication adherence with treatment failure of TB disease, the bivariate and multivariate analysis at 95% confidence showing OR value and the value of LL and UL> 1 so that non-compliance with taking medication is a risk factor for TB disease treatment failure in children.

There is no family support relationship with TB disease treatment failure, the multivariate analysis showed 95% CI indicates the value of OR and LL and UL<1 so that family support is a protective factor rather than as a risk factor for TB disease treatment failure in children.

Conflict of Interest Statement

This study there was no conflict of interest between the researcher and the subject.
Source of Funding

This research was funded independently by researchers, because they did not get sponsorship from other institutions.

Ethical Clearance

This study received ethical recommendations from the health research ethics commission of the Makassar Health Polytechnic No. 390/KEPK-PTKMK/S VII/2017.

References


Challenges in Performance Enhancement – Work Related Variables, Performance Link in Indian Manufacturing Sector

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Abstract

Producing of quality products at a reasonable cost mainly depends on the employees enhanced performance. Organizations keen in evaluating the factors most related to enhancement of performance. This study explores the link between the work related factors like work environment, organization commitment and training and development with performance of employees in ceramic sanitary ware factories in India. A sector which is unattended in the context of employee performance. It also verifies relative significance of the factors. Statistical tools were used for analysis. Findings reveal that all the three factors are positively linked to the performance enhancement and training and development is the strongest predictor and work environment is the weakest. Implications, suggestion for future research discussed.

Keywords: Work environment, Organization commitment, Training and Development, performance of employees, performance enhancement

Introduction

The success and failure of an organization mostly relied on the performance of work force in the present competitive business environment. Since Organization’s development is mostly relied on the employees performance as it affects profitability\(^1\) and lack of required performance affects organization’s survival\(^2\), better performance is very important for overall organizational improvement.\(^3\) As economies of business get more complex people, productivity will become an important criterion leading to more pressure on under performers.

World bank alsoindicated thatIndian needs to improve manufacturing sector performance to return to high growth path\(^4\). Industrialization provides more opportunities for high performers job-hops, organizations are necessarily to enhance performance of existing employees. This induced Indian companies to declare war on under performers and performance enhancement become a major challenge for manufacturing industries to find out all possible ways to improve their employee’s performance. Several researchers on performance of employees had been carried out and work related variables like work environment\(^5\), organization commitment\(^6\), training and development\(^7\), performance appraisal\(^7\), engagement and leadership\(^8\) are closely associated with performance enhancement.

This study analyze the linkage of work environment (WE), training and development (T&D) and organization commitment (OC) on performance of employees, working in ceramic sanitary ware factories in India, a sector which is unattended in the context of employee performance (EP), though this industry contributes substantially to national income and provide employment to considerable number of work force and tries to fill-in the gap in the literature.

Motivation to Research

Ceramics is a diverse industry and contains several categories of products, including sanitary ware. Ceramic segment has recorded remarkable growth in the last 20 years and emerged as a major producer and supplier in the world market. The Indian Ceramic

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Industry ranks at 8th position in the world and produces around 2.5% of global output. The industry provides employment to 550,000 people, of whom 50,000 are directly employed and accounted for 13% growth and valued approximately INR 10,000 crores in year 2017. Availability of abundant raw materials and availability of labours for lesser pay and opportunities exists in the sanitary ware market, attracted manufacturers and paved way for the new comers to start manufacturing units and also guided the leading players to expand their units in India.

These are all increased the requirement of workforce and performance enhancement of employees has become a major issue to be tackled by this industry and to ascertain the factors which can increase the performance of employees.

**Review of Literature**

**Organization commitment and Employees Performance**

Commitment creates psychological links between organizational goals and employees goals and results in better performance. Because of desirable outcomes organization commitment is gaining more attention now-a-days for the people and organization. It is an emotional reaction towards organization policies and satisfaction over organization policies increases employee’s dedication to work, in turn improves performance. The previous studies relating to organization commitment and performance of employees given evidence that there exists positive relationship between them. The above findings gives evidence that organization commitment is an important factor closely related to employee performance and the hypothesis is as follows.

\[ \text{H1: OC will be positively related to employee performance} \]

**Work environment and Employees Performance**

Motivating environment is necessary to utilize employee’s full potential, and work environment increases employee’s job satisfaction level, consequently the achievement of organization goals. The right environmental factors, both physical and Psychosocial will lead to increased performance and in manufacturing sector also there exists positive impact on employees performance. Several researchers on working environment establish a positive relationship with employee performance.

From the previous studies it is concluded that working environment is an important determinant of employee’s performance and hypothesis is follows

\[ \text{H2: WE will be positively related to employee performance} \]

**Training And Development and employee performance:**

Training improves skills and efficiency of employees results in improved performance hence organizations are investing on training program which will be justified by greater productivity.

Numerous researchers given evidence that training is closely linked to performance of employees as it prepares employees to do the work as desired by the organization. According to, employees technical skills inter personal skills and solid knowledge for performing their works effectively and efficiently increased by training and lack of training results in low performance. Thus T&D plays a recognized role for both work and personal improvement and significant positive relationship with EP.

From the previous studies it is concluded that T&D is an important determinant of employee’s performance and hypothesis is follows

\[ \text{H3: T&D will be positively related to employee performance} \]

**Methodology**

**Sample and procedure**

The study focuses on ceramic sanitary ware factories in India. Given the difficulties in getting permission researcher successfully received permission from 5 factories located in different places in India. After arriving total sample size as 550 and also size for each factory, questionnaire were distributed to employees by researcher with the help of some HR staffs during break hours and 416 usable questionnaire were received back, representing a response rate of 75%. The selection of the respondents was based on the simple random sampling. Around 81% of the respondents were of 25-45 age group and 73% of them possess post graduate and professional qualification while 57% of the respondents falls under
5-15 years of experience. Regarding designation, middle level managers were dominating in the industry and majority of them belong to production department.

**Measurement**

Independent variables proposed in this study are WE, OC and T&D. The outcome variables is EP. Totally 24 questions exists in the questionnaire besides questions related to personnel details.

Work environment was measured utilizing 5 items adopted from\(^\text{23}\). The example items are “overall this organization is a harmonious place to work” and “workers and management get along in this organization”. The reliability coefficient (α) for the items is 0.707 which is above the acceptance level of 0.700 and provides support to the items.

Training and Development was measured using 7 items adopted from\(^\text{24, 23}\). The reliability coefficient for the items (α = 0.800) gives good level of support to the items. Example items are “I have the opportunity to be involved in activities that promote my professional development” and “people are properly oriented and trained upon joining this organization”.

Organization commitment items were adopted from\(^\text{25}\), that consists of 9 items. The reliability coefficient (α = 0.846) gives good level of support to the items. Examples items are “for me this is the best of all possible organizations for which to work” and “I find that my values and the organization’s values are very similar”.

Finally employee performance was measured using 3 items adopted from\(^\text{26}\). Example items are “I met formal performance requirements” and “I performed all tasks that were required of me”. The reliability coefficient for the items is 0.703 which is above acceptable limit of 0.700. Respondents were asked to respond the questionnaire on a likert- scale range from 1- 5, 1 = strongly disagree and 5 = strongly agree. Statistical package for the social sciences (SPSS) has been employed for analyzing the data’s collected.

All the items were subjected to an assessment of content validity as per the procedure described by.\(^\text{27}\) A correlation matrix (item by item) of the data was calculated and that matrix was subjected to principle component analysis. A commonly used rule specifies that only variables with loadings greater than 0.40 on a factor should be considered “significant” and used in defining that factor. The factor loadings of all the items were above 0.40 with no major cross loadings and taken for analysis.

**Results**

Table 1. Mean standard deviation and Cronbach’s alpha & correlation of proposed factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>Cronbach</th>
<th>S.D</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Work environment</td>
<td>21.72</td>
<td>0.707</td>
<td>1.98</td>
<td>1</td>
<td>0.672**</td>
<td>0.735**</td>
</tr>
<tr>
<td>2 Organization commitment</td>
<td>38.58</td>
<td>0.846</td>
<td>3.67</td>
<td>0.672**</td>
<td>1</td>
<td>0.718**</td>
</tr>
<tr>
<td>3 Training and development</td>
<td>30.17</td>
<td>0.800</td>
<td>2.68</td>
<td>0.735**</td>
<td>0.718**</td>
<td>1</td>
</tr>
<tr>
<td>4 Employee performance</td>
<td>12.91</td>
<td>0.703</td>
<td>1.28</td>
<td>0.565**</td>
<td>0.702**</td>
<td>0.612**</td>
</tr>
</tbody>
</table>

**p<0.01, \*p<0.05, **p<0.01**

Table 1 represents mean standard deviation, Cronbach’s alpha and correlation matrix of the proposed factors. The alpha co efficient varies from 0.703 to 0.846 concurs with minimum acceptable value of 0.700\(^\text{28}\). There exists correlation among all the variables and ranges from 0.565 to 0.735. Further all the proposed factors are significantly related to EP.

Table 2. Multi linear regression analysis of employee performance on proposed factors [n = 416]

<table>
<thead>
<tr>
<th>Factors</th>
<th>p</th>
<th>Standardized beta</th>
<th>t</th>
<th>R</th>
<th>Adjusted R(^2)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>work environment</td>
<td>0.045*</td>
<td>0.088</td>
<td>1.674</td>
<td>0.721</td>
<td>0.516</td>
<td>148.748**</td>
</tr>
<tr>
<td>Organization commitment</td>
<td>0.006**</td>
<td>0.177</td>
<td>3.148</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training and development</td>
<td>0.002**</td>
<td>0.515</td>
<td>9.999</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p< 0.05, **p<0.01
To determine the relationship between proposed factors and EP, all the factors regressed simultaneously and the results are tabulated in Table 2. As shown in Table 2, the proposed factors exhibit significant amount of variance in EP ($R^2 = 0.516, p=0.000$). The proposed factors WE and OC were significant predictors of EP and provide support to the hypothesis $H_1$, $H_2$. The strong predictor is T&D ($\text{beta} = 0.515$) and the weak is WE($\text{beta}=0.088$).

**Discussion**

The purpose of this study was to check the impact of WE, OC and T&D over EP among employees of ceramic sanitary ware factories in India.

The Multi linear regression proposing EP as dependent variable and the proposed factors as independent variables show that all the three factors are positively related to employee’s performance. Employees are influenced by present day business environments and this will have reasonable impact on the factors influencing EP. The result of the study indicates that proposed factors explained 51.6% of variance in EP. This signifies that all the proposed factors are influential and crucial and need to be given top priority for better performance of employees. The findings that indicates T&D as the strongest predictor of EP coincides with earlier findings of and can be justified as follows. Training improves skills of employees and training program shapes the employees to work efficiently and effectively to reach the goals of organization results in monetary benefits to employees - This also emotionally induces to work hard, simultaneously increasing their Performance.

The next permanents factor is OC and coincides with, since committed employees feel that they are members of organization and organization is interested on them and this attitude makes them to work sincerely exerting utmost efficiency and this act as a driving force for their better performance.

The next predominant factor positively related to EP is WE and this coincides with previous findings of and this may be due to the fact that employees, while joining, to unfold their capabilities expect favorable working condition. Positive perception towards availability of such favorable working conditions, gives them satisfaction, which leads to dedication in their work, consequentially improves performance.

In summary HR managers need to extent their support to the factors T&D, OC and WE to improve employee’s performance.

**Conclusion, Implication and Future Study**

Although, performance enhancement is very essential, only few studies were carried out in Indian manufacturing industries and practically no research was carried out in the fast growing ceramic sector and this research fills the gap.

The findings provide empirical evidence that T&D, OC and WE are positively related to performance of employees of ceramic sanitary ware factories in India. The research also reveals that T&D is stronger predictor and weaker predictor is work environment. Factory managers are advised to take all measures to provide needed training programs to employees along with providing favorable working conditions. Also periodical meetings may be conducted to generate better understanding and relationship with employees. Future study is proposed for conducting research on other manufacturing industry and using other variables for getting more specific results.

**Conflict of Interest Statement:** NIL

**Statement of Informed consent:** NIL

**Source of Funding:** NIL

**References**


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Reliability and Validity of WHOQOL-BREF into Indonesian Version as a Measure of Quality of Life of Tuberculosis Patients

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Abstract
Tuberculosis is one of the infectious disease as a public health problem in Indonesia. Tuberculosis causes high pain, disability, and a high level of death. This causes the quality of life of Tuberculosis patients. The WHOQOL-BREF is a special instrument which was widely used to measure the patients’ quality of life. The objective of this study was to assess the validity and reliability the Indonesian version of WHOQOL-BREF for measuring quality of life of Tuberculosis patients. A descriptive cross-sectional design with 30 subjects was conducted at Duren Sawit Public Health Center, East Jakarta, DKI Jakarta, Indonesia. Data collection was carried out on 11 to 15 of July 2017. The validation process included internal consistency, discriminant validity and construct validity. All of the domains met the reliability criteria (Cronbach-\(\alpha\) was \(\geq 0.6\)). The results showed the \(r\) table value>0.361 and the value of Cronbach's Alpha=0.880. The score distribution of each domain from WHOQOL-BREF is symmetrical and there is no floor or ceiling effect. Internal consistency, discriminantand construct validity shows good results from the fourth domain score.

Conclusions: The Indonesian version of WHOQOL-BREF is a valid and reliable questionnaire for measuring the quality of life of Tuberculosis patients.

Keywords: Indonesia.WHOQOL-BREF, Tuberculosis, Validation.

Introduction
Tuberculosis is a diseases that affects many people in the world. In 1992, the World Health Organization (WHO) declared TB as a “Global Emergency”\(^{(1)}\). In Indonesia, Tuberculosis is a disease as the highest contributor to the disease burden. Tuberculosis can affect the patients’ quality of life (QOL), such as psychological, physical, social functioning\(^{(2)}\).

WHO compiled the WHOQOL-BREF which is a short version of WHOQOL-100 that consists of 24 facets covering 4 domains (physical health, psychological, social relationships, and environment) and also measures 2 facets of QOL (overall QOL and general health)\(^{(3)}\). Although the WHOQOL-BREF has been used in 23 other countries\(^{(4)}\), the use of WHOQOL-BREF for Tuberculosis patients is still not widely practiced, especially in Indonesia. The Quality of life of Tuberculosis patients is very important to note because this infectious disease is chronic which has a wide impact on all aspects of life. Chronic illness not only affect the individuals concerned but also the whole family\(^{(5)}\).

With the differences in ethnicity, culture, and language background, it is considered very important to evaluate validity and reliability of WHOQOL-BREF in the Indonesian version. This study aims to assess the validity and reliability of the WHOQOL-BREF to measure the QOL of Tuberculosis patients.

Material and Method
Subjects of this study were patients who diagnosed as new pulmonary Tuberculosis patients bacteriological confirmed at Duren Sawit Public Health Center, East Jakarta, DKI Jakarta, Indonesia, aged more than 15 years,
which had complete medical records and is willing to be a research respondent by signing an informed consent.

The study was carried out using a cross-sectional design. The technique of obtaining samples is by purposive sampling, that is, every Tuberculosis patients at Duren Sawit Public Health Center, which fulfills the research criteria is selected and included as research respondents. Data collection is carried out by 11 enumerators who have received training. The types of data collected are primary data, namely quality of life and other variables related to research. Data collection was conducted on 11-15 of July 2017.

Frequency analysis performed to illustrate the characteristics of respondents. The domain and facets of WHOQOL-BREF data was presented as descriptive data with means and standard deviations (SD), floor and ceiling effects. The floor and ceiling effect>20% of the sample size was significant, indicating that the measurement was limited to a few questions from WHOQOL-BREF\(^{(6)}\).

Internal consistency of each domain was assessed using Cronbach’s Alpha and the contribution of each question to the total Alpha. The Cronbach’s Alpha value is calculated by comparing the r table value for a sample of 30 respondents (r=0.361) with the corrected item-total correlation value\(^{(7)}\) and the reliability test results by looking at the Cronbach’s Alpha value (cut off point=0.6)\(^{(8)}\). The discriminant validity is carried out to determine the ability of the score of each domain to distinguish healthy and unhealthy respondents, tested by using the t-test\(^{(9)}\). According to Hair JF., et al. as cited by Ch. SalimO, et al.\(^{(10)}\) construct validity is tested by using principal component analysis to assess this questionnaire is valid as a questionnaire to measure the QOL. Each question must have a minimum loading factor value of ±0.3. Factor loading ±0.4 is more important (loading), loading >±0.5 is practically significant. Furthermore, the eigenvalue value was used to explain the variations of the question item of the domain, the eigenvalue of >1.0 is meaningful.

Findings

The Indonesian version of the WHOQOL-BREF was created as instruments to measure QOL of Tuberculosis patients. The WHOQOL-BREF in original version was developed as a general psychometric properties by WHOQOL group that would be applicable cross-culturally\(^{(5)}\).

Subjects in this study were new pulmonary Tuberculosis patients bacteriological confirmed at Duren Sawit Public Health Center. Table 1 presents the subjects’ characteristics in this study. Subjects analyzed consisted of 13 (43.3%) men and 17 (56.7%) women and age ranged from 19-69 years with a mean of 40.1 years (SD=14.7). The formal education is mostly 17 (56.7%) with high school education and only 1 (3.3%) uneducated. A total of 14 (46.7%) employed and 16 (53.3%) unemployed. Most married 22 (73.3%) and 8 (26.7%) were not married/divorced/widowed.

Table 1. Subjects Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>25-34</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>35-44</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>45-54</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>55-64</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td>&gt;65</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Elementary</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Junior High School</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>High School</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>Academy/Collage</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>Unemployed</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Material Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Single/Divorced/Widowed</td>
<td>8</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Table 2 shows that the mean score of the physical health was 3.2 (SD=0.8), the psychological was 3.6 (SD=0.7), the social relation was 3.4 (SD=0.8) and the environmental was 3.4 (SD=0.6). The value for each domain, the median value is close to the mean value, this means that the distribution of the values of each domain is almost symmetrical approaching the normal distribution. The percentage of floor and ceiling values for each domain is quite low (<20%) ranging from 2.1-18.9%.
Table 2. Mean, SD, Floor and Ceiling Effect

<table>
<thead>
<tr>
<th>Domain and Facet</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>% floor</th>
<th>% ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of life in general</td>
<td>3.4</td>
<td>1.1</td>
<td>4.0</td>
<td>10.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Quality of health in general</td>
<td>2.8</td>
<td>1.0</td>
<td>3.0</td>
<td>10.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Physical Health</td>
<td>3.2</td>
<td>0.8</td>
<td>3.2</td>
<td>5.7</td>
<td>12.9</td>
</tr>
<tr>
<td>Psychological</td>
<td>3.6</td>
<td>0.7</td>
<td>3.8</td>
<td>2.2</td>
<td>18.9</td>
</tr>
<tr>
<td>Social relations</td>
<td>3.4</td>
<td>0.8</td>
<td>3.7</td>
<td>3.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Environment</td>
<td>3.4</td>
<td>0.6</td>
<td>3.5</td>
<td>2.1</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Table 3 present the Cronbach’s Alpha coefficient of the magnitude domain ranges from 0.742 to 0.860; physical health, psychological, social and environmental domains show strong internal consistency (>0.60). If compare with the r table value for a sample of 30 respondents (r=0.361) with the corrected item-total correlation value, it can be seen that the value is corrected item-the total correlation is all >0.361.

Table 3. Internal Consistency

<table>
<thead>
<tr>
<th>Domain and facet</th>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.880</td>
<td>0.863</td>
<td></td>
</tr>
<tr>
<td>1. Physical Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>0.843</td>
<td>0.639</td>
<td></td>
</tr>
<tr>
<td>Dependence on medical aids</td>
<td>0.862</td>
<td>0.535</td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>0.850</td>
<td>0.583</td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>0.856</td>
<td>0.539</td>
<td></td>
</tr>
<tr>
<td>Sleep and rest</td>
<td>0.836</td>
<td>0.687</td>
<td></td>
</tr>
<tr>
<td>Activities of daily living</td>
<td>0.830</td>
<td>0.741</td>
<td></td>
</tr>
<tr>
<td>Work capacity</td>
<td>0.830</td>
<td>0.762</td>
<td></td>
</tr>
<tr>
<td>2. Psychological</td>
<td>0.821</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive feeling</td>
<td>0.828</td>
<td>0.461</td>
<td></td>
</tr>
<tr>
<td>Personal belief</td>
<td>0.741</td>
<td>0.841</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>0.811</td>
<td>0.492</td>
<td></td>
</tr>
<tr>
<td>Bodily image</td>
<td>0.833</td>
<td>0.475</td>
<td></td>
</tr>
<tr>
<td>Self-esteem</td>
<td>0.745</td>
<td>0.790</td>
<td></td>
</tr>
<tr>
<td>Negative feeling</td>
<td>0.798</td>
<td>0.566</td>
<td></td>
</tr>
<tr>
<td>3. Social Relations</td>
<td>0.742</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 presents the results t-test of the discriminant analysis. Discriminant analysis shows that there are significant differences in mean domains of psychology, social and environmental relations between healthy and unhealthy respondents. The mean score of the physical health domain in the unhealthy respondents was lower than in the healthy ones, but not statistically significant.

Table 4. Mean, standard deviation and t-test of discriminant validity

<table>
<thead>
<tr>
<th>Domain</th>
<th>Health Status</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy(n =10)</td>
<td>Unhealthy (n = 20)</td>
</tr>
<tr>
<td>Physical Health</td>
<td>37.1 ± 0.61</td>
<td>2.91 ± 0.81</td>
</tr>
<tr>
<td>Psychological</td>
<td>4.05 ± 0.29</td>
<td>3.36 ± 0.79</td>
</tr>
<tr>
<td>Social relations</td>
<td>3.87 ± 0.23</td>
<td>3.23 ± 0.94</td>
</tr>
<tr>
<td>Environment</td>
<td>3.76 ± 0.34</td>
<td>3.25 ± 0.64</td>
</tr>
</tbody>
</table>

* p < 0.05

Table 5 shows that all WHOQOL-BREF question items have a factor loading value >0.5, meaning that the question is meant to be included in the domain.
Table 5. Loading Factor from Each Item of WHOQOL-BREF

<table>
<thead>
<tr>
<th>Domain/ Item WHOQOL-BREF</th>
<th>Factorloading</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3. Physical pain prevents activity</td>
<td>0.731</td>
</tr>
<tr>
<td>P4. Dependence on medical treatment for daily life</td>
<td>0.640</td>
</tr>
<tr>
<td>P10. Energy for everyday life</td>
<td>0.702</td>
</tr>
<tr>
<td>P15. Able to get around</td>
<td>0.675</td>
</tr>
<tr>
<td>P16. Sleep satisfaction</td>
<td>0.782</td>
</tr>
<tr>
<td>P17. Satisfaction to perform daily living activities</td>
<td>0.846</td>
</tr>
<tr>
<td>P18. Satisfied with capacity to work</td>
<td>0.852</td>
</tr>
<tr>
<td><strong>Domain Psychological</strong></td>
<td></td>
</tr>
<tr>
<td>P5. How much enjoying life</td>
<td>0.628</td>
</tr>
<tr>
<td>P6. How far does life feel meaningful</td>
<td>0.924</td>
</tr>
<tr>
<td>P7. Able to concentrate</td>
<td>0.649</td>
</tr>
<tr>
<td>P11. Accept body appearance</td>
<td>0.616</td>
</tr>
<tr>
<td>P19. Self-satisfaction</td>
<td>0.881</td>
</tr>
<tr>
<td>P26. Have negative feelings</td>
<td>0.719</td>
</tr>
<tr>
<td><strong>Domain Social Relations</strong></td>
<td></td>
</tr>
<tr>
<td>P20. Satisfied with personal relationships</td>
<td>0.899</td>
</tr>
<tr>
<td>P21. Satisfied with sex life</td>
<td>0.873</td>
</tr>
<tr>
<td>P22. Satisfied with social support</td>
<td>0.683</td>
</tr>
<tr>
<td><strong>Domain Environment</strong></td>
<td></td>
</tr>
<tr>
<td>P8. Feeling safe in daily life</td>
<td>0.735</td>
</tr>
<tr>
<td>P9. Healthy physical environment</td>
<td>0.837</td>
</tr>
<tr>
<td>P12. Enough money to meet needs</td>
<td>0.541</td>
</tr>
<tr>
<td>P13 Availability of information</td>
<td>0.693</td>
</tr>
<tr>
<td>P14. Leisure activities opportunity</td>
<td>0.602</td>
</tr>
<tr>
<td>P23. Satisfied with the living place</td>
<td>0.825</td>
</tr>
<tr>
<td>P24. Satisfied with access to health services</td>
<td>0.830</td>
</tr>
<tr>
<td>P25. Satisfied with transportation</td>
<td>0.708</td>
</tr>
</tbody>
</table>

P = question number

Table 6 shows the eigenvalue of all four domains >1, which means that the question items from all four domains can explain the domain. Overall these four domains are meant to explain the variation of the items of the WHOQOL-BREF questions of 53.1-67.9%.

Table 6. Eigenvalue and Percentage Each Domain of WHOQOL-BREF

<table>
<thead>
<tr>
<th>Domain</th>
<th>Number of questions</th>
<th>Principle Component Analysis</th>
<th>% Varian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Health</td>
<td>7</td>
<td>3.944</td>
<td>56.349</td>
</tr>
<tr>
<td>Psychological</td>
<td>6</td>
<td>3.342</td>
<td>55.699</td>
</tr>
<tr>
<td>Social relations</td>
<td>3</td>
<td>2.037</td>
<td>67.884</td>
</tr>
<tr>
<td>Environment</td>
<td>8</td>
<td>4.245</td>
<td>53.062</td>
</tr>
</tbody>
</table>

Discussion

Based on findings above, women were more found than men in distribution of Tuberculosis patients. Previous study in Pakistan by Codlin AJ., et al. (11) also found more women as Tuberculosis patients than men. According to Nurjana MA. (12), the proportion of Tuberculosis sufferers was found to be almost comparable between male (1.9%) and female (1.8%).

The age of productive patients (15 - 54 years) in this study was 22 years (73.3%). Similar results with research of Hafidah Z., et al. (13) stated that 70% of Tuberculosis patients were in productive age. Ministry of Health Republic Indonesia (1) states that risk factors for pulmonary Tuberculosis are in the productive age (15-54 years).

Formal education of respondents in this study mostly 17 years (56.7%) have the high school education and only 1 (3.3%) uneducated. This result is in accordance with previous research conducted by Adnan, et al. (14), Tuberculosis patients are found at the high school level (45.9%). Likewise also stated by Hafidah Z., et al. (13), that 35% of Tuberculosis patients have high school education. The higher the education of a person, the better knowledge of Tuberculosis, so they can prevent it from being infected and have treatment efforts when infected with Tuberculosis (15).

Respondents in this study were 14 (46.7%) employed and 16 (53.3%) unemployed. The same study by Abror I., et al. (16), 77.3% of Tuberculosis patients do not work after illness. Research conducted by Tinartayu S., et al. (17) also found that the most patients with pulmonary Tuberculosis (72.2%) did not have a permanent job.

Respondents in this study mostly married 22 (73.3%) and 8 (26.7%) were not married/divorced/widowed. In a previous study in Aceh by Hafidah Z., et al. (13), showed that there were many Tuberculosis patients who are married (80%). Research by Abrori I., et al. (16) also found 59.1% of married Tuberculosis patients and 18.2% were unmarried and 22.7% divorced.

In this study, the floor and ceiling effects for each domain are quite low (less than 20%) ranging from 2.1-18.9%. This picture shows that the response of the Tuberculosis patients to the 26 questions of WHOQOL-BREF quite well. A questionnaire must produce a minimal floor and ceiling effect so that it can be recommended to measure a phenomenon (4).
The WHOQOL-BREF shows good internal consistency values, where the Cronbach’s Alpha coefficient of the magnitude domain ranges from 0.742 to 0.860; physical health, psychological, social relation and environmental domains show strong internal consistency (>0.60). The Cronbach’s Alpha coefficient value for each item ranges between 0.828-0.862 for the physical health, 0.741-0.833 for the psychological, for the social relations ranges from 0.529-0.843 and 0.831-0.862 for the environmental. Cronbach’s Alpha value is low (<0.60) if the domain consists of only a few questions. The social relations domain consists of only 3 questions while the physical, psychological and environmental domains consist of 6-8 questions. Non-different results were shown in the study conducted by Ch. Salim O., et al. (10) for the elderly who got the Cronbach’s Alpha coefficient value for each social domain item ranging from 0.10 to 0.69. The results of this study show overall WHOQOL-BREF is reliable (consistent) to measure the QOL in Tuberculosis patients.

Discriminant analysis shows the average score of all four domains in healthy Tuberculosis patients is greater than in those who are unhealthy. Studies conducted in Taiwan(18), in 23 other countries(4) and Ch. Salim O, et al.(10) in Jakarta showed consistent results, WHOQOL-BREF is a valid questionnaire to measure a person’s QOL.

Most of the questions from WHOQOL-BREF have a factor loading value >0.5, meaning that the question is meant to be included in the domain. The four domains of WHOQOL-BREF were able to explain variations of data collected by 53.06-67.88%. These four domains are able to present one’s overall QOL(19). The distribution of the 26 questions from WHOQOL-BREF was symmetrical and the results showed that the WHOQOL-BREF was valid and reliable to measure the QOL in Tuberculosis patients.

Conclusion

Characteristics of Tuberculosis patients were more on productive age, female, high school education, unemployed and married. Overall WHOQOL-BREF is a valid and reliable questionnaire for measuring the QOL Tuberculosis patients. In each domain of the WHOQOL-BREF, the distribution of scores is almost symmetrical and there is no floor or ceiling effect.

Conflict of Interest: The author(s) declare that they have no conflict of interest.

Source of Funding: No funding source for the research.

Ethical Clearance: The ethical clearance has been endorsed by The Health Research Ethic Committee, Faculty of Public Health Indonesia University.

References


Relationship Individual Factors with Sickness Absence in Hospital

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²Department of Occupational Health and Safety, School of Public Health, University of Airlangga.

Abstract

Background: Workers in health industries are more likely to have health problems. Health problems may result in sickness absence. High rate of sickness absence can decrease productivity and consumer satisfaction.

Objectives: To analyse individual factors with types of sickness absence.

Method: Retrospective study design. Data collection was done using secondary data in the form of sickness absence data report of hospital in 2017. A binary logistic regression test was used to identify the significance of correlation of age, sex, years of service and marital status correlation with types of sickness absence.

Results: Of 416 workers, 100 people submitted 163 sickness absence letter with the total of 653 days. Women workers with age range of 26-45, who were married and with 5 years of service were the group with the most sickness absence. Short term sickness absence was the most common type. The results of multivariate binary logistic regression showed that age (p value = 0.659 and Exp (B) = 0.783), sex (p value = 0.929 and Exp (B) = 0.945), years of service (p value = 0.620 and Exp (B) = 0.866), marital status (p value = 0.773 and Exp (B) = 0.837) variables were not significant.

Conclusion: There is no significant relationship between individual factors and type of sickness absence.

Keyword: sickness absence, workers, hospital

Introduction

Based on Canadian Institute for Health Information (CIHI) in 2000, workers in health care are 1.5 times more likely to call in sick or leave work on disability compared to workers in industries other than health care. The average duration of 11.8 days of sickness absence is higher than workers in other fields which is 6.7 days.¹

Unhealthy workers are prone to sickness absence. Sickness absence is divided into 2 types. Short term sickness absence (fewer than 4 days) and long term sickness absence (longer than 4 days). Short term sickness absence is more common than the long term one. Long term sickness absence is generally caused by serious or severe illness.³ It is important therefore to identify individual correlation factors with the types of sickness absence.

The objective of this study is to analyse the individual correlation factors with the types of sickness absence of workers in hospital X in 2017.
Method

This type of research is an observational analysis study with a retrospective research design. The population is workers who call in sick in hospital in Malang, Indonesia. During the period of 2017, the total number of workers was 416 people with 100 workers submitted sickness absence, amounting to 163 sick letters (spell) and 653 days of sickness absence. The research variables studied included the characteristics of workers, namely age, sex, years of service and marital status, and types of sickness absence. Data collection was carried out using secondary data in the form of hospital worker’s sickness absence data in 2017. The data obtained were analyzed descriptively using cross tabulation. Binary logistic regression test was used to test the significance of parameters in a multivariable manner.

Findings

The frequency distribution of hospital workers by age can be seen as follows (see Table 1). Based on table 1 it can be seen that 56 people (56%) who submitted sickness absence were in the age group between 26 to 45 years.

<table>
<thead>
<tr>
<th>Age</th>
<th>Total (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-25</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>26-45</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td>&gt;45</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 2 shows that 79 workers (79%) who called in sick were women.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>Men</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 3 shows that 73 workers (73%) who called in sick were married.

<table>
<thead>
<tr>
<th>Status</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>Unmarried</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 4 shows that 61 workers (61%) who called in sick had years of service of less than 5 years (see Table 4).

<table>
<thead>
<tr>
<th>Years of Service</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 5 years</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>6 – 10 years</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Most of the workers (79%) submitted short term sickness absence (see Table 5).

Nagelkerke R Square in Table 6 shows a value of 0.16 or 16%. This means that the dependent variable can be explained by 16% independent variables. That is, all independent variables affect the dependent variable simultaneously in the range of 16%, while 84% are influenced or explained by variables not included in this study.

Table 6. Model parameter estimation test

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101,728(a)</td>
<td>.011</td>
<td>.016</td>
</tr>
</tbody>
</table>

It can be seen in Table 7 that the p-value (sig.) is more than 0.05, meaning that age, years of service,
marital status and sex not significantly influence the types of sickness absence.

**Table 7. Univariable Significance Test Results**

<table>
<thead>
<tr>
<th></th>
<th>S.E.</th>
<th>P Value</th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Age</td>
<td>.554</td>
<td>.659</td>
<td>.264</td>
</tr>
<tr>
<td>Years of Service</td>
<td>.291</td>
<td>.620</td>
<td>.490</td>
</tr>
<tr>
<td>Marital status</td>
<td>.618</td>
<td>.773</td>
<td>.249</td>
</tr>
<tr>
<td>Sex</td>
<td>.637</td>
<td>.929</td>
<td>.271</td>
</tr>
<tr>
<td>Constant</td>
<td>1,402</td>
<td>.793</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

As many as 56% of workers who submitted sick letters were aged 26-45 years. This is consistent with a cross sectional study conducted on 1200 workers by Sorevi et al (2013) at Mazandaran university hospital, where the frequency of sickness absence was most common among workers aged 38 - 41 years.\(^{(4)}\) Likewise, the study conducted by Isah et al (2008) concluded that the number of sickness absence was significantly correlated with the age of workers.\(^{(5)}\)

Of the 100 people who submitted sick letters, 79% of them were women. This is consistent with a 602 nurse cross sectional study in Brazil in 2008-2012 conducted by Marques et al (2015) which stated that 92.9% of sickness absence were female nurses.\(^{(6)}\) According to Kurniawidjaja (2010), female workers, especially those who are married, are more often called in sick because they have multiple roles, that is, aside from work duties, they also have to provide domestic services to their children and husbands, plus the role of educating children so that they have no problems in their studies.\(^{(6, 7)}\)

About 73% of those who called in sick were married. According to Kurniawidjaja (2010), sickness absence of married workers is related to household problems such as divorce, children and workload. In fact, women who are married have a higher sickness absence or absenteeism in general, and non-medical factors are thought to contribute.\(^{(7)}\)

Workers with the years of service less than 5 years submitted most sick letters, amounting to 61%. This is consistent with the research of Linggarwati et al (2017) which stated that workers with short years of service will be more likely to be absent which may be because they are still adjusting to the environment and workplace conditions. Workers who have worked for years have better attendance because they do not need to adjust to the environment or working conditions.\(^{(8)}\) According to Kurniawidjaja (2010), workers with longer years of service usually have fewer sickness absence than those who have worked for less than a year, presumably because older workers have better working relationships.\(^{(7)}\)

79% of workers submitted short term sickness absence. This is in accordance with Kurniawidjaja’s opinion which stated that 80-90% of sickness absence are short-term ones. Usually, short-term sickness absence is acute and mild in nature, such as diarrhea, red eye disease, common cold or sore throat. However, if it occurs 12 times or more in one year, for example 3 to 6 times in 3 months, the risk factors and pattern need to be analyzed both medically and non-medically.\(^{(7)}\) The study conducted by Tripathi et al (2010) on 385 nurses in India concluded that two-thirds of sickness absence were short-term absences and this was attributed to the low morale of workers.\(^{(9)}\)

Based on variable statistical test, age, years of service, gender and marital status did not significantly influence the types of sickness absence. This was consistent with studies conducted by Mollazadeh et al (2018) in hospital workers in Iran, which concluded that there was no correlation between sex and marital status with workers’ absenteeism.\(^{(3)}\) This result is also supported by a research conducted by Linggarwati (2017) concluding that sickness absence does not have a significant relationship with age, gender, years of service and level of education. From the results of statistical tests, the variables of age, years of service, gender and marital status have an effect of about 16%, while 84% are influenced or explained by variables not included in this study.\(^{(6)}\) According to Kurniawidjaja (2010) there are 3 factors influencing sickness absence, which are individual factors, geographical factors and organisational factors.\(^{(7)}\) The unanalysed factors of this study include geographical factors, comprising of climate, ethnicity, epidemic, insurance system, retirement age. While organisational factors include company scale, work type, occupational hazard, work shift, personal policy, health facility and industrial relationship. While the individual factors that have not been analyzed from this study are job satisfaction, distance of travel to work, social activities.
Conclusions

Based on the results of the analysis it can be concluded that there is no significant relationship between individual factors with the types of sickness absence. Limitations in this study are limited to only a few individual factors. Subsequent research will be better if it is complemented by the inclusion of variables of organizational factors and geographical factors in the analysis of sickness absence.

Conflict of Interest Statement: The authors of this research declare that there is no conflict of interest related to this study.

Source of Funding: All funds used to support this research comes from the researchers themselves.

Ethical Clearance: Because it uses secondary data using an ethical test is not needed.

References

Does E-health have a role to play in HIV-AIDS programmes?

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Abstract

The new buzz word in the healthcare industry is Electronic health or E-health. This plays an important role in making services more accessible and person-centred, as well as improving the operations and financial efficiency of health systems. Unequal access to technology means not everyone can benefit from e-health initiatives, so addressing its limitations is also important. E-health interventions can benefit clinicians and patients, enabling outreach to key populations and improving the exchange of information between health service providers and their patients.

Keywords: HIV-AIDS; Electronic health or E-health

Background

Global new HIV infections have declined by just 18% in the past seven years, from 2.2 million in 2010 to 1.8 million in 2017. Although this is nearly half the number of new infections compared to the peak in 1996 (3.4 million), the decline is not quick enough to reach the target of fewer than 500,000 by 2020. E-health interventions are already being used within the global HIV response. Telehealth or telemedicine refers to a practice whereby technology is used to enable a health worker to interact with an individual when they are separated by distance. The uses of digital games that include elements of game playing (gamification) are rapidly becoming an important tool for improving health behaviours and supporting the delivery of care and education. Social media, such as Facebook, Twitter and YouTube, provide interactive platforms for individuals, communities and organisations to share and discuss content, debate issues and promote new ideas.

Methodology

A retrospective literature review of all available local South African data on E-health was conducted to assess enablers and barriers to its use in HIV-AIDS clinics and programmes. Data reviewed showed various levels of E-health utilisation in HIV-AIDS programmes. SMS notifications were common often used as adherence reminders for treatment compliance. Social media was also a key player with interactive programmes for awareness and education campaigns aimed at HIV-AIDS.

Findings

The digital divide of barriers and limitations to technology and e-health in HIV programming is growing exponentially as several patients and service providers make e-health practises part of their daily lives. E-health holds significant benefits to consumers aimed at their disease education, awareness and advocacy. There are also significant benefits to clinicians aimed at enhancing networking and collaboration on difficult patients. A potential drawback of e-health is loss of human contact which is preferred by certain healthcare providers and their patients. It is important to also single out the potential cost and accessibility of internet access to all within their reach. New technologies and new applications of technologies open up a whole range of possibilities for the HIV response with the potential to be extremely effective if they are designed, used and targeted properly. Finally the potential legal issues coupled with privacy issues are also potent reasons for correct corporate governance regarding e-health and programme management, in particular for HIV-AIDS programmes.
Discussion

The use of E-health in HIV-AIDS programmes can result in the generation of tools, frameworks and approaches toward holistic integrated HIV-AIDS care and prevention. If appropriately implemented within the correct regulatory and governance channels-health can be a very beneficial tool to allow optimal treatment outcomes for healthcare workers and patients alike.

Conclusion

E-health has the potential to revolutionise HIV-AIDS healthcare and assist in achieving the UNAIDS Millennium Development goals. It is important to ensure the correct implementation of E-health platforms to allow early gains to be made in the HIV-AIDS prevention arena.

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Competing Interests: NIL

Funding: Durban University of Technology as part of the primary author’s doctoral thesis.

Ethical Clearance: Durban University of Technology as part of the primary author’s doctoral thesis.

References

A Feasibility Literature Review, to Explore the Need to Undertake a Study, to Assess the Level of Knowledge and Awareness of HIV Pre-exposure Prophylaxis (PrEP) as an HIV Prevention Modality, Among Young Adults Attending Institutes of Higher Learning in Durban, Kwa-Zulu Natal, South Africa

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Abstract

HIV-AIDS is an alarming health concern both globally and locally which continues to increase, despite efforts to curb the epidemic. The rate of new infections is the greatest in the younger age group between 18-35 years of age with women being more infected than men. In the absence of a cure for the disease, the mainstay of clinical management involves adherence to lifelong anti-retro viral (ARV) therapy. Another integral component in trying to decrease new HIV infections is enhancing HIV-AIDS prevention modalities. These approaches have grown through the years and range from local to systemic forms either singly or in combination with other therapies. An emerging potentially viable option is Pre-exposure prophylaxis (PrEP). This form of therapy is the ingestion of a type of ARV on a daily basis by an HIV-Negative individual to remain HIV free. There are several clinical trials ongoing and past that have shown efficacy for use in adults and primarily in young adults. The rollout of PrEP as prevention modality globally has commenced and South Africa stands on the brink of roll out for high risk and young adults through the South African Department of Health ARV treatment programme. It is thus imperative that a study to explore the level of knowledge and awareness of HIV pre-exposure prophylaxis (PrEP) as an HIV prevention modality among young adults occurs in order to assess readiness for implementation in order to identify potential challenges with recommendations for smart practices.

Key words: HIV-AIDS; Pre-exposure prophylaxis (PrEP).

Background

South Africa is home to one-sixth of the world’s population living with HIV and has the largest antiretroviral therapy (ART) programme in the world. ART roll out began nationally in late 2003. By the middle of 2008, 568,000 adults and children were receiving ART, and, at present, over 1.5 million children and adults receive antiretrovirals every day. The latest treatment guidelines recommend earlier initiation of therapy for certain patients, thus increasing the numbers eligible for ART and widening the gap between those in need of treatment and those receiving it. Global efforts to end HIV-AIDS have spanned since almost 20 years and still any form of a cure or effective HIV prevention modality remains at large. The newly coined term of HIV-AIDS combination prevention approaches have been shown to increase HIV-AIDS programme effectiveness. These combination prevention packages utilise a variety of prevention mechanisms to best suit the patient and the community concerned, in order to develop a tailor made intervention approach to curb the HIV incidence in that particular community. Several studies have shown that antiretroviral drugs prevent HIV infection. Treatment for prevention in particular provides hope...
as a promising new HIV prevention technology that can empower women to protect themselves from HIV-AIDS\(^2\). The new anti-retroviral drug, Tenofovir, alone or in combination with 200 mg of Emtricitabine can decrease the chances by 50% or more among persons with high adherence to the regimen, with demonstrated efficacy in men who have sex with men, heterosexuals, and injection-drug users\(^3\). Pre-exposure prophylaxis (PrEP) is a daily course of antiretroviral drugs (ARVs) that can protect HIV-negative people from HIV before potential exposure to the virus\(^5\). PrEP has been registered in South Africa for at risk populations and is available at most public health clinics for the general population. Given the high risk of HIV infection among young adults in South Africa, it is imperative to gauge the level of awareness, acceptability and use among young adults in South Africa.

**Methodology**

A retrospective literature review of all available local South African data on PrEP was conducted to assess enablers and barriers to the use of PrEP in young adults in South Africa in order to explore to explore the need to undertake a study, to assess the level of knowledge and awareness of HIV pre-exposure prophylaxis (PrEP) as an HIV prevention modality, among young adults attending institutes of higher learning in Durban, Kwa-Zulu Natal, South Africa.

**Findings**

PrEP is a novel and new area of HIV prevention that will be rolled out to young adults however a paucity of data exists in the level of education, awareness and advocacy in this age group. It is imperative for new studies to be undertaken to inform key decisions regarding education and awareness for this group as well as other institutes of higher learning. Information from these studies can also be provided to the South African National AIDS council in order to inform policy changes as required.

**Discussion**

A great deal can be gleaned from a unique study exploring attitudes and behaviours of young adults attending institutes of higher learning with regard to PrEP. A study of this nature can result in the generation of tools, frameworks and approaches toward holistic integrated HIV-AIDS care and prevention.

**Conclusion**

PrEP is an important tool in the fight against HIV-AIDS especially in the young generation. It is important that surveys, knowledge and awareness studies are conducted to ascertain the gap requiring further enhancement and empowerment to ensure a healthy and productive younger generation.

**Acknowledgements**

Durban University of Technology as part of the primary author’s doctoral thesis.

**Competing Interests:** NIL

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**Ethical Clearance:** Durban University of Technology as part of the primary author’s doctoral thesis.

**References**

Husband's Role Related To Wife's Antenatal Care

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2Department of Obstetrics and Gynaecology, Faculty of Medicine, Airlangga University
3Department of Health Promotion and Behavioral Science, Faculty of Public Health, Airlangga University

Abstract

Husband’s involvement is essential in overcoming the problem of being late in recognizing signs of danger, making decisions and reaching health care facilities, as well as getting help from health services. Therefore, husband’s involvement facilitates the preparation of labor and seeks for emergency care if needed. Regular check-ups during pregnancy are crucial for detecting risks, so that health experts can carry out antenatal care, prevent complications during pregnancy, so that health experts in health facilities can help and conduct referrals as well as early treatment if obstetric complications occur at the referral site. This study is to analyze the relationship between husband's role and antenatal care. This research is an observational analytic research. This research used cross sectional approach. The data was obtained through interview using questionnaires. The analysis were descriptive and chi-square. Results indicate that the majority of husband and wife respondents are in reproductive age, working husbands, housewives, low education, and there is no relationship between husband's role and antenatal care. Provision of information to husband and family needs to be constantly improved take care of mother and baby health.

Keywords: Husband's role, Antenatal care, Maternal health, Husband's involvement

Introduction

Maternal Mortality Rate in Indonesia still has not reached the 2015 MDGs (Millennium Development Goals) target. It was 305 while the MDGs target was 102 per 100,000 live births1. Sustainable Development Goals (SDGs) is the continuity of Millennium Development Goals (MDGs) on the 3rd purpose of SDGs, which is Good Health. Mother and baby should not die because the actual causes can be prevented. In 2030, MMR is expected to be 70 per 100,000 live births.

Maternal deaths are preventable through access to good antenatal care (ANC). The huge burden of maternal mortality and morbidity and the health systems challenges call for community involvement and strong family or partner support along the continuum of maternal care pathway. One such essential approach is birth preparedness and complication readiness in antenatal care.2

Husbands have an important role to play in antenatal care. The role of husbands in antenatal care should include knowledge of key danger signs during pregnancy, labor and childbirth, and during the postpartum period. Other roles include identifying transportation and health facility, arrangement for a skilled birth attendant, saving money for delivery and emergency, arrangement for blood donor, accompanying wife and making postpartum readiness plan for both the mother and the baby.3

Attention has long been drawn to the absence of men from previous reproductive health initiatives, although men play a major role in influencing women’s reproductive health. Pregnancy and childbirth is regarded as exclusively women’s affair in developing countries. And a male partner is rarely seen at antenatal care. Harsh, critical behavior and language used by health providers, financial constraints, lack of space
to accommodate male partners at ANC clinics, long waiting time during ANC services and opening hours for ANC clinics are associated with poor male participation in ANC attendance. In addition, men have social and economic power, and have more control over their partners. Involvement of male partner becomes even more critical in maternal health services to raising their awareness and engaging them in antenatal care. So this research’s aims is to analyze the relationship between husband’s role and antenatal care.

Materials and Method

This research is an observational analytic research. This research used cross sectional approach. This research was conducted from August to September 2018 in Lumajang Regency, precisely at Gucialit Sub-district, Yosowilangun Sub-district and Ranuyoso Sub-district. Simple random sampling was used to select 221 respondents, namely husbands and their spouse who had just given birth within the past 1 year. Data on husband’s role and ANC were measured by using questionnaires. Questionnaires’ validity and reliability were tested. In examining the relationship of husband’s behavior and ANC, bivariate analysis was conducted by using chi-square with a 95% confidence interval and a significance level of p <0.05.

Findings

Table 1 indicates that the majority of respondents are husbands (67.9%) and wives (69.7%) aged 20-35. Husbands (52.5%) and wives (48.9%) are elementary school graduates. Majority of husbands (97.3%) work and wives (52.9%) do not work or housewives. Husbands have poor knowledge (66.1%) and moderate attitude (86.6%).

Table 1. Respondent Characteristics

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Respondent</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Husband Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>20-35 years</td>
<td>150</td>
<td>67.9</td>
</tr>
<tr>
<td>&gt;35 years</td>
<td>68</td>
<td>30.8</td>
</tr>
<tr>
<td><strong>Wife Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>28</td>
<td>12.7</td>
</tr>
<tr>
<td>20-35 years</td>
<td>154</td>
<td>69.7</td>
</tr>
<tr>
<td>&gt;35 years</td>
<td>39</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Table 2 indicates that the majority of respondents had visited the ANC well, which is 89.1%. The antenatal care factor in this study is divided into 2 groups, namely poor (<4 visits) and good (> 4 visits).

Table 2. Distribution of Antenatal Care Visit Frequency

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Respondent</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antenatal Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>24</td>
<td>10.9</td>
</tr>
<tr>
<td>Good</td>
<td>197</td>
<td>89.1</td>
</tr>
</tbody>
</table>
Table 3 indicates that the majority of husbands is response husband, which is 69.2%. The husband’s role variable in this study is divided into 2 groups, namely responsive and not responsive.

### Table 3. Distribution of Husband’s Role Frequency

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>n=221</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Husband’s Role</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>153</td>
<td>69.2</td>
</tr>
<tr>
<td>Not responsive</td>
<td>68</td>
<td>30.8</td>
</tr>
</tbody>
</table>

Table 4 indicates that from the result of statistical tests, there is no significant relationship between ANC visit and husband’s role with a p value > α = 0.05

### Table 4. Relationship between Husband’s Role and Antenatal Care

<table>
<thead>
<tr>
<th>Subject Characteristics</th>
<th>ANC poor</th>
<th>ANC good</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Husband’s Role</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>20</td>
<td>13.1%</td>
<td>133</td>
</tr>
<tr>
<td>Not Responsive</td>
<td>4</td>
<td>5.9%</td>
<td>64</td>
</tr>
</tbody>
</table>

**Discussion**

Results indicate that the number of husband and wife respondents aged 20-35 is more than those who aged <20 and >35. This is also related to knowledge, which has a strong contribution on someone in taking attitude or making decision. The results are in line with the research conducted by Bhatta that explored the factors associated with men involvement during ANC and found that uneducated men or elementary level graduates, aged over 25, have higher income and formal job indicate greater involvement. These factors should be considered empathically during the development of maternal health program. The literature indicates that couples whose men have a higher level of education obtain better information and likely involved in birth planning, they are also socially or financially more prepared to make necessary decisions.

Men who are knowledgeable and obtain health education tend to accompany their spouse during ANC visits. The research highlights the reason why husbands do not accompany their spouse during ANC visits. It is the belief that ANC visit is a woman’s duty, the husband is busy with his work and he is embarrassed to accompany his wife.

This study also indicates that the majority of husbands is employee. The majority of wives is housewife. Regarding education, the majority of husbands is in the group of elementary school graduate. While the majority of wives is also elementary school graduate.

ANC examination is crucial as an effort to detect if there is any problem that occurs during pregnancy so that women can receive early treatment. Regarding ANC examination, this study indicates that the majority of respondents undergoes ANC visits well. The majority of husbands is response husband. The majority of respondents has poor knowledge. The majority of respondents have moderate attitude.

Antenatal care (ANC) services can be defined as care provided by skilled health workers to ensure the best mother and baby health during pregnancy. The ANC components include risk identification, prevention and management of diseases related to pregnancy, and the provision of health education and health promotion. ANC directly reduces maternal and perinatal mortality and morbidity, through detection and complication treatment related to pregnancy, while indirectly identifying increasing risks that can develop into complication during pregnancy and delivery, so that early referral can be performed. Pregnant women must have the same right to access affordable and quality health care in achieving optimal health so as not to have any negative impact on both mother and newborn.

This is consistent with the research conducted by Aliyu about the predictors that cause ANC delay in Nigeria, namely the higher the mother’s educational level, the earlier ANC visit at the beginning of pregnancy. Likewise, mothers from high-income families will start ANC in the first trimester compared to those with low income.

Pregnancy check-ups or antenatal care (ANC) is very important for pregnant women and should be conducted at least 4 times, once in the first trimester, once in the second trimester and twice in the third trimester, because it aims to monitor health during pregnancy. Regular pregnancy check-ups can find abnormalities as early as possible so that treatment can be performed as soon
as possible and mother is in a good condition. Some problems that emerge during pregnancy are related to maternal visits by mothers, this is in accordance with research conducted by Bekele et al., anemia in Ethiopia was caused by low family income, less than 2 years delivery distance, iron supplementation and consisted more than 2 people. This is also related to ANC which is not conducted on regular basis.

Several factors related to ANC in the first trimester of pregnancy include age at pregnancy, family income, media exposure, attitude towards pregnancy, knowledge of danger signs of pregnancy, husband’s consent to conduct antenatal care and distance to the health facilities. In addition, reproductive age, behavior, and attitude during pregnancy, birth order, expectation of pregnancy, ideal family size also affect ANC visits. Some factors are related to delay in conducting ANC examination include socio-demographic, such as maternal education, media exposure, place of residence. Maternal education is a strong predictor of antenatal care services usage. The pregnancy checkup timing has a significant effect on pregnancy result, delay in prenatal care at the beginning of pregnancy is associated with poor pregnancy result.

Conclusion

Results indicate that the number of husband and wife respondents aged 20-35 is more than those who aged <20 and >35. This study also indicates that the majority of husbands is employee. The majority of wives is housewife. Regarding education, the majority of husbands is in the group of elementary school graduate. While the majority of wives is also elementary school graduate. ANC examination is crucial as an effort to detect if there is any problem that occurs during pregnancy so that women can receive early treatment. Regarding ANC examination, this study indicates that the majority of respondents undergoes ANC visits well. The majority of husbands is response husband. The majority of respondents has poor knowledge. The majority of respondents have moderate attitude and there is no relationship between husband’s role and antenatal care.

Conflict of Interest: There was no conflict of interest in the study.

Ethical Clearance: The study was received ethical approval from the Health Research Ethics Committee, Faculty of Public Health, Airlangga University

Source of Funding: Self

References

Indicators In Communication Skills of Taman Posyandu Cadres In The Implementation of Tender Loving Care-Based Child Growth And Development Services

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Abstract

Child development activities must be based not only to fulfill physical nutrition for children, but also to pay attention to meet the needs of psychological nutrition, such as giving love, attention and affection to children that can be manifested in talk, action, touch and gentle speech to children(1). These are the values of Tender Loving Care (TLC)-based parenting, especially in growth and development services by cadres in Taman Posyandu. This research aims to analyze the dominant indicators in the competence of communication skills of cadres in TLC-based Taman Posyandu. It is a kind of quantitative study with a cross-sectional approach. This research was carried out in 4 districts (cities) in East Java Province with a large sample consisting of 320 Taman Posyandu. The results of this research show that the dominant indicator in the competencies of cadre communication skills is an indicator of understanding the basic communication with children when performing services in Taman Posyandu (0.78). This skill needs to be continuously developed optimally to provide growth and development services in Taman Posyandu, so the services can be implemented properly and wholeheartedly by TLC-based cadres.

Keywords: Health cadres, Communication skills, Tender loving care (TLC)

Background

Cadre is one of the drivers of the success of health programs, especially community-based health programs or community-based health efforts or called Upaya Kesehatan Bersumberdaya Masyarakat (UKBM), one of them is Taman Posyandu. The cadres are believed to be able to make valuable contributions to community development, and can also improve the access and coverage of the community to basic services. There is strong evidence showing that cadres can provide better health outcomes, especially in the field of child health(2). Cadres play an important role in determining the success of children’s growth and development as well as maternal health since the mothers get health information first through the cadres(3), including information about care and fulfillment of children’s needs.

Based on the data obtained from Health Office of East Java Province in 2013, the coverage of detection of child growth in East Java Province is still 70.34%. In addition, monitoring of growth and development carried out at Posyandu has also not been encouraging. Only 49.4% of
toddler who performed monitor growth 4 times or more within 6 months, 23.8% of children under five are not weighed, only 30.5% of children under five have card for health services or called KartuMenujuSehat (KMS) and only 25.5% of children under five have book for mother and child health or called KartuIbuAnak (KIA)\(^4\).

A preliminary study conducted by interviewing 15 cadres in RinginrejoSubdistrict, Kediri Regency showed that 12 cadres (80%) did not have the confidence to be PAUD caregivers since they did not have sufficient knowledge, 13 cadres (87%) had not received training in Taman Posyandu and there had not been any specific guidance from related parties regarding cadre assignments in Taman Posyandu. This shows that the competencies possessed by cadres still need to be improved, particularly related to cadre communication skills in TLC-based services.

TLC is seen as the greatest virtue of dedication in providing professional care\(^5\). It is used to describe how love is shaped and refined to meet the demands of practice\(^5\). Feelings of compassion for others, followed by an empathetic approach, are a requirement for concern for others. Thus, what stands out is the relationship of caring and love\(^6\). This research aims to analyze the dominant indicator in the competence of communication skills of health cadres in TLC-based Taman Posyandu services.

**Material and Method**

This research is a quantitative study with a cross-sectional approach. It was carried out in 4 districts or cities of East Java Province: Blitar, Ponorogo, Surabaya and Jember. The samples were 320 Taman Posyandus spread in 4 districts or cities. The inferential analysis to obtain the measurement model used Confirmatory Factor Analysis (CFA).

**Findings**

**Respondent Characteristics**

The majority of Taman Posyandu chosen as the research sample are in the optimal category (64.06%). Based on the age of the respondents in 320 Taman Posyandu, the majority were ≥ 45 years old, while the least were 30-34 years old. The age group ≥ 45 years old dominates in each city of the research area. All cadres who became the respondents in 320 Taman Posyandu were women. There were no male cadres, even though there was no prohibition for a man to become a cadre. The largest ethnic groups of Taman Posyandu cadres are Javanese people (89.06%), while the remaining 10.94% are Madurese people. The latter was found in Jember (Pandalungan) and Surabaya. Based on education, the majority of Taman Posyandu cadres have high school education. The education background with the least percentage is elementary and diploma or undergraduate. The majority of cadres in East Java have become the Taman Posyandu cadre for more than 5 years (63.44%), except in Blitar with the highest percentage of cadre work period of 3-4 years.

**Cadre Communication Skills**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Median</th>
<th>IQR</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLC-based communication skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Extension Understanding</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2. Counseling Knowledge</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3. Communication Knowledge</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4. Extension Skills</td>
<td>3</td>
<td>1.73</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5. Counseling Skills</td>
<td>3</td>
<td>1.73</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6. Communication Skills</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Loading factor (λ)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-value (tλ)</td>
<td>11.99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on output Lisrel as shown in table 5.4, it can be concluded that the index composing the competency of TLC-based Taman Posyandu cadres is a valid index since the value of loading factor is $\geq 0.5$ and significant since the value of $t \geq 1.96$. 
Indicator of Cadre Communication Skills

Tabel 2. Loading Factor in Communication Skills

<table>
<thead>
<tr>
<th>Competence Indexes</th>
<th>Indicators</th>
<th>Loading Factors (λ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLC-based communication skills</td>
<td>1. Understanding the Basis of Extension</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>2. Understanding the Basis of Counseling</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>3. Understanding the Basis of Communication with</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Extension Skills</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>5. Counseling Skills</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>6. Good Communication Skills</td>
<td>0.47</td>
</tr>
</tbody>
</table>

All communication competencies of TLC-based  
	Taman Posyandu cadres are valid indicators because they  
have a loading value ≥ 0.3. Based on the loading factor  
value it can be concluded that the dominant indicator in  
cadre communication competencies is an indicator of  
understanding the basic communication with children  
when performing services in Taman Posyandu (0.78).  
The lowest competency is the ability to communicate  
with children (0.47) with the overall factors has positive  
influences.

Discussion

Competence is a combination of knowledge, skills  
and behavior so that individuals can do work as expected.  
Cadres are part of the children’s environment who  
contributes to provide and support children by playing a  
role in providing an appropriate environment, fulfilling  
children’s basic needs, security and helping children  
prepare for their future. Therefore it is important for  
cadres to have good competences. Cadres need to have  
knowledge about the reality of society that are able to  
provide learning experiences to children about friendship  
and love(7). TLC-based cadre competencies can be  
improved through caring, responsibility, appreciation,  
and understanding or knowledge in conducting guidance  
and supervision of child growth and development.

Communicate skills is a fundamental thing  
forTamanPosyandu cadres. It is one way to exchange  
information and convey messages related to child  
development, so it should be properly done. The message  
conveyed in communication becomes important because the addresser and addressee can strengthen  
each other through the messages. A good message in  
communication can have a big impact. Communication  
can run well if the addressers, in this research is Taman  
Posyandu cadres, pay attention and understand the  
audience, the target we expect in conveying information,  
the choice of communication channels, the content of  
messages delivered and good control during the message  
delivery process(8). The factors in communication skills  
are consist of 6 indicators.

The dominant indicator in the preparation of  
cadre communication competencies is an indicator of  
understanding the basic communication with children  
when performing services in Taman Posyandu. This  
indicator is also an indicator with the highest loading  
factor compared to counseling and counseling skills.  
Good communication skills with children indicate that  
cadres understand the things needed to communicate  
with children. Implicitly, by understanding how to  
communicate with them, cadres will apply the best  
techniques or ways to communicate so that the feelings  
of TLC will grow and flow inTamanPosyanduactivities.

The least indicator in forming communication is the  
way the cadre communicates with the child. This must  
be performed with full respect to show love for children.  
Respect is acknowledging, appreciating, accepting what  
is, not making fools, openly accepting the opinions and  
views of others without criticizing or judging, opening  
communication, providing psychological security  
and providing experience for success(8)(7). Respect  
emphasizes how to respect and accept objects that are  
loved as they are and do not act as they wish(9). The  
level of one’s sense of respect can be divided into 5  
scales: 1) how to communicate that shows the lack of  
respect; 2) responding to communication, but tend to  
be passive or ignoring; 3) able to show the attention  
and potential of his interlocutor; 4) deeply responding  
giving the addresser the opportunity to be himself); and  
5) paying attention to potential and commit to respect  
the values of others(10).
Conclusion

The dominant indicator in cadre communication competencies is an indicator of understanding the basic communication with children when performing services in Taman Posyandu (0.78). Communication skills must be basically done with full respect to show love for children. Good communication skills with children indicate that cadres understand the things needed to communicate with them. Implicitly, by understanding how to communicate with children, cadres will apply the best techniques or ways to communicate so that the feelings of TLC will grow and flow in Taman Posyandu activities.

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Conflict of Interest – Nil

Ethical Clearance – The ethical clearance has been taken from the Ethics Committee of the Faculty of Public Health Airlangga University

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The Effect of Progressive Muscle Relaxation Technique on Decreasing Blood Pressure among Elderly in Kendari City

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Abstract

Background: The effect of increasing the life expectancy is increasing problem of degenerative diseases. One disease caused by a degenerative process is hypertension. This study aimed to analyze the effect of Progressive Muscle Relaxation (PMR) techniques on reducing blood pressure in the elderly.

Method: This research was a quasi experiment with a pre-post test with control group design. The population in this study were all elderly who experienced hypertension. The sample in this study amounted to 30 people, divided into two groups, 15 intervention groups and 15 control groups. Data analyzed using t-test.

Results: There was a decrease in systole pressure after the intervention, with a different mean of 12 mmHg, and the results of statistical analysis showed a significant difference (p = 0.000). The results of the analysis on diastolic pressure also showed a decrease in diastolic pressure after intervention with a mean difference of eight, but the difference was not significant (p = 0.054). Analysis of differences in systolic and diastolic blood pressure in the control group before and after the intervention, both systolic and diastolic blood pressure showed no significant differences between the pre and post measurements. The results of the statistical analysis also showed significant differences in systolic and diastolic blood pressure between the intervention group and the control group (p-value = 0.00).

Conclusions: There was an effect of PMR techniques on reducing blood pressure in both systole and diastole.

Keywords: Progressive Muscle Relaxation Technique, Blood Pressure, Elderly.

Introduction

The various effects of increasing the life expectancy of the elderly, among others, are the increase in the number of elderly people and the increasing problem of degenerative diseases. One disease caused by a degenerative process is hypertension. The onset of hypertension in the elderly is also influenced by psychosocial changes.\(^1\) Psychological changes that occur in old age have negative consequences, changes in the cardiovascular system and psychological stress that pose a risk of hypertension.\(^2\)

Hypertension is responsible for at least 45% of death due to heart disease and 51% of death due to stroke.\(^3\) Based on data from World Health Organization (WHO), hypertension is the biggest cause of death in the population aged 65 years with more deaths in developing countries. General description of hypertension problems in the Southeast Sulawesi Province from year to year has increased. In 2007, the percentage of cases of hypertension amounted to 17% of cases that often occur in the top 10 diseases and increased in 2013 to 22%. The prevalence of hypertension based on measurements is quite high (> 30%) in Konawe Selatan District, Konawe, Kolaka, Wakatobi, and North Kolaka.\(^4\)
Non-pharmacological therapy, such as lifestyle behavior and pharmacology, is needed to decrease blood pressure.\textsuperscript{5,6} The management through lifestyle behavior is very potential in improving blood pressure control and even in decreasing the need for pharmacological management.\textsuperscript{6}

Progressive Muscle Relaxation (PMR) is one technique to reduce stress. The effect of PMR techniques physiologically is to relax tense muscles, the digestive and cardiovascular tract, causing blood pressure to become normal, headaches become lost, digestion becomes normal. Psychological effects are reducing anxiety, eliminating depression, overcoming sleep difficulties and eliminating insomnia.\textsuperscript{7} The previous research showed that muscle relaxation techniques can reduce insomnia complaints effective in reducing pain in clients with glaucoma; and effective against skeletal muscle relaxation and blood pressure stability in hemorrhagic stroke patients.\textsuperscript{8,9}

This study aimed to analyze the effect of PMR techniques on reducing blood pressure in the elderly and developing a PMR Technique Model in the Elderly.

**Method**

This research was a quasi-experiment with a pre-post test with control group design. The study was conducted in September - October 2015 at the Social Home of Tresna Wardha Minaula Kendari. The sample in this study amounted to 30 people, divided into 2 groups, namely 15 intervention groups and 15 control groups. The sampling technique used was a simple random sampling.

The intervention was a progressive technique in the form of contraction and relaxation exercises in each muscle group in sequence according to the guidelines and schedule. The intervention used a booklet that contained instructions for implementing PMR techniques accompanied by pictures of contraction and relaxation movements in each muscle group alternately. The PMR technique in this study was carried out sitting on the floor while leaning against the wall with pillows placed on the back and legs straightened. Its movement is tense the muscle group (muscle contraction) and holds it for 5 seconds then relax (muscle relaxation) for 5 seconds. Each movement is repeated twice. Relaxation techniques were carried out on 10 muscle groups consisting of 1) leg and thigh muscles; 2) wrist muscles; 3) forearm muscles; 4) elbow and upper arm muscles; 5) abdominal muscles; 6) chest muscle; 7) back muscles; 8) shoulder muscles; 9) head and neck muscles; 10) facial muscles. Interventions were conducted twice a day, namely in the morning at 09.00 and in the afternoon at 17.00 for 5 days, so that the total PMR technique carried out was 10 times.

Data analysis using t-test to determine the effect of PMR techniques with blood pressure.

**Results**

Characteristics of respondents shown that the majority 18 people (60\%) of elderly people with hypertension are male (Table 1).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Groups</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Control</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>9 (60)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>6 (40)</td>
</tr>
<tr>
<td>Age</td>
<td>60-74</td>
<td>8 (53,3)</td>
</tr>
<tr>
<td></td>
<td>75-90</td>
<td>7 (46,7)</td>
</tr>
</tbody>
</table>

**Table 2: Distribution of Blood Pressure in intervention and control group**

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Amount (%)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Intervention Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>0 (0)</td>
<td>11 (73,3)</td>
</tr>
<tr>
<td>Mild Hypertension</td>
<td>13 (86,7)</td>
<td>3 (20)</td>
</tr>
<tr>
<td>Moderate Hypertension</td>
<td>1 (6,7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Severe Hypertension</td>
<td>1 (6,7)</td>
<td>1 (6,7)</td>
</tr>
<tr>
<td>Diastolic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>4 (26,7)</td>
<td>12 (80)</td>
</tr>
<tr>
<td>Mild Hypertension</td>
<td>6 (40)</td>
<td>3 (20)</td>
</tr>
</tbody>
</table>
In table 2 it is shown that in the intervention group the results of the initial systole measurement (pre) obtained the highest percentage were those who experienced mild hypertension (86.7%). Whereas in the results of diastole measurements there were 40% who experienced mild hypertension and 26.7% had moderate hypertension. After the intervention, the second blood pressure (post) was measured and it was found that at systolic pressure 73% of the results were normal and the remaining 20% had mild hypertension. Also seen in table 2 that there was a decrease in the average systolic and diastolic blood pressure in the intervention group. Furthermore, for the control group, pre and post measurements were also carried out. For systolic blood pressure, the highest percentage in the mild hypertension group was 93.3% at the pre-measurement and to 86% at the post-measurement, because there was 1 sample that had increased blood pressure to moderate hypertension. For diastolic blood pressure, the highest percentage of mild hypertension was 80% and in post measurements, there was an increase in mild hypertension to 86.7%, because there were 1 patient whose diastolic pressure increases. In the control group, an increase in the average value of systole and diastole at the final measurement (post).

Table 3: Differences in blood pressure in the intervention group between before and after the intervention

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>n</th>
<th>Mean ±SD</th>
<th>Mean Difference</th>
<th>pValue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>15</td>
<td>154 ±15,9</td>
<td>22</td>
<td>0,000</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>132 ±17,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>15</td>
<td>87,3 ±15,3</td>
<td>8</td>
<td>0,054</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>79,3±7,0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It shown in table 3 that there was a decrease in systole pressure after the intervention, with a different mean of 12 mmHg, and the results of statistical analysis showed a significant difference (p = 0.000). The results of the analysis on diastolic pressure also showed a decrease in diastolic pressure after intervention with a mean difference of 8, but the difference was not significant (p = 0.054). Furthermore, analysis of differences in systolic and diastolic blood pressure in the control group before and after the intervention shown in table 4, both systolic and diastolic blood pressure showed no significant differences between the pre and post measurements.

Table 4: Blood pressure differences in the control group

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>n</th>
<th>Mean ±SD</th>
<th>Mean Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>15</td>
<td>151,3 ±9,9</td>
<td>1,3</td>
<td>0,10</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>154 ±9,1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>15</td>
<td>88 ±4,1</td>
<td>0,67</td>
<td>0,67</td>
</tr>
<tr>
<td>Post</td>
<td>15</td>
<td>88,7±3,5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Differences in blood pressure after the intervention of PMR techniques between the intervention group and the control group

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>N</th>
<th>Mean ±SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>15</td>
<td>132,00±17,8</td>
<td>0,00</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>154,00±9,1</td>
<td></td>
</tr>
<tr>
<td>Diastolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>15</td>
<td>79,33±7,0</td>
<td>0,00</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>88,67±3,5</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 shows that the mean of systolic and
diastolic blood pressure in the intervention group was lower than the average in the control group. Based on the results of the statistical analysis also showed significant differences in systolic and diastolic blood pressure between the intervention group and the control group (p-value = 0.00). The results of this study indicate that there was an effect of PMR techniques on the reduction in blood pressure of elderly people who have hypertension as indicated by a decrease in blood pressure, both systolic and diastolic blood pressure in the intervention group which was carried out by PMR techniques.

**Discussion**

This study found the majority of elderly people with hypertension were male. This result is in accordance with theory that gender is one of the risk factors for hypertension. The majority of men with hypertension can be caused by active smoking. Smoking habits are associated with an increased incidence of malignant hypertension. Thomas S. Bowman et al, found that the highest incidence of hypertension was in people smoking more than 15 cigarettes per day.\(^\text{10, 11}\)

The intervention of PMR techniques in accordance with the guidelines and schedule is expected to provide a greater relaxation effect and provide a better therapeutic effect in lowering blood pressure in both systole and diastole. This study found that in the elderly who do PMR techniques regularly or according to guidelines (n = 12), which was twice a day for five days showed a decrease in blood pressure is greater, which was equal to 10-20 mmHg, whereas in elderly with hypertension who did not implement PMR techniques according to guidelines (n = 3) only showed a decrease in blood pressure of 0.5-10 mmHg.

This finding is supported by several studies showing that PMR techniques can reduce insomnia complaints, effective against skeletal muscle relaxation and blood pressure stability in hemorrhagic stroke patients.\(^\text{12, 13, 14}\) PMR techniques were first applied to patients in hospitals who experience high blood pressure. Patients are guided to carry out PMR techniques for two to three times a day in a week, the results show that the patient’s blood pressure decreases and within a few weeks the patient’s blood pressure becomes normal.\(^\text{7}\)

Elderly people who live in nursing homes can experience stress due to loneliness or lack of family support. In times of stress, there will be tension in certain body muscle groups that are sometimes not realized. Muscle tension is not always a sign of strength, but can also indicate the presence of energy being discarded. By learning and practicing PMR techniques can avoid unnecessary scattering of energy and store it for things that are needed.\(^\text{15}\) PMR techniques can be used to maintain physical and mental balance and are important competencies possessed by nurses.\(^\text{16}\)

PMR has been applied to patients with various health problems including hypertension, insomnia, headaches, and childbirth.\(^\text{7, 15}\) PMR techniques have been used as a way to deal with stress (stress management) in everyday life.\(^\text{16, 17}\)

Relaxation has a healing effect.\(^\text{18, 19}\) The impact of this intervention is not limited to healing high blood pressure and heart disease, but can also relieve pain.\(^\text{20}\) To get the therapeutic effect of PMR techniques, this exercise must be carried out regularly every day in a systematic order, ie twice a day in the morning and evening for five days, so that the total implementation of PMR techniques is 10 times. This will make individuals aware of the tension in the body muscles and achieve total muscle relaxation. Total muscle relaxation conditions will counteract the negative effects of stress by restoring the balance of the physiological conditions of the body due to the effects of the endocrine system and sympathetic nervous system that occur during stress.\(^\text{15}\)

In this study it was found that the majority of respondents (80%) performed relaxation techniques according to guidelines and schedules, namely twice a day in the morning and evening for five days, so that the total implementation of PMR techniques carried out by respondents was 10 times, while the remaining 20 % only performs PMR techniques 8 times. The implementation of PMR techniques in accordance with the guidelines and schedule will provide a greater relaxation effect and provide a better therapeutic effect in reducing blood pressure in both systole and diastole. This is evident from the results of the study found that in the elderly who do PMR techniques regularly or according to guidelines (n = 12), which is twice a day for 5 days shows a decrease in blood pressure is greater, which is equal to 10-20 mmHg, whereas in elderly with hypertension who do not carry out PMR techniques according to guidelines (n = 3), only show a decrease in blood pressure of 0.5-10 mmHg.
Conclusions

There was an effect of Progressive Muscle Relaxation techniques on reducing blood pressure in both systole and diastole.

Acknowledgements

We give our gratitude to Polytechnic of Health, Ministry of Health, Kendari, that have supported this research. Our appreciation also for all elderly at the Social Home of Tresna Werdha Minaula Kendari that have participated in this study.


Conflict of Interest: The authors have no conflicts of interest to declare.

Ethical approval: This study received ethical approval from the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health of Yogyakarta with Number: I. B. 01. 01 / KE / LIX / 537/2016.

References


Determinants of First Dose Measles Immunization In Four Districts, Indonesia 2017

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2Department of Epidemiology, School of Public Health, University of Indonesia

Abstract

Background: Measles is a major cause of child mortality worldwide. High measles immunization coverage is required in reducing the child mortality. The study aimed to identify the determinants of first dose measles immunization in four districts in Indonesia.

Method: This cross sectional study used secondary data of The Assessment of Second Dose Measles Immunization and Immunization for School Children Coverage in Two Provinces in Indonesia in 2017. Sample were total of 1,200 respondents whose children aged 12-37 months in the survey. Bivariate and multivariate analysis were used to examine the predisposing, enabling, need, and reinforcing factors associated with the immunization.

Results: Factors that statistically associated with the immunization were attitudes toward immunization service quality PR=1,35 (95%CI 1,02-1,79); information on immunization PR=3,17 (95%CI 2,37-4,22); perceived needs of immunization PR=1,55 (95%CI 1,13-2,13); and family support PR=9,07 (95%CI 5,76-14,28). The dominant determinant was the family support.

Conclusion: All the factors associated to the first dose measles immunization have important role in the child immunization. Therefore, stakeholders were expected to intervent all the factors in increasing the immunization coverage.

Keywords: Immunization, First dose measles, Indonesia

Introduction

Measles is an acute, infectious, and highly contagious disease caused by a virus. This disease is one of the main causes of child mortality worldwide. Thus the prevention of measles has a significant role in reducing under-five mortality. Indonesia is a country with high cases of measles. Every year more than 11,000 cases of suspected measles are reported. During 2010 to 2015, it was estimated that there were 23,164 cases of measles in Indonesia. The measles outbreaks still occur every year. The number of outbreaks decreased from 2011 to 2015 (328, 160, 128, 173, 68 cases) but increased in 2016 (129 cases).

Indonesia is committed to achieve measles elimination in 2020 in line with the Global Vaccine Action Plan (GVAP) which targets measles elimination in 5 WHO regions by 2020. High coverage (>95%) is required to maintain high levels of herd immunity through routine and additional immunization. However, the first-dose measles immunization coverage in 2014 and 2015 in Indonesia has decreased. In addition, the percentage of districts that have the first dose of measles coverage >95% also tends to decrease from 45% in 2013 to 28% in 2015.

Immunization coverage for children can be influenced by provider and client factors related
to health services (immunization services). However, some previous studies were only in one area of the primary healthcare (Puskesmas) or only the sub-district and no one had specifically observed the first dose measles immunization as the main outcome so that it did not adequately describe factors related to the first dose of measles immunization in Indonesia. This study was conducted to find out more information and in a wider area, in four districts / cities about determinant factors of first dose measles immunization based on four main factors, namely predisposing, enabling, need, and reinforcing as the theory of Andersen and Green.

Material and Method

The study design was a cross sectional using secondary data of Assessment of Second Dose Measles Immunization Coverage and Immunization for School Children in 2 Provinces in Indonesia 2017 which was conducted on January-May 2017. The population were all children aged 25-37 months in four selected cities/ districts, of Aceh Jaya, Pidie, Bantaeng and Palopo. Samples were children aged 25-37 months who were selected as samples in the survey and the data was well documented (n = 1,200).

The dependent variable was first dose measles immunization was seen from the first dose measles immunization status when the child was before 12 months. Maternal and paternal education were categorized into low if the last education was primary school (up to junior high school) and included to high education if it completed a higher level. Maternal and paternal occupation were categorized as not working and working. Attitudes were measured by respondent’s judgement about health worker’s hospitality, service satisfaction, and cleanliness of the service area (score 0-4). Knowledge was related to the immunization that should be given to children under five and the right age to give the first dose measles immunization (score 0-6). The mean values of these score of each assessment was used as a cut-off point for defining the status of knowledge and attitudes. Family income were also devided by using the mean value. Information on immunization was categorized into ever and never exposed to information. Missed opportunities were categorized into had and had no missed opportunities. Perceived of benefits, barriers and needs (score 1-4) were devided to be less good (<mean) and good (≥mean). Family support included evaluative, instrumental and emotional support to determine which children should be immunized (score 0-7), categorized to be less good and good. Community support was defined as the presence or absence of support from other people (religious leaders, community leaders, neighbors, friends, relatives) to inform or socialize immunization.

Cox regression was performed to calculate the prevalence ratio (PR) with 95% Confidence Interval and to find out the dominant factors associated with the first dose measles immunization.

Results

The proportion of children who had no first dose measles immunization in four districts in Indonesia in 2017 were 19.3%. While children who had immunization were 80.7% or still below the national target (95%). Table 1 showed that based on predisposing factors, non-immunized children had a higher proportion in lower educated mothers and fathers (21.6% and 23.1%), non-working mothers (20.1%), working fathers (19.4%), less good attitudes group (34.8%), and poor knowledge groups (28.5%). Based on the enabling factor, the proportion of not immunized was higher in families with less income (19.9%), in the group that had never been exposed to information about immunization service (61.8%), in the group with missed service opportunity (23.1%). Based on the need factors, not immunized children had a higher proportion in less perceived benefits, barriers, and need groups were 78.2%, 20.1%, and 86.4%. Based on reinforcing factors, not immunized children had a higher proportion in the group with poor family support (43.5%) and in the group with no community (40.2%). Bivariante analysis showed variables which had significantly association with the first dose measles immunization were paternal education, attitudes toward immunization service quality, knowledge about immunization, perceived benefits of immunization, perceived needs of immunization, information on immunization, family support, and social support.
Table 1. The First Dose Measles Immunization Based on Predisposing, Enabling, Need and Reinforcing Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>First Dose Measles Immunization</th>
<th>PR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Immunized</td>
<td>Immunized</td>
<td>n</td>
</tr>
<tr>
<td><strong>Predisposing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>131</td>
<td>21.6</td>
<td>475</td>
</tr>
<tr>
<td>High</td>
<td>101</td>
<td>17</td>
<td>493</td>
</tr>
<tr>
<td>Father Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>138</td>
<td>23.1</td>
<td>459</td>
</tr>
<tr>
<td>High</td>
<td>94</td>
<td>15.6</td>
<td>509</td>
</tr>
<tr>
<td>Mother Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Working</td>
<td>169</td>
<td>20.1</td>
<td>671</td>
</tr>
<tr>
<td>Working</td>
<td>63</td>
<td>17.5</td>
<td>297</td>
</tr>
<tr>
<td>Father Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Working</td>
<td>1</td>
<td>8.3</td>
<td>11</td>
</tr>
<tr>
<td>Working</td>
<td>230</td>
<td>19.4</td>
<td>957</td>
</tr>
<tr>
<td>Attitudes Towards Immunization Service Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Good</td>
<td>85</td>
<td>34.8</td>
<td>159</td>
</tr>
<tr>
<td>Good</td>
<td>147</td>
<td>15.4</td>
<td>809</td>
</tr>
<tr>
<td>Knowledge about Immunization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Good</td>
<td>125</td>
<td>28.5</td>
<td>314</td>
</tr>
<tr>
<td>Good</td>
<td>107</td>
<td>14.1</td>
<td>654</td>
</tr>
<tr>
<td>Enabling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income (mean=Rp 1.722.958,00)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;mean</td>
<td>146</td>
<td>19.9</td>
<td>589</td>
</tr>
<tr>
<td>&gt;=mean</td>
<td>86</td>
<td>18.5</td>
<td>379</td>
</tr>
<tr>
<td>Information on Immunization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>139</td>
<td>61.8</td>
<td>86</td>
</tr>
<tr>
<td>Ever</td>
<td>93</td>
<td>9.5</td>
<td>882</td>
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<tr>
<td>Missed Opportunity on Immunization Services</td>
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<tr>
<td>Yes</td>
<td>9</td>
<td>19.2</td>
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<tr>
<td>No</td>
<td>223</td>
<td>23.1</td>
<td>938</td>
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<tr>
<td>Need</td>
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<td></td>
</tr>
<tr>
<td>Perceived benefits of Immunization</td>
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<td></td>
</tr>
<tr>
<td>Less Good</td>
<td>61</td>
<td>78.2</td>
<td>17</td>
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<tr>
<td>Good</td>
<td>171</td>
<td>15.2</td>
<td>951</td>
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<td>Perceived barriers of Immunization</td>
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<td>Less Good</td>
<td>88</td>
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<td>86.4</td>
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<tr>
<td>Good</td>
<td>175</td>
<td>15.4</td>
<td>959</td>
</tr>
<tr>
<td>Reinforcing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family support</td>
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</tr>
<tr>
<td>Less good</td>
<td>210</td>
<td>43.5</td>
<td>273</td>
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<td>Good</td>
<td>22</td>
<td>3.1</td>
<td>695</td>
</tr>
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<td>Social support</td>
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<td>Yes</td>
<td>47</td>
<td>40.2</td>
<td>70</td>
</tr>
<tr>
<td>No</td>
<td>185</td>
<td>17.1</td>
<td>898</td>
</tr>
</tbody>
</table>

* significant p < 0.05 and entered to multivariat analysis
After removing one by one the independent variables with \( p > 0.05 \) from the first multivariate model, the final multivariate model was obtained (table 2). In the final model of multivariate analysis, it could be seen that the variables which were most strongly associated with the immunization were family support, information on immunization, perceived needs and attitudes toward immunization service.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>PR (95% CI)</th>
<th>( p ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predisposing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes Towards Immunization</td>
<td>0.299</td>
<td>0.145</td>
<td>1.35 (1.02-1.79)</td>
<td>0.039</td>
</tr>
<tr>
<td>Service Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Enabling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information on Immunization</td>
<td>1.152</td>
<td>0.147</td>
<td>3.17 (2.37-4.22)</td>
<td>0.000</td>
</tr>
<tr>
<td>Need</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived needs of Immunization</td>
<td>0.437</td>
<td>0.162</td>
<td>1.55 (1.13-2.13)</td>
<td>0.007</td>
</tr>
<tr>
<td>Reinforcing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Support</td>
<td>2.205</td>
<td>0.231</td>
<td>9.07 (5.76-14.28)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Discussion**

This study used a cross sectional study design so it could not establish causal relationship and temporality. Another limitation of study using secondary data was it could not measure all possible variables related to immunization such as the role of health workers and health services which might be strongly associated with immunization.\(^{(20)}\) There was a potential bias in this study due to the use of instruments which were not specifically designed to assess the determinant factors of the first dose measles immunization. The potential bias in measuring the dependent variable was might be a recall bias from the respondent in remembering the first dose measles immunization status. However, this bias had been minimized by checking the Maternal and Child Health Book Record. Measurement of knowledge, attitudes and perceptions of respondents might be potentially cause non-differential-information bias.

This study found attitudes toward immunization service quality as the predisposing factor was significantly associated with the first dose measles immunization. The attitudes of health workers and the immunization services were expected to build positive attitudes to the immunization services quality. Therefore, parents would bring their child for immunization. In this study, poor attitudes and trust would make mothers of the children would not go to immunization services. Poor attitude and trust would make people reluctant and uncomfortable coming to immunization services. This was in line with study by Izza (2017) that parents who had poorly attitudes toward immunization service quality, their children (aged 12-36 months) were more likely to be not getting DPT immunization.\(^{(16)}\)

Information on immunization as the enabling factor was significantly associated with the immunization status. In this study, information was related to facilities and immunization service workers. Group who have obtained information might have better knowledge so they had a positive attitudes toward immunization. This could encourage them to aware and understand about immunization so they would immunize their children. These results were in line with the study by Hijriani (2015) which showed exposure to information was significantly related to the completeness of basic infant immunizations.\(^{(21)}\)

Perceived needs as the need factor was also significantly associated with the immunization. Perceived needs could be seen from respondent’s assumption or judgement that children must be immunized because they really need immunization. This study proved the poor perceived needs was significantly associated with not immunized status. The results were similar to the study in Nepal (2002) that the assessment of immunization service needs was significantly related to the completeness of immunization.\(^{(22)}\) Thus, it was an important factor which influenced parents to immunize their children.

In this study, family support as the reinforcing factor was significantly associated with the first dose measles immunization. The result showed the magnitude of the role of family in health decision making. Families with good knowledge, awareness or understanding of immunization would give positive support in immunization. Many respondents probably lived close to their families so family support influenced determining the immunization of children. Furthermore, this study showed that family support had the strongest role influencing the first dose measles immunization.
This results was in line with some previous studies.\(^{(23,24)}\)

**Conclusion and Recommendation**

The results of this study showed factors that were significantly associated with the first dose measles immunization for under five children were predisposing: attitudes toward immunization service PR 1.35 (95% CI 1.02-1.79); enabling: information on immunization PR 3.17 (95% CI 2.37-4.22); need: perceived needs of immunization PR 1.55 (95% CI 1.13-2.13); and reinforcing: family support PR 9.07 (95% CI 5.76-14.28). Further research was needed with specifically instruments to assess the first-dose measles immunization with a wider area (larger sample), respondents are mothers who have babies (one year old children) at the time of the study, and add variables such as the role of health workers and services so that more valid and complete information will be obtained. All the factors associated to the first dose measles immunization have important role in the child immunization. Therefore, stakeholders were expected to intervene all the factors in increasing the immunization coverage. It could support the increasing of immunization coverage as a strategy to against measles in child.

**Ethical Considerations**

This clearance issued by the ethic committee in Health Research and Development Agency of Indonesia Ministry of Health. The ethic committee had reviewed the study report and independently issued the clearance.

**Conflict of interest**

Both author declared that no competing interest.

**Acknowledgements**

We thank to the Indonesia Ministry of Health, Province of Aceh Health Office, Province of South Sulawesi Health Office, District of Aceh Jaya Health Office, District of Pidie Health Office, District of Bantaeng Health Office, City of Palopo Health Office and all researchers who provided the data survey.

**References**


9. CDC. Strengthening Immunization Systems The Solution: Better immunization systems What makes a good immunization system?


Association of Parent’s Body Height towards Adolescents Body Height

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Abstract

Background: Adolescent is a period of growth and development as well as transition time from childhood into adult, which need an optimal nutrition intake. Malnutrition during adolescents will give a negative impact on nutrition status of their children in the future. Female adolescents had got impacted more severe compared to male adolescents, because it caused an intergeneration effect. Underweight female or short female tended to give birth a low birth weight infant, and this negative cycle will continue occurred for the next generation. Objective of this study was to analyze association of parents’ body weight to their adolescent height

Method: Using data from Indonesian Family Life Survey (IFLS). Sample inclusion criteria of this study included children aged two to five years old during the IFLS 1, as a biological child, single birth, still alive, living with parents, still alive in IFLS 4, while the exclusion criteria were had incomplete cohort data from 1993 to 2007. This study analyzed 428 individuals out of 847 sample population. Bivariate analysis of Chi-square test had been done followed by multiple logistic regression for independent variables with p value < 0.25.

Result: Multivariate analyses showed that adolescents who had stunted mother had 2.4 times risk of develop stunted.

Conclusions: Adolescent’s height correlate to mother’s heigt.

Keywords: Adolescents height, mother’s height, stunted

Introduction

Adolescent is a time period for growth and development and transition from childhood into adult life and considered as the second fastest growth moment after the first year of newborn life period. Nutrition status is an important contribution during these two period of times. About 50% of body weight and adult body mass frame can be reached during childhood time, and more than 20% of body height of adult can be reached during adolescents¹.

In numerous countries, where half of their adolescents population had short height (z score for height by age according to [HAZ] < –2 SD of WHO Child Growth Standard), it was related to higher risk of negative perinatal outcome to their child in the future. Severe malnutrition was not only contributed to stunting or underweight during adulthood², but it was also impacted their nutrition status. This will lead to intergeneration effects, which were underweight or stunted females tended to give birth a low birth weight infant and will continue in their life cycle for their next generation³, caused constraint on development of their mental,
cognitive, education and economy achievement, increasing risk of raised blood pressure.

A study in Bangladesh, showed prevalence of stunting in adolescents was 46.6% (43.1% in males and 50.3% in females; p value >0.05) . Meanwhile, in Bengal India, indicated that stunting had significantly higher among females child (58.4%) compare to male child (48.7%) . In Africa, the stunting prevalence in adolescents aged 15 to 19 years was 19.1% (22.3% in males and 15.5% in females) . Stunting also known was higher in rural (36.4%) than in urban areas (23.5%) . Within different education background of parents, it showed that prevalence of stunting adolescents was higher in those who had father with low education (illiterate) which was 3.99% compare to father with literate or higher education (12.0%) . In Indonesia, prevalence of stunting in adolescents was relatively high, about 31.4% (7.5% very short and 23.9% short).

Stunting was an indicator of chronic malnutrition that occurred during a long period of time. Interaction between genetic and environment factors was a risk factor for stunting. There were many studies showed the relationship between parent’s height and their child height however, similar study was still needed in different places to confirm result from previous study, in order to obtain most appropriate policy to prevent stunting that specifically meet the need of local population at risk and environment. This study aimed to analyse association of parent’s body height to their adolescent body height.

**Materials and Method**

**Population and Sample**

This study used data from Indonesian Family Life Survey (IFLS). IFLS was a survey conducted in Indonesia by RAND and demographic institution of Universitas Indonesia in 1993, 1997, 2000, 2007. Focus of the survey were fertility, family planning and contraception, health and child survival, migration, occupation, functional health, economic and social of elderly. IFLS is public domain and can be obtained from http://www.rand.org.

This cohort study followed under five children age in 1993 (IFLS 1) until they reached age 16 to 19 years (IFLS 4) and meet the inclusion and exclusion criteria. The inclusion criteria included age of two to five years in ILFS-1, biological child, single birth, still alive, living with parents, and participated in ILFS – 4. Exclusion criteria were incomplete longitudinal data set from 1993 to 2007. Total number of population was 847 (aged two to five years) and we excluded those who had HAZ < -6 and > 6, while individuals who had missing data of parent’s height were excluded. Total number of cleaned sample to be analyzed was 428 individuals.

**Data Manajemen**

This study use data of father’s and mother’s body height, father’s education, mother’s education, environment condition, household economy status, living areas, sex and body height of adolescents. These data was part of data that will be published later on. All of the data were obtained from the IFLS-1 except for adolescents body height was from the ILFS-4.

The IFLS used microtoise to measure the body height. Height measurement result was in centimeter with 0.1 cm accuracy. The height measurement was carried out by trained field workers. The height data of fathers was categorized into two groups based on mean value of body height, which was short < mean 160.5 cm and normal >= 160.5 cm for fathers, while < 150.2 cm (short) and >= 150.2 cm (normal) for mothers. Parent height was defined as short if both father and mother were short; and high or normal if either father or mother was normal. Adolescents body height was defined using Z score based on WHO Anthro Plus 2007, whereas short for those who had height for age (HAZ) < -2 SD of WHO standard median and normal for those who had HAZ >= -2SD of WHO standard median value.

Father’s and mother’s education were grouped into two education status, which were low (less than or equal to junior high school) and high (higher than or equal to senior high school). Living areas were defined as urban and rural.

Living environment were determined using composite variables of house condition (floor, roof, and wall type), electricity source, drinking water source, clean water source, waste discharge, rubbish discharge method, and human feces discharge method. Each of the variables was weighted based on healthy house standard (Minister of Health regulation no: 829/SK/VII/1999). Living environment was defined as healthy if score value was reaching 80% or higher from the highest score and unhealthy environment referred to score value less than 80% of highest score.
Household economy status was measured by percentage of household food expenditure per month per capita. Data was calculated by dividing total food expenditure and total household expenditure (expenditure for food, non-food, education, housing). Poor or low economic status was categorized by percentage of food expenditure ≥ 56.86% from total household expenditure per capita and non-poor or high economic status was defined as percentage of food expenditure per capita < 56.86%. The percentage of 56.86% was based on median value of expenditure in 1993 calculated by Statistic Bureau of Indonesia (BPS).

Data Analysis

Data analysis was completed using a statistic software of SPSS 17.0. Prior to the statistical analyses, the data was tested for normality distribution using Kolmogorov-Smirnoff test. The result showed that the data was not normally distributed, and all variables were modified into two grouped. A univariate analyses was done to describe each variables and bivariate analyses were completed to calculate cross tabulation between each of independent and dependent variables using Chi-square test with 0.05 alpha and 95% CI. Results from the chi-square test were selected independent variables (p value < 0.25) that included in the multivariateanalyze of multiple logistic regression using model prediction analyses.

Results

Table 1 showed 31.8% of adolescents were stunted, male adolescents were higher than females. Half of the adolescents (52.3%) living in rural area. Percentage of adolescents who had stunted mother was 49.3%, and stunted father was 43%, while the percentage of who had both stunted mother and father was 20.8%. Percentage of adolescents who had low educated father was 72.9%, and 81.8% had low educated mother. Percentage of adolescents who had low economic status was 32.7% and 74.8% adolescents was living in unhealthy environment.

Table 2 showed that mother’s height, father’s height, parental’s height, mother and father’s education, economic status and environment were associated with adolescent height (p<0.05), except sex and adolescent resident. Meanwhile all the variables were included in the multivariate analyses (p-value<0.25).

Table 3 showed results of multiple logistic regression. Summary prediction model indicated value of R-squared of Nagelkerke was 19.4%, which assumed that proportion of stunted adolescents can be explained as much as 19.4% from the mother’s height, father’s height, sex and household characteristics (parents education, living environment, food expenditure and residential areas). It was showed under five children (two to five years old) who had stunted mother had higher risk of getting stunted during their adolescents age (OR=2.406, 95% CI= 1.280 - 4.487) compared with those whose mother was not stunted.
Table 2. Relationship between Household Characteristics and Height of Parents in Stunted Adolescents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stunting</th>
<th>Normal</th>
<th>Total</th>
<th>OR</th>
<th>95% CI</th>
<th>Chi-Square</th>
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<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Sex</td>
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<td>Male</td>
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<td>Father's Height</td>
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<td>Short</td>
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<td>192</td>
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<td>Mother &amp; Father are short</td>
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<tr>
<td>Mother &amp; Father are normal</td>
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<td>24.2</td>
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<td>75.8</td>
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<td>Low</td>
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<td>64.7</td>
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<td>77.6</td>
<td>116</td>
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<td>17.9</td>
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<td>100</td>
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<td>107</td>
<td>76.4</td>
<td>140</td>
<td>100</td>
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<td>Not Healthy</td>
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<td>36.2</td>
<td>204</td>
<td>63.8</td>
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<td>Healthy</td>
<td>20</td>
<td>18.5</td>
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<td>81.5</td>
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<td>100</td>
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<td>Resident</td>
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<tr>
<td>Urban</td>
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<td>27.9</td>
<td>147</td>
<td>72.1</td>
<td>204</td>
<td>100</td>
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<td>Rural</td>
<td>79</td>
<td>35.3</td>
<td>145</td>
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<tr>
<td>Total</td>
<td>138</td>
<td>31.8</td>
<td>292</td>
<td>68.2</td>
<td>428</td>
<td>100</td>
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</tbody>
</table>

* significant (p-value < 0.05)

Tabel 3. Multiple Logistic Regression of Stunting Risk Factors in Adolescents

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Estimated</th>
<th>Regression Coefficient (β)</th>
<th>SE</th>
<th>p-value</th>
<th>Odds Ratio Exp (β)</th>
<th>95% CI of Exp (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.646</td>
<td>-1.003</td>
<td>0.000</td>
<td>0.01</td>
<td>0.01</td>
<td>0.830 - 2.027</td>
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<tr>
<td>Adolescents’ sex</td>
<td>0.260</td>
<td>0.228</td>
<td>0.253</td>
<td>0.1297</td>
<td>1.297</td>
<td>0.830 - 2.027</td>
</tr>
<tr>
<td>Mother’s height (stunted)</td>
<td>0.878</td>
<td>0.318</td>
<td>0.006</td>
<td>2.406</td>
<td>1.290 - 4.487</td>
<td></td>
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<tr>
<td>Father’s height (stunted)</td>
<td>0.667</td>
<td>0.349</td>
<td>0.056</td>
<td>1.949</td>
<td>0.984 - 3.860</td>
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<td>Parent’s height (stunted)</td>
<td>0.425</td>
<td>0.459</td>
<td>0.354</td>
<td>1.530</td>
<td>0.622 - 3.766</td>
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<tr>
<td>Father’s education (low)</td>
<td>0.146</td>
<td>0.332</td>
<td>0.660</td>
<td>1.157</td>
<td>0.604 - 2.217</td>
<td></td>
</tr>
<tr>
<td>Mother’s education (low)</td>
<td>0.48</td>
<td>0.411</td>
<td>0.243</td>
<td>1.616</td>
<td>0.722 - 3.618</td>
<td></td>
</tr>
<tr>
<td>Economic status (poor)</td>
<td>0.419</td>
<td>0.254</td>
<td>0.099</td>
<td>1.521</td>
<td>0.924 - 2.503</td>
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</tr>
<tr>
<td>Physical Living environment (unhealthy)</td>
<td>0.512</td>
<td>0.314</td>
<td>0.103</td>
<td>1.668</td>
<td>0.902 - 3.084</td>
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</tr>
<tr>
<td>Residential areas (urban)</td>
<td>0.033</td>
<td>0.248</td>
<td>0.893</td>
<td>1.034</td>
<td>0.636 - 1.680</td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The statistical analysis showed risk of stunted adolescents was 2.4 times higher among those who had stunted mother after controlling covariates variable. This result in line with other studies\textsuperscript{3,14,13,16}. These facts most likely related to genetic influence as a result of interaction and permanent adaptation of poligen from adolescents’ parent. The genetic factor highly contributed to the adolescents height, after controlled by certain external factors\textsuperscript{17}.

Conclusion

Our finding confirm that mother’s height has association with adolescent height. Hence female adolescent need to maintain their nutritional status in adequate condition to to cut the malnutrition and stunting cycle during adolescents time period.

Conflict of Interest: The authors declare that they have no competing interests

Ethical Clearance: This research was approved by ethics committee of Public Health Faculty, Universitas Indonesia.

Source of Funding: This study support by Ministry of Research, Technology and Higher Education (Kemenristekdikti)

References


Identification of Related Factors to Safety Behavior Perception in PT. Kimia Farma (Persero) Tbk. Plant Bandung

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²Bachelor Programme in Public Health, Bhakti Kencana Institute of Health Science Bandung, Indonesia.
³Faculty of Health Sciences, Ibn Khaldun Bogor University, Indonesia.

Abstract

Perception is one of the factors that can determine the attitude and behavior of someone. Perception of safety behavior can be interpreted negatively or positively, workers who have a positive perception will tend to be supportive to behave safely so they can avoid workplace accidents. PT. Kimia Farma (Persero) Tbk. Plant Bandung is listed as a company that has received zero accident awards, meaning that there have never been work accidents that have caused loss of work time. The purpose of this study was to determine the relationship of worker motivation, social support, work experience, and years of service with perceptions of safety behavior of PT. Kimia Farma (Persero) Tbk. Plant Bandung 2017. The type of research used is an analytical survey using a cross-sectional approach. The study population was all production workers I part of PT. Kimia Farma (Persero) Tbk. Plant Bandung. The sampling technique of this study was purposive sampling. The study sample was 51 workers. The data analysis technique uses chi-square. The results of this study indicate that there is a relationship between motivation, social support, work experience, and working period with perceptions of safety behavior. Based on the results of this study it can be concluded that motivational factors, social support, work experience and years of work are related to perceptions of safe behavior.

Keywords: Perception, Safe Behavior, Occupational Safety.

Introduction

Law number 1 of 1970 concerning work safety states that every workforce has the right to get protection from safety in carrying out work and increasing national production and productivity. But the fact that work safety is still not entrenched, this is evidenced by the still high number of workplace accidents and illnesses caused by work that occur both nationally and internationally.¹

According to the International Labor Organization (ILO) every day an average of 6,000 people die, as well as one person every 15 seconds, or 2.2 million people per year due to illness or accident related to their work. The number of men who die two times more than women (Primasari, 2016). In Indonesia the number of occupational accidents recorded in 2011-2014 was the highest in 2013 with 35,917 work accident cases, while in 2011 there were 9,891 cases; in 2012 there were 21,735 cases, and 2014 there were 24,910 cases².

Domino theory Henrich states that workplace accidents are caused by two main things. First is mechanical and environmental factors or unsafe conditions, while the second is unsafe action. Henrich estimates that 85% of accidents are the result of unsafe work behavior (Halimah, 2009). Based on this, it can be said that human behavior plays an important role in the occurrence of accidents and illnesses due to work.³

According to Green, there are three factors that influence individual behavior, namely, basic factors...
(predisposing factors), supporting factors (enabling factors), and reinforcing factors (reinforcing factors). One of the basic factors that influence individual behavior is a perception\(^4\).

According to Robins, there are three factors that can influence perceptions, namely factors originating from perception, target, and situation. Perception includes knowledge, attitudes, expectations, experiences, and motivation. Targets include background, intensity, size, something new and closeness. While the situation includes the environment, social conditions or social support and time or length of observation\(^5\).

OHS programs implemented at PT. Kimia Farma (Persero) Tbk Plant Bandung aims to create a workplace that is safe, comfortable and free from workplace accidents, especially for workers and the community working environment. The K3 Program held at PT. Kimia Farma (Persero) Tbk Plant Bandung is summarized in a program called the zero accident program.

Based on the 2015 zero accident program document PT. Kimia Farma (Persero) Tbk Plant Bandung which shows data from 2011 to 2015 has reached 5,122,353 working hours without losing work time. While for 2016 this company has reached 928,225 working hours without losing work time. So that in 2016 based on the Decree of the Minister of Manpower of the Republic of Indonesia Number PER-01 MEN / I / 2007 PT. Kimia Farma (Persero) Tbk. Plant Bandung received a zero accident award.

The purpose of this study was to identify the relationship between workers’ motivation, social support, work experience and years of service with perceptions of safety behavior in Production I employees of PT. Kimia Farma (Persero) Tbk. Plant Bandung.

### Material and Method

This research is an analytical survey with a Cross-Sectional approach and a method of collecting data at a time (point time approach)\(^6\). The independent variables in this study were worker motivation, social support, worker experience and years of service. The dependent variable in this study is the perception of safety behavior. Variables were measured using a questionnaire with a Likert scale. Alternative answers to questions strongly agree, agree, disagree and strongly disagree\(^7\). Categorization uses median\(^8\). Test the validity and reliability in the production section II, the questionnaire is said to be reliable if the value of Cronbach’s Alpha> 0.60\(^9\). The study sample of 51 production part I workers PT. Kimia Farma (Persero) Tbk. Plant Bandung. Data management through editing, coding, processing, and cleaning\(^10\). The data analysis technique uses the chi-square test.

### Findings

**Table 1. Safety Behavior Perception**

<table>
<thead>
<tr>
<th>Safety Behavior Perception</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>36</td>
<td>70.6</td>
</tr>
<tr>
<td>Negative</td>
<td>15</td>
<td>29.4</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Most workers have a positive perception of safety behavior.

PT. Kimia Farma (Persero) Tbk. Plant Bandung organizes various forms of activities in an effort to provide a positive understanding and understanding to workers of the safety behavior. These efforts include OSH training for workers so as to give a positive impression on workers and workers able to interpret safety behavior properly.

**Table 2. Motivation of Workers**

<table>
<thead>
<tr>
<th>Motivation of Workers</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>30</td>
<td>58.8</td>
</tr>
<tr>
<td>Low</td>
<td>21</td>
<td>41.2</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Most workers have a high motivation to behave safely (safety behavior).

The production process requires the production part I worker PT. Kimia Farma (Persero) Tbk. Plant Bandung to interact directly with production components, this certainly has a risk of workplace accidents. This risk is understood by workers as something that can interfere with production and harm safety. Therefore, with the understanding of workplace safety, workers are highly motivated to behave safely.
Table 3. Social Support

<table>
<thead>
<tr>
<th>Social Support</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well</td>
<td>27</td>
<td>52.9</td>
</tr>
<tr>
<td>Enough</td>
<td>24</td>
<td>47.1</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Most workers get good social support for safety behavior.

According to Sarafino, social support means that there is acceptance from people or groups of individuals that give rise to perceptions in themselves that they are cared for, and helped.

PT. Kimia Farma (Persero) Tbk. Plant Bandung has a morning talk program that is filled with a review of company culture guidelines, the spirit of corporate culture (5-AS), and the fundamental of improvement culture (5R).

So that by doing this a good relationship is established between superiors and subordinates, good relationships are established with fellow co-workers, workers feel support for worker safety from superiors and efforts to remind each other of coworkers. This situation creates harmonization between workers and superiors while in the work environment.

Table 4. Worker Experience

<table>
<thead>
<tr>
<th>Worker Experience</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well</td>
<td>33</td>
<td>64.7</td>
</tr>
<tr>
<td>Enough</td>
<td>18</td>
<td>35.3</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Most workers have good experience with safety behavior.

PT. Kimia Farma (Persero) Tbk. Plant Bandung has implemented national and international standards for workplace safety. All aspects relating to workers and worker safety are well managed. So that workers have good skills in implementing the company’s K3 Standard Operating Procedure (SOP). Good OSH implementation has an impact on workers so that they feel the benefits of K3 and know the OSH aspects well. Fulfillment of these indicators has caused most workers to have good experience with the implementation of OSH in the company.

Table 5. Working Period

<table>
<thead>
<tr>
<th>Working Period</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old worker</td>
<td>39</td>
<td>76.5</td>
</tr>
<tr>
<td>New Worker</td>
<td>12</td>
<td>23.5</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

Almost all workers have long service periods.

Domination of the long working period of PT. Kimia Farma (Persero) Tbk. Plant Bandung is inseparable from the long history of the establishment of this company which began in colonial times, namely in 1896. Previous research on the period of work carried out by Ferlisa showed that the majority of Unit II and III workers at PT. Semen Padang has a long job.11

Table 6. The Relationship between Workers’ Motivation with Safety Behavior Perception

<table>
<thead>
<tr>
<th>Motivation of Workers</th>
<th>Safety Behavior Perception</th>
<th>N</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>25</td>
<td>5</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>83.3%</td>
<td>16.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>11</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>52.4%</td>
<td>47.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70.6%</td>
<td>29.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

There is a relationship between the motivation of workers with perceptions of safety behavior.

The results of this study showed 30 workers who were highly motivated, 5 of whom had negative perceptions of safety behavior. This can be caused by the fact that there are still workers who claim that participating in safe behavior is only based on obligations that have been set by the company and solely want to be praised by superiors.

Furthermore, the results of this study also show that of the 21 workers who had low motivation, 11 of them had positive perceptions of Safety Behavior. This can happen because of the company’s efforts to routinely carry out work safety promotions and have an impact on increasing workers’ knowledge and understanding of safety behavior. The author’s statement is based on the theory conveyed by Robins that in addition to the perception factors examined by the author there are other factors that can influence perception, namely knowledge.
Table 7. The Relationship between Social Support with Safety Behavior Perception

<table>
<thead>
<tr>
<th>Social Support</th>
<th>Safety Behavior Perception</th>
<th>N</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well</td>
<td>23</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>85.2 %</td>
<td>14.8 %</td>
<td>100%</td>
</tr>
<tr>
<td>Enough</td>
<td>13</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>54.2 %</td>
<td>45.8 %</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>15</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>70.6 %</td>
<td>29.4 %</td>
<td>100%</td>
</tr>
</tbody>
</table>

There is a relationship between social support and the perception of safety behavior.

According to Notoatmodjo, factors that can influence a person’s perception other than experience can also be influenced by socio-culture. The social aspect that is intended is the existence of good interactions and mutual support between individuals (social support)\(^4\).

The results showed that of 27 workers who received good social support, 4 of them had negative perceptions of safety behavior. This can happen because there are still workers who consider safety behavior only to save production and earn income in order to meet family needs. In addition, this can also be caused by a lack of support from the family towards workers’ safety behavior during the work process. According to Handayani, social support in addition to being obtained from coworkers and superiors can also be sourced from families\(^12\).

The results of this study also showed that of 24 workers who had good social support, 13 of them had positive perceptions of safety behavior. This condition can be caused by the intense work safety promotion carried out by the HSE section so that it increases workers’ knowledge and fosters a supportive attitude from workers towards the perception of safety behavior.

Table 8. The Relationship between Worker Experience with Safety Behavior Perception

<table>
<thead>
<tr>
<th>Worker Experience</th>
<th>Safety Behavior Perception</th>
<th>N</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well</td>
<td>28</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>84.8 %</td>
<td>15.2 %</td>
<td>100%</td>
</tr>
<tr>
<td>Enough</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>44.4 %</td>
<td>55.6 %</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>15</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>70.6 %</td>
<td>29.4 %</td>
<td>100%</td>
</tr>
</tbody>
</table>

There is a relationship between the experience of workers and the perception of safety behavior.

According to Robbins and Krech, one of the factors that influence a person’s perception of something is experience\(^13\).

The results of this study indicate that there are workers who have a good experience but have negative perceptions of safety behavior. According to Wibowo, this happens because there are several things that can make workers wrong in perceiving something. The good experience obtained by workers can be caused by imitating what other workers do without understanding their purpose. This error is called the halo effect\(^14\).

Table 9. The Relationship between Working Period with Safety Behavior Perception

<table>
<thead>
<tr>
<th>Working Period</th>
<th>Safety Behavior Perception</th>
<th>N</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Worker</td>
<td>31</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>79.5 %</td>
<td>20.5 %</td>
<td>100%</td>
</tr>
<tr>
<td>New Worker</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>41.7 %</td>
<td>58.3 %</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>15</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>70.6 %</td>
<td>29.4 %</td>
<td>100%</td>
</tr>
</tbody>
</table>

There is a relationship between years of service with the perception of safety behavior.

The working period can affect the length of observation or the length of interaction between workers and the work environment. So the longer the workers work somewhere more likely to recognize the surrounding environment\(^15\).

Based on the results of the crosstab, there were 39 workers who had a long working period, 8 of whom had negative perceptions of safety behavior. This can be caused by the cognitive aspects of knowledge of elderly workers who find it difficult to accept positive changes in Occupational Health and Safety held at PT. Kimia Farma (Persero) Tbk. Plant Bandung.

The results of this study also showed that of 12 workers who had new years of service, 5 of them had positive perceptions of safety behavior. Workers with a new working period are classified as teenagers, so they tend to be easier to accept and follow the rules set by the company. So that with health promotion routinely
carried out at PT. Kimia Farma (Persero) Tbk. Plant Bandung workers can immediately understand and interpret safety behavior properly.

**Conclusion**

Based on the results of the study it can be concluded that the majority of workers have a positive perception of the safety behavior, most workers have high motivation, most workers get good social support, most workers have a good experience and almost all workers have long years of service.

There is a relationship between worker motivation, social support, work experience and working period with perceptions of safety behavior at PT. Kimia Farma (Persero) Tbk. Plant Bandung.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** The source of this research costs from self.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of The Bhakti Kencana Institute of Health Science.

All subjects were fully informed about the procedures and objectives of this study each subject prior to the study signed an informed consent form.

**References**

Effect of Happiness at Work on Employee Engagement and Intention to Stay of Hospital Employees

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³Faculty of Economic and Business, Universitas Airlangga, Indonesia

Abstract

Employee engagement in organizations is very important, because it provides many benefits, so every employee must have a sense of being engaged. The purpose of this study was to determine the effect of happiness at work on both employee engagement and intention to stay of hospital employees. The current research was an observational analytic. The research design used was cross sectional. The sample size was 154 respondents. The sampling technique used was Proportional Random Sampling. Data analysis was conducted with PLS. Based on the results of analysis and discussion, it is concluded that happiness at work has positive and significant relationship with employee engagement; employee engagement has positive and significant relationship with intention to stay; and happiness at work has no direct relationship with intention to stay, but has relationship through employee engagement.

Keywords: Employee engagement, Happiness at work, Hospital, Intention to stay

Introduction

Health service industry is an industry that has good prospects. Because health services are not only focused on the treatment of diseases, but also provide services for prevention and improvement of health. One of the factors that affect the quality of service in a hospital is the role of human resources (HR) as service providers. The attitude, ability and integrity of HR in the hospital affect the success of establishing relationships between companies, employees and customers. Employee engagement is very important in organizational development. High employee engagement can bring the organization to success, because the current progress of the organization depends on the creativity of its human resources. If the employee has a feeling of being engaged with the company, it will increase three general behaviors, i.e. (3S) Say (talk positively about the organization), Stay (stay in the organization), and Strive (motivated to work more seriously). According to Macey, measurement of employee engagement is done by using a combination of four individual elements with the same weight of importance, i.e. Pride, Satisfaction, Advocacy and Commitment.

The reason for choosing this element is because of employee involvement, which is one of the prides they have, which shows satisfaction with the organization they work in, as well as the intention to stay with their organization.

Employee engagement makes employees have higher loyalty, thereby reducing the desire to leave the company (turnover intention). If turnover intention is low, employee performance will increase. The desire to stay (intention to stay) is the opposite of turnover intention which is defined as when individuals think, plan and want to leave work.

The success of an organization is also marked by employees who are happy at their workplace. Happiness is not only limited to physical aspects, but
also to psychological aspects. This means that happiness will help individuals to control aspects of their lives consciously. Employees who feel happy while working are related to core and contextual performance, customer satisfaction, security, high work presence and retention.

A phenomenon that often occurs is that the good performance of a hospital can be disrupted by various employees’ behaviours that are difficult to be prevented, such as employees’ decision to leave work (turnover). Employees’ decision to leave their previous jobs is preceded by their intention or desire to change jobs (intention to leave)\(^{18}\). The prevalence of nurse turnover events in the world ranges from 10% to 21% per year\(^{13}\).

In Indonesia, the turnover rate is quite high. This can be seen from several studies in class C hospitals, such as Anik’s study. She found that the turnover of nurses at IbnuSina Hospital in Padang from 2010 to 2014 was about 11.95%. The research conducted by Lubis at Zahirah General Hospital in Jagakarsa, South Jakarta, stated that the number of nurse inpatient turnover in 2012 reached 40%. Sources of data obtained from Surabaya Surgical Hospital also showed high turnover rates over the past four years (2011 – 2014), i.e. around 12.22%. At a glance, for the last three years, the turnover rates have shown a decline, but the rates are still above the standard value with an average of 19.6%. Gillies states that the turnover rate is said to be normal if it ranges from 5% to 10% per year and said to be high if it values more than 10%. Therefore, researchers are interested in analysing the relationships between happiness at work on both employee engagement and intention to stay of hospital employees.

**Materials and Method**

The current research was an observational because the process of collecting data did not involve any intervention or treatment\(^3\). This research was an observational analytic because of the nature of the research problem which is a causal relationship and the purpose of this research is to find a model. The design of this study is cross-sectional because data variables were collected in one time period\(^3\).

This research was conducted in the city of Surabaya, i.e. at some private class C hospitals. Data were collected from October 2017 to November 2017. The population in this study was nurses who worked in hospitals. The unit of analysis is nurse. The samples of this study were some nurses who worked in selected hospitals. Sample size in this study was determined by using the estimated stratified sampling formula. Hence, the study used 158 samples from a population of 264. A total of out of 154 questionnaires were feasible to be used in this study.

**Results**

**Individual Characteristics**

The respondents in this study were characterised based on their demographic characteristics, including age, gender, education, marital status and work status as described in Table 1.

**Table 1. Characteristics of Respondents at Four of Class C Hospitals Located in Surabaya in 2017**

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>Indicators</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>16 – 25 years</td>
<td>27</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>26 – 35 years</td>
<td>58</td>
<td>37.7</td>
</tr>
<tr>
<td></td>
<td>36 – 45 years</td>
<td>45</td>
<td>29.2</td>
</tr>
<tr>
<td></td>
<td>46 – 55 years</td>
<td>23</td>
<td>14.9</td>
</tr>
<tr>
<td></td>
<td>&gt;56 years</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>154</td>
<td>100</td>
</tr>
</tbody>
</table>

| Gender | Male | 5 | 3.2 |
|        | Female | 149 | 96.8 |
|        | Total | 154 | 100 |

| Education | D3 Nursing/Midwifery | 124 | 80.5 |
|           | D4 Nursing/Midwifery | 3 | 1.9 |
|           | Bachelor of Nursing/ Midwifery | 28 | 18.2 |
|           | Total | 154 | 100 |

| Marital status | Married | 124 | 80.5 |
|                | Single | 30 | 19.5 |
|                | Total | 154 | 100 |

| Work status | Permanent employee | 134 | 87 |
|             | Contract employee | 20 | 13 |
|             | Total | 154 | 100 |

Based on the analysis in Table 1, the highest age for respondents was 26–35 years. The number of respondents in this category was 58 respondents (37.7%). Overall, the numbers of respondents under 35 years were more than those over 35 years. Only one person (0.6%)
was aged more than 50 years. The numbers of female respondents were by far higher than male respondents, with 149 (96.8%) of females and 5 (3.2%) of males.

Most respondents were nurses with D3 degree, with 124 respondents (80.5%), followed by nurse with bachelor degree, with 28 respondents (18.2%). Most of the respondents were married, with 124 respondents (80.5%). The numbers of single respondents were 30 respondents or 19.5%. 87% of respondents are permanent employees, while the other 13% are contract employees.

**Outer Model Analysis**

The evaluation of the outer model is performed to determine the validity and reliability that connects indicators with latent variables. Meanwhile the evaluation of the inner model is performed to determine how much influence or causality relationship between variables in a study. The test results of the outer model of the indicators for each latent variable are presented in Table 2.

<table>
<thead>
<tr>
<th>Variables of indicator</th>
<th>Path Coefficient</th>
<th>T-statistics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Happiness at work</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1.1 Good relations with employers</td>
<td>0.535</td>
<td>7.305</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.2 Completion of tasks according to standards</td>
<td>0.603</td>
<td>9.022</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.3 Support of work environment for work</td>
<td>0.788</td>
<td>19.656</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.4 Comfort of work environment</td>
<td>0.740</td>
<td>15.811</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.5 salary that meets demands</td>
<td>0.624</td>
<td>7.540</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.6 Incentives according to performance</td>
<td>0.592</td>
<td>7.775</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.7 Attention to employee health</td>
<td>0.745</td>
<td>15.138</td>
<td>Significant</td>
</tr>
<tr>
<td>X1.8 Providing health insurance for employees</td>
<td>0.728</td>
<td>14.070</td>
<td>Significant</td>
</tr>
</tbody>
</table>

**Employee Engagement**

<table>
<thead>
<tr>
<th>Variables of indicator</th>
<th>Path Coefficient</th>
<th>T-statistics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2.1 Commitment to the organization's mission</td>
<td>0.825</td>
<td>27.669</td>
<td>Significant</td>
</tr>
</tbody>
</table>

It can be seen from Table 2 that the loading factor of each item for all variables is valued more than 0.5. Thus, the items used in this study have met convergent validity.

**Inner Model Analysis**

The results of the model test of the indicators for each latent variable are presented in Table 3.
Table 3: Inner Loading Values

<table>
<thead>
<tr>
<th>No</th>
<th>Hypothesis</th>
<th>Original Sample (O)</th>
<th>T-statistics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Happiness at work à Intention to Stay</td>
<td>0.099</td>
<td>1.197</td>
<td>Not significant</td>
</tr>
<tr>
<td>2</td>
<td>Happiness at work à Employee Engagement</td>
<td>0.541</td>
<td>10.660</td>
<td>Significant</td>
</tr>
<tr>
<td>3</td>
<td>Employee Engagement à Intention to stay</td>
<td>0.492</td>
<td>6.136</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Structural or inner model measurement is used to see the relationship between variables, through a bootstrapping process. Individual reflective size is said to be valid if it has a t-statistic value greater than 1.96 (two-side test). If statistical value of a variable is less than 1.96, then the variables do not affect each other.

Table 3 can be explained as follows:

1. Happiness at work does not have a significant relationship with intention to stay, with a t-statistic value of 1.197 (<1.96). The original sample estimate value is positive (=0.099); hence indicating that happiness at work has a positive relationship with intention to stay. Thus the H1 hypothesis in this study which states that “Happiness at work has an effect on intention to stay” is not acceptable.

2. Happiness at work has a significant relationship with employee engagement, with a t-statistic value of 10.660 (>1.96). The original sample estimate value is positive (=0.541); hence indicating that happiness at work has a positive relationship with employee engagement. Thus the H2 hypothesis in this study which states that “Happiness at work has an effect on employee engagement” is acceptable.

3. Employee engagement has a significant relationship with intention to stay, with a t-statistic value of 6.136 (>1.96). The original sample estimate value is positive (=0.492); hence indicating that employee engagement has a positive relationship with intention to stay. Thus the H3 hypothesis in this study which states that “Employee engagement has an effect on intention to stay” is acceptable.

Discussion

The Effect of Happiness at Work Factor on Employee Engagement

The results showed that happiness at work had a direct effect on employee engagement. Happiness at work relates to employee satisfaction, commitment and engagement. Both job satisfaction and employees’ commitment to the organization are strong predictors in improving employee performance and turnover. Previous researchers by some experts have proven that happiness affects performance, including employee engagement at work.

The relationships between happiness and employee engagement are affected by several reasons: First, the construct of happiness contains an understanding of intrinsic motivation in individuals to excel in life in general, both in marriage and in social life. Workers will stay in the organization very much depending on how they see the future in the organization. Furthermore, employees will leave the company if the company they work for cannot provide happiness to their workers. Thus, happiness is a power from within an individual and not based on external factors. The choice to act is not influenced by external factors. If the environment is wrong, the individual continues to act in accordance with his dignity as a person. Second, employee engagement is a motivation for achievement in work in the company. These two psychological constructs basically have a relationship with individual achievement. Happiness is basically an intrinsic motivation to grow, while engagement results in inherent strength in the company. Both constructs basically contribute to employee performance. Consequently, happiness is one of the causes of employee engagement that will influence employee performance.

The Effect of Employee Engagement Factor on Intention to Stay

The results showed that employee engagement has a direct effect on the intention to stay. The variable that has the highest influence as a form of employee engagement factor is satisfaction with the hospital where they work. In addition, inspiring leadership also affects employee engagement. It is undeniable that engagement has an impact on improving financial performance, work quality, employee retention, customer satisfaction and loyalty. Employee engagement is an important contributor to employee retention, customer satisfaction and performance.
Employees who are satisfied with the company will have a low level of stress. Otherwise, they will have a high level of commitment and advocacy. Engaged employees have higher job satisfaction than disengaged employees. Engaged employees have a positive attitude, strong discipline and good work behaviour in the work. The CEO of General Electric described three benchmarks of a healthy organization, i.e. employee attachments, customer satisfaction and positive cash flow.

Happiness in the workplace is very important for employees because employees who are happy at work, have positive feelings that make employees satisfied and productive, which will result on low turnover. As a consequence, happiness at work will create qualified human resources. Basically, employees who are happy at work will have both positive and negative impacts on the organization. By observing both positive and negative effects that are obtained from happy and unhappy employees, the organization can increase employee happiness at work. However, to increase employee happiness at work, it is important to first know the factors that make employees happy at work.

The Effect of Happiness at Work Factor on Intention to Stay

The results showed that happiness at work has no direct effect on the intention to stay, but has effect through employee engagement.

Happiness in the workplace is very important for individuals because individuals who are happy at work, have positive feelings that make individuals satisfied and productive, which will result on low turnover. As a consequence, happiness at work will create qualified human resources. Basically, individuals who are happy at work will have both positive and negative impacts on the organization. By observing both positive and negative effects that are obtained from happy and unhappy individuals, the organization can increase individual happiness at work. However, to increase individual happiness at work, it is important to first know the factors that make individuals happy at work. The factors are (1) positive relationships with others, (2) achievements, (3) physical work environment, (4) compensation, and (5) health. Positive relationships with others are the main factor that makes someone happy at work.

Conclusions

Based on the results of analysis, this research can be concluded as below:

1. Happiness at work has positive and significant relationship with employee engagement;
2. Employee engagement has positive and significant relationship with intention to stay;
3. Happiness at work has no relationship with intention to stay.

Conflict of Interest

The authors have declared that no competing interests exist.

Source of Funding

The authors have no funding and support to report.

Ethical Clearance

All procedures performed in this study involving human participants were in accordance with the ethical standards of the Faculty of Public Health, Airlangga University and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Validity and Reliability of Indonesian Languages Version of Zung Self-Rating Depression Scale Questionnaire for Pulmonary Tuberculosis Patients

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Abstract

Background: Patients with chronic disease, including tuberculosis, can easily get depressed. A valid and reliable instrument is needed to detect depression in tuberculosis patients. The Indonesian language version of Zung Self-Rating Depression Scale questionnaire is needed to be proved as a valid and reliable instrument because so many Indonesian people are unable to read the English version.

Objective: The purpose of this research is to obtain evidence on the validity and reliability of the Indonesian language version of Zung Self-Rating Depression Scale questionnaire.

Method: The design of this study is cross-sectional by giving Zung Self-Rating Depression Scale questionnaire that had been translated into Indonesian language to pulmonary tuberculosis patients. Characteristics of the population were presented as mean, standard deviation, and percentage. Corrected Item-Total Correlation table was used for validity test and reliability test result was presented as Cronbach’s Alpha value.

Results: Mean age of the population in this research is 47.75 ± 8.44 years old. Most of all have married (93%). Male and female pulmonary tuberculosis patients are 69% and 31% and 43% only graduated from elementary school. All 20 questions are valid because Corrected Item-Total Correlation values for all the questions are more than r table (>0.195). The questionnaire is also reliable with r Alpha value (Cronbach’s Alpha) 0.887, greater than r table value (>0.195).

Conclusion: Indonesian language version of Zung Self-Rating Depression Scale questionnaire is a valid and reliable instrument to be used for detecting depression in adult pulmonary tuberculosis patients.

Keywords: Validity, Reliability, Depression Scale Questionnaire, Pulmonary Tuberculosis, Indonesia

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Introduction

Tuberculosis (TB) is an infectious disease. It is caused by Mycobacterium tuberculosis. It majorly infects the lungs and known as pulmonary TB, but can also find in other part of the human body and known as extrapulmonary TB. Tuberculosis is one of major global health problems until now. It causes ill health people about 10 million people a year worldwide and become one of the top ten causes of population death. It’s the 9th causes of population death and its ranking is above Human immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS). New cases of Tuberculosis in the world were 6.3 million cases in 2016. Death in Tuberculosis without HIV patients almost 82% reported from WHO African Region and the WHO South-East Asia Region in 2016. Approximately 33% of global deaths in Tuberculosis without HIV patients occurred in India. Indonesia is one of the top 20 countries with the highest incident of TB cases that share 84% of global TB incidence in 2016. TB incidence rate in Indonesia is ≥ 300 per 100,000 population in 2016, Indonesia get the second position after India for countries that have largest incident cases in 2016(1).

Psychiatric problems and mental illness, depression includes mood disorder, may develops in patients with TB. Prevalence of depression have a significant correlation with the severity and duration of disease. The failure of TB control can be caused by many factors, includes the nonadherence to medication that was caused by psychiatric disorders (2). Poor of adherence to medication is a behavioural problem (3). TB and psychiatric disorder have a two way relationship. Severe mental disorder has a positive and significant relation with the incidence of TB, and conversely, the incidence of mental disorder comorbidity increases in TB patients. Researches in England found that 30 – 34% of TB patients were having mental disorder and research in New York found that 20 – 50 % of TB patients were nonadherence to medication because of psychological problems. A research focused on the contagious factors in depression incident of TB patients at Kariadi Hospital in Semarang, Indonesia, found that 51.9% patients with TB were depressed (4).

Valid and reliable instruments needed to detect the psychiatric disorder in TB patients. Zung Self-Rating Depression Scale has been provided by World Health Organization as an instrument to detect depression, but this instrument was written in English language. Not all Indonesian people are able to read and understand English language, so that this instrument should be translated in Indonesian language in order to use it for Indonesian patients, especially Indonesian pulmonary tuberculosis patients. Translation of an instrument needed for a cross cultural research. Translation cannot only be done literally because it can develop cross cultural pitfalls. The challenge is to create a translated version that can be adapted to the local language and culture, but still maintain the original meaning of the items. Translated version of an instrument should be validated for the specific population (5). This research was done to validate and obtain the evidence of reliability of the Indonesian version Zung Self-Rating Depression Scale in pulmonary TB patients’ population.

Materials and Method

This study was approved by Pelita Harapan University Ethical Committee. The design of this study is cross sectional by giving Zung Self-Rating Depression Scale questionnaire that have been translated to Indonesian language to pulmonary tuberculosis patients. Zung Self-Rating Depression Scale questionnaire was translated from original English version to Indonesian language version by one psychiatrist and one clinical psychologist. After being translated from English version, the Indonesian language version was reviewed by one medical doctor with master degree of psychology. The Indonesian language version that has been reviewed then was given to The Faculty of Cultural and Science, University of Indonesia to be back translated to English version by translator that was blinded to the original questionnaire. The result from back translate process was reviewed once again and compared with the original English version to make sure that the back translate version has the same meaning as the original English version. After the reviewer stated that the back translate version has the same meaning as the original English version, the Indonesian language version was given to the pulmonary tuberculosis patients to be tested for validity and reliability (5).

Participants included in the validity and reliability test for the Indonesian language version of Zung Self-Rating Depression Scale questionnaire were 100 patients with pulmonary tuberculosis that were treated as outpatient in Siloam General Hospitals Lippo Karawaci, Puskesmas Kutai and Puskesmas Curug from March to April 2018. The sampling method used was consecutive sampling. Every patient came to the outpatient department was included until we got 100 patients. Informed consents
were given and Indonesian version of Zung Self-Rating Depression Scale questionnaires were filled by patients that have agreed to be participated in this study after they were explained about how to fill the questionnaire.

Inclusion criteria for the patients included in this study are 17 – 66 years old male or female patients with lung tuberculosis who stay in Tangerang and are receiving Tuberculosis drugs regimen therapy. Exclusion criteria in this study are male or female patients who did not agree to participate in this study, and also pregnant female patients. Other data collected from the patients were gender, age, weight, height, educational status, and marital status. All data collected by interviewing the patients.

The data were then analyzed using Statistical Package for the Social Sciences (SPSS) version 23. Numeric variable of characteristics of the population were presented as mean and standard deviation, meanwhile categorical variable of characteristics of the population were presented as percentage. Validity test was done to assess the construct validation. Each question will be declared as a valid question if the corrected item-total correlation value is higher than r table value, so that the validity test result was presented as Corrected Item-Total Correlation table. For reliability test, the internal consistency was evaluated using Cronbach’s Alpha value. The internal consistency will be considered as internally consistent if the Cronbach’s Alpha value is 0.7 or higher, so that the result was presented as Cronbach’s Alpha value\(^{6,7}\).

### Findings

A. Characteristics of Population

#### Table 1. Characteristics of The Patients.

<table>
<thead>
<tr>
<th></th>
<th>Mean + Standard Deviation (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>47.75 + 8.44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>69 (69)</td>
</tr>
<tr>
<td>Female</td>
<td>31 (31)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>7 (7)</td>
</tr>
<tr>
<td>Married</td>
<td>93 (93)</td>
</tr>
<tr>
<td>Widower</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary School</td>
<td>43 (43)</td>
</tr>
<tr>
<td>Junior High School</td>
<td>20 (20)</td>
</tr>
<tr>
<td>Senior High School</td>
<td>19 (19)</td>
</tr>
<tr>
<td>Diploma</td>
<td>9 (9)</td>
</tr>
<tr>
<td>Bachelor</td>
<td>9 (9)</td>
</tr>
</tbody>
</table>

Validity test was done with significance level \(\alpha=5\%). From \(r\) table we can find that \(r\) table value with significance level (alpha) 5% and degrees of freedom (df) 18 (n-2) is 0.195. Table 1 second column shows the Corrected Item-Total Correlation values for every question. We can see that all Corrected Item-Total Correlation values are more than 0.195.

B. Validity Test Result in Patients with Pulmonary Tuberculosis

#### Table 2. Corrected Item-Total Correlation of Each Questions in Patients with Pulmonary Tuberculosis

<table>
<thead>
<tr>
<th>Question</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>.589</td>
<td>.880</td>
</tr>
<tr>
<td>P2</td>
<td>.276</td>
<td>.889</td>
</tr>
<tr>
<td>P3</td>
<td>.699</td>
<td>.876</td>
</tr>
<tr>
<td>P4</td>
<td>.609</td>
<td>.878</td>
</tr>
<tr>
<td>P5</td>
<td>.447</td>
<td>.883</td>
</tr>
<tr>
<td>P6</td>
<td>.377</td>
<td>.886</td>
</tr>
<tr>
<td>P7</td>
<td>.210</td>
<td>.892</td>
</tr>
<tr>
<td>P8</td>
<td>.338</td>
<td>.887</td>
</tr>
<tr>
<td>P9</td>
<td>.450</td>
<td>.883</td>
</tr>
<tr>
<td>P10</td>
<td>.569</td>
<td>.880</td>
</tr>
<tr>
<td>P11</td>
<td>.645</td>
<td>.877</td>
</tr>
<tr>
<td>P12</td>
<td>.538</td>
<td>.881</td>
</tr>
<tr>
<td>P13</td>
<td>.502</td>
<td>.882</td>
</tr>
<tr>
<td>P14</td>
<td>.605</td>
<td>.878</td>
</tr>
<tr>
<td>P15</td>
<td>.393</td>
<td>.885</td>
</tr>
<tr>
<td>P16</td>
<td>.448</td>
<td>.883</td>
</tr>
<tr>
<td>P17</td>
<td>.542</td>
<td>.880</td>
</tr>
<tr>
<td>P18</td>
<td>.564</td>
<td>.880</td>
</tr>
<tr>
<td>P19</td>
<td>.593</td>
<td>.879</td>
</tr>
<tr>
<td>P20</td>
<td>.728</td>
<td>.875</td>
</tr>
</tbody>
</table>

From Table 1, we can see that the average age of the population in this research is 47.75 ± 8.44 years old. Almost all have married (93%). Most of them are male pulmonary tuberculosis patients (69%), and only graduated from elementary school (43%).
C. Reliability Test Result in Patients with Pulmonary Tuberculosis

Table 3. Cronbach Alpha Value in Patients with Pulmonary Tuberculosis

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.887</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 2 shows the r Alpha value (Cronbach’s Alpha) is 0.887. This value is higher than 0.7 (>0.7).

Discussion

Psychiatric disorders, including depression, can be experienced by patients with pulmonary TB. There is a significant correlation between prevalence of depression and severity and duration of TB. Psychiatric disorder is one of the factors that cause non adherence to the treatments given to pulmonary TB patients (2). Depression should be detected as early as possible. Zung Self-Rating Depression Scale questionnaire is one of many instruments that can be used to detect depression in TB patients, but this questionnaire is provided in English language.

Many Indonesian people cannot read and understand English language, so that Zung Self-Rating Depression Scale questionnaire should be translated to Indonesian language. Translation to different language can compromise validity of the questionnaire. The translation cannot be done literally because complex inter-cultural problems (5). Validity and reliability evidences in pulmonary TB patients should be obtained for the translated version of Zung Self-Rating Depression Scale questionnaire used. Validity and reliability evidences were obtained by testing this translated questionnaire to 100 pulmonary TB patients.

Almost all patients with pulmonary TB tested in this research have married (93%). Previous study shows that 84.3% patients with pulmonary TB are married (10). Other study in Indonesia, Central java province: Banyumas district, shows that 59.1% patient with pulmonary TB are married (11). Study in Semarang district, also shows that 61% of pulmonary TB patients are married (12). We can see that pulmonary TB happened more frequent in married patients and the same result was found in this study.

Most of the pulmonary TB patients tested are male pulmonary tuberculosis patients (69%). According to World Health Organization (WHO), in 2018 pulmonary TB was generally more frequent to invade male than female, summarize with 64% percentage of the infected population were male patients. In Indonesia, male population might have three times higher chance to be infected by pulmonary TB than female patients. However, the smoking and alcohol consumption habit (which is likely done by male) are also taking part to make the number higher in male patients (8). Other study of the pulmonary TB based on gender issue has shown that 58% of male population were infected (12). The other study describe to about gender issue of pulmonary TB shown that 61.3% are males (13). As several study have been done, the result shown that male population are generally have more tended to get pulmonary TB infection than female population.

Most of the pulmonary TB patients tested were graduated from elementary school (43%), 20% were graduated from Junior High School, 19% were graduated from Senior High School, 9% were Diploma, and the rest were Bachelor. The results from several other studies has shown that the patients with Pulmonary TB were mostly only graduated from primary education as much as 95.5%, and only 4.5% were graduated from higher education (8). Other study of the pulmonary TB based on gender issue has shown that 58% of male population were infected (12). The other study describe to about gender issue of pulmonary TB shown that 61.3% are males (13). As several study have been done, the result shown that male population are generally have more tended to get pulmonary TB infection than female population.

In this research we found that the mean age of the tested pulmonary TB population is 47.75 ± 8.44 years old. The cases in all countries, by age groups, 90% were adults with age > 15 years. In Indonesia, based on data from Indonesian Ministry of Health, in 2018 the prevalence of pulmonary TB is 759 per 100,000 population with age > 15 years old (8). From two data above we can see that pulmonary TB mostly happened in population with age > 15 years old. The result about the population age in this study is almost the same with the data from WHO and Indonesian Ministry of Health (9).
Corrected Item-Total Correlation values for each question in this research are 0.210 – 0.728. Corrected Item-Total Correlation values are more than r table (0.195) for all 20 questions. That means all 20 questions that have been translated to Indonesian language are valid questions, especially to be used to pulmonary TB patients. R Alpha value (Cronbach’s Alpha) for the translated Zung Self-Rating Depression Scale questionnaire is 0.887. This value is higher than 0.7 (>0.7). It means that this questionnaire is reliable and has a good internal consistency.

The limitation of this research are 1) in this research the translated Zung Self-Rating Depression Scale questionnaire only tested in 100 pulmonary tuberculosis patients, so that the adequacy of the sample can be ranked as poor, 2) there was a possibility that the unhealthy patients were too lazy to answer the questions seriously too weak to concentrate, although this possibility had been reduced by giving them informed consent and slowly detailed explanation about how to fill the questions before they started to fill the questionnaire, 3) the questionnaires were given to the patients and filled in the busy and noisy outpatient departments that can distract patient’s concentration in understanding the real meaning of the questions.

Conclusion

The translated Indonesian version of Zung Self-Rating Depression Scale questionnaire is a valid and reliable instrument to detect depression in adult pulmonary TB patients with different educational status.

Conflict of Interest: There are no conflicts of interest in publishing this article.

Source of Funding: This research was self funded

Ethical Clearance: This research was approved by ethical committee of faculty of medicine Pelita Harapan University number 152/K-LKJ/ETIK/V/2018.

Reference

Earplug as a Barrier on Hearing Disorders Due to Noise Exposure

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Abstract

The use of production machinery in the industry is getting higher. Noise due to production machinery disturbs workers, resulting in hearing loss for workers. Deafness due to industrial noise is one of the diseases caused by work. The purpose of the study was to analyze noise intensity and analyze the benefits of earplug on hearing loss. This research is a quantitative study, the design used is a cross-sectional study. The population is workers at PT X who are exposed to noise intensity of 81 - 89 dB of 77 workers. Total population sampling technique. Data analysis using Spearman correlation (rs). The results of the analysis have no relationship to noise intensity with the right audiometry value (p-value = 0.895), there is no correlation between noise intensity and left audiometric measurements (p-value = 0.581). Workers use personal protective equipment so that noise intensity does not affect hearing function. Earplugs used when working are useful as barriers to protect hearing, able to reduce noise intensity by 30 dB. There is a relationship between right and left audiometry (p-value = 0.000). Decreasing the hearing power in the right ear will result in a decrease in hearing the power in the left ear, and vice versa. The auditory structure of the right and left ears has anatomically uninterrupted pathways (interconnected channels). Conclusion Earplugs function effectively to protect the ears from hearing loss, therefore it is highly recommended that you always use earplugs during work.

Keywords: Audiometry, Personal protective equipment, Earplug, Hearing loss, Noise intensity.

Introduction

The World Health Organization (WHO) said that in 2013 as many as 360 million people in the world experienced hearing loss, of which 180 million people who experience hearing loss are in the Southeast Asia region¹. Occupational diseases due to noise exposure rank first in the United States and Europe.

Hidayat et al. (2014) found 63% of employees experienced sensorineural hearing loss, who worked in the production room of PT Alas Kusuma, Kubu Raya Regency. This industry is engaged in wood which produces plywood, block boards, sawn timber and paper overlays, noise intensity of 93.3 dB². The 2018 Regional Health Research notes the causes of hearing loss include: deafness 0.09%, cervical blockage 18.8% and 2.4% secretions in the ear canal¹. Hearing loss causes decreased sensitivity to received sound impulses. Some of the causes that reduce hearing power based on the results of Regional Health Research come from human physiology, not from factors outside the environment or work environment.
Indonesia as a developing country has experienced rapid progress in the field of industry with the availability of industrial machinery for the production process and producing company products. The use of industrial machinery creates noise in the work environment. Unwanted sounds that exceed the ear’s ability to receive them are called noise. Sources of industrial engine noise can result in hearing loss for workers.

Hearing loss occurs due to several reasons, such as age factor, obstruction of the ear canal, secretion in the ear, exposure to noise, long exposure to noise, air pressure and drug use. Industrial noise sources come from production machines. Industries generally use machines that produce noise in the work environment, and this noise is received by workers during their work. The longer workers exposed to the noise the more at risk of experiencing occupational diseases. Aksurali (2010) states that hearing loss is initially temporary, becomes permanent if it is continuously exposed to noise in the workplace which can lead to workplace accidents(3).

Hearing loss due to noise exposure cannot be cured, only can be prevented by noise control efforts(4). One action that can be done is to provide ear protectors or APT (Ear Protector). The use of ear protectors, based on the results of Rahayu’s research (2016), the company provides premolded Ear Protector for workers exposed to noise. The tool is able to reduce noise by 25-27 dB, but workers feel uncomfortable using this type of Ear Protective Equipment, so many workers who do not use Ear Protector Equipment while working, the impact found complaints include: workers feel the ears often buzzing (52%), often dizzy (36%), listening to television with very loud volume (60%), pain in one or both ears (14%) and found 38% screaming when talking(5).

Research at PT X has noise intensity between 81 - 89 decible. Data obtained in the field found 22 workers experiencing hearing loss. Workers are given a personal protective device (PPE), the earplug, workers use PPE but sometimes release the device when the worker. Departing from this problem, it is necessary to analyze the use of earplugs as ear protectors, so as to provide motivation for workers to adhere to the rules and standards of work procedures and support the company to implement health protection for workers. Research problem: does the noise intensity affect hearing? Are earplugs useful to prevent hearing loss? The aim of the study: to analyze the intensity of noise to decrease hearing and analyze the benefits of earplugs to prevent hearing loss.

Material and Method

This research is a quantitative study, the design used is a cross-sectional study. The study was conducted for 6 months, from May 2018 to October 2018. The population of this study was all workers in the PT X production section. The sample was taken by means of the total population, as many as 77 workers in the production section of PT X. Data were collected by directly measuring the noise intensity and worker audiometry examination at PT X by the company doctor.

Data analysis through several stages, namely: Univariate, data analyzed and presented in the form of a frequency distribution of each research variable. The next step is to test the normality of the data, this test is done to determine the next bivariate analysis. If the results of data analysis are normally distributed using parametric tests (product moment correlation), and if the data is not normally distributed using non-parametric tests (Spearman correlation). The next stage is bivariate analysis using Spearman Correlation (rs) because the research data scale is ratio and data is not normally distributed (non-parametric test).

Results and Discussion

The data obtained from this study are grouped in two parts, namely univariate data consisting of the characteristics of the research respondents based on age, years of service, noise intensity, and hearing loss can be seen in the table below:

Table 1. Characteristics of Age and Working Period

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 – 33</td>
<td>12</td>
<td>15, 6</td>
</tr>
<tr>
<td>34 – 43</td>
<td>56</td>
<td>72, 7</td>
</tr>
<tr>
<td>44 – 53</td>
<td>9</td>
<td>11, 7</td>
</tr>
<tr>
<td>Amount</td>
<td>77</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working Period (year)</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>8</td>
<td>10, 4</td>
</tr>
<tr>
<td>– 10</td>
<td>7</td>
<td>9, 1</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>62</td>
<td>80, 5</td>
</tr>
<tr>
<td>Amount</td>
<td>77</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on age, the majority of workers aged 34-44 years were 56 people (72.7%), 24 - 33 years as many
as 12 people (15.6%) and aged 44 - 53 years as many as 9 people (11.7%). Age is at risk for hearing loss. Decreasing hearing thresholds due to age or presbycusis is the most common cause in developed countries\(^6\). The majority of respondents of productive age hearing function has not decreased, but hearing loss due to noise is very common in the age group > 40 years\(^7\).

Based on years of work, the majority of workers have a tenure of > 10 years totaling 62 people (80.5%), work period < 5 years 8 people (10.4%) and working period of 5 - 10 years 7 people (9.1%). Previous research revealed the prevalence ratio (RP) of hearing loss 2.1 (RP > 1) indicating that working period is a risk factor for hearing loss\(^8\).

Table 2. Respondents Exposed to Noise Intensity

<table>
<thead>
<tr>
<th>Noise Intensity (dB)</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (&lt; 85)</td>
<td>20</td>
<td>26.0</td>
</tr>
<tr>
<td>Noisy (&gt; 86)</td>
<td>57</td>
<td>74.0</td>
</tr>
<tr>
<td>Amount</td>
<td>77</td>
<td>100</td>
</tr>
</tbody>
</table>

The noise intensity is grouped into 2 normal and noisy categories, workers who work in the production section and are exposed to noise > 86 dB as many as 57 people (74%). Exposure to noise received by workers exceeds the appropriate threshold value. Suma’mur (2009) mentions noise intensity in Indonesia which is used as a guideline for hearing protection so that there is no hearing loss which is 8 hours a day for 5 working days (40 hours a week) is 85 dB (A). This provision was agreed upon for 3 decades, and finally became a national standard\(^9\).

Table 3. Hearing Loss experienced by Workers

<table>
<thead>
<tr>
<th>Hearing disorders</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no interference</td>
<td>55</td>
<td>71.4</td>
</tr>
<tr>
<td>Hearing disorders</td>
<td>22</td>
<td>28.6</td>
</tr>
<tr>
<td>Amount</td>
<td>77</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the table above, it was found that hearing loss was experienced by 22 workers (28.6%) and workers who did not experience 55 hearing loss (71.4%). Hearing loss which looks a very common health issue but affects nearly 10% of the world population as indicated by many international studies. Hearing disorders effectively frail sensitivity to the sounds ordinarily heard\(^10\). Liang K et al. (2018) stated that environmental and human activities can be at risk for ear disorders, such as upland residents who carry out daily activities in the lowlands experiencing changes in barotrauma air pressure\(^11\).

Bivariate Analysis

Audiometric measurement data is numerical and abnormally distributed data, so that data analysis is adjusted to the data obtained using non-parametric tests. The following are the results of analysis of Spearman correlation non-parametric test (rs).

Table 4. Correlation of Noise Intensity with Audiometry Measurements

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation value</th>
<th>Noise Intensity</th>
<th>Right Audiometry</th>
<th>Left Audiometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Intensity</td>
<td>Correlation coefficient</td>
<td>1,000</td>
<td>0.015</td>
<td>-0.064</td>
</tr>
<tr>
<td></td>
<td>Significant (p value)</td>
<td>-</td>
<td>0.895</td>
<td>0.581</td>
</tr>
<tr>
<td>Right Audiometry</td>
<td>Correlation coefficient</td>
<td>0.015</td>
<td>1.000</td>
<td>0.647**</td>
</tr>
<tr>
<td></td>
<td>Significant (p value)</td>
<td>0.895</td>
<td>-</td>
<td>0.000</td>
</tr>
<tr>
<td>Left Audiometry</td>
<td>Correlation coefficient</td>
<td>-0.064</td>
<td>0.647**</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Significant (p value)</td>
<td>0.581</td>
<td>0.000</td>
<td>-</td>
</tr>
</tbody>
</table>

The results of the Spearman correlation noise intensity with the right audiometry obtained a value of \(r = 0.015\) and the value of \(p = 0.895\) showed no relationship between noise intensity and right audiometry. Noise intensity with left audiometry obtained a value of \(r = -0.064\) and the value of \(p = 0.581\) showed no relationship between noise intensity and left audiometry. Increased audiometry results of 22 workers and diagnosed with hearing loss were not caused by noise exposure but were indicated due to other factors not examined such as drug use, cerumen blockage, earwax, lifestyle, smoking behavior and others.

Although workers are exposed to noise but are not related to statistical audiometry values. The results of monitoring workers use Personal Protective Equipment
so that noise does not interfere with hearing power. Ear plugs that are used when working are useful for protecting hearing function. Research by Fredinanta et al. (2013) describes the efforts to reduce noise can be done by controlling at the recipient level. The use of ear plugs provides benefits as ear protectors against the decreased hearing. This tool can reduce noise by + 30 dBA so that the earplug effectively protects the ear from noise exposure(12).

Workers exposed to noise levels 80 - 85 dB are not required to use Personal Protective Equipment, based on Minister of Manpower Decree No. 13 of 2011, because noise sources are at the noise threshold for 8 working hours per day. Workers are advised to use Personal Protective Equipment in this zone, to prevent Occupational Diseases. Measurement of noise intensity at PT X found 12 points above the threshold value (85 - 90 dB) zones must use Personal Protective Equipment(13).

The measurement of right and left audiometry values obtained $r = 0.647$ and the value of $p = 0.000$ means that there is a relationship between the right audiometry and left audiometry and shows a strong and positive pattern, meaning that the higher the right audiometric value the higher the left audiometric value. Decreasing the hearing power in the right ear will result in a decrease in hearing the power in the left ear, and vice versa. Research conducted to prove the ability to hear between the right and left ears, the test involved 41 people aged 19-28 years. Samples are given different information through headphones. The test results found no difference between the functions of the right and left ears in capturing information(14).

Based on the audiogram measurement standard, the classification of deafness is based on audiogram values as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Audiometry Value Standard (dB)</th>
<th>Audiometry Value Standard (Person) Measurement Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0 – 25</td>
<td>55</td>
</tr>
<tr>
<td>Mild deafness</td>
<td>26 – 40</td>
<td>21</td>
</tr>
<tr>
<td>Being Deaf</td>
<td>41 – 60</td>
<td>1</td>
</tr>
<tr>
<td>Deafness is heavy</td>
<td>61 – 90</td>
<td>0</td>
</tr>
<tr>
<td>Very heavy</td>
<td>&gt; 91</td>
<td>0</td>
</tr>
<tr>
<td>Amount</td>
<td></td>
<td>77</td>
</tr>
</tbody>
</table>

High audiometry value means hearing loss, and the results of analysis based on Spearman test found that the relationship between right ear hearing loss will have an impact on hearing the loss in the left ear. The hearing loss is usually slow in onset but progresses relentlessly for as along as the exposure continues. Indeed, the harmful effects may continue long after noise exposure has ceased. They are irreversible(15). In accordance with the results of the study, the ability to hear the right ear is related to the ability to hear the left ear, the auditory structure of the right and left ears anatomically has an unbroken relationship path (interconnected channels). Sound received by someone, in the form of vibration in the eardrum. Vibration is produced from a number of variations in air pressure produced by the sound source and propagated by the surrounding medium, called the acoustic field. This sound changes from an acoustic signal to an electrical signal and is transmitted by the auditory nerve to the brain(16). Sound localization requires the cooperation of both ears. A sound source close to the right ear will enter the brain earlier than the left ear, but if the sound source is in a straight position it will reach both ears at the same time.

Conclusions and Recommendations

1. The earplug functions to effectively protect the ear from hearing loss, therefore it is very good to still use earplug during work.

2. The decrease in the hearing of the right ear is associated with a decrease in hearing the power in the left ear because the ability to hear the right ear is related to the ability to hear the left ear.

3. There is no correlation between noise intensity and hearing loss, although the intensity of noise in the workplace exceeds the threshold value does not affect the hearing of workers because the earplug can reduce noise intensity + 30 dB (A).

Acknowledgments

Directors, managers and all employees of PT X for the support and permission of the research provided, and willingness to become research respondents.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Cleared
References


Study of Deviated Nasal Septum in Vijaywada Population

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Abstract

35 males and 25 female patients aged between 18-40 were studied. There were three types of DNS. Left deviation were 35(58.3%), right deviation were 20(33.3%) and 5(8.3%) were bilateral. The symptoms were bilateral. The symptoms were nasal observation24(40%), nasal discharge 12(20%), headache 10(16.6%), 9(15%) bleeding per nose, 5 (8.3%) had loss of smell. Post–operative complicated were bleeding 1%, residual deforming or deviation was 5.2%, syneche was 5.50% and septal perforation was 0%. Relief after post endoscopic septoplasty were nasal obstruction 94%, headache 82% nasal discharge 84.5%, Hyposmia 86.5%. This study of deviated nasal septum will be quite useful to ENT surgeons, radiologists and physicians to correlate the percentage of relief from various complications after endoscopic septoplasty.

Keywords: Endoscopic septoplasty, DNS-Deviated nasal septum, Vijaywada

Introduction

Nasal septum in the armature of nose It maintains the nose in prominent position over the face. Besides an anatomical function it also helps in physiological function of respiratory system. Deviated nasal septum (DNS) is a rule rather than an exception and is considered to arise out of consequences of trauma(1) either during intrauterine life or thereafter. Though majority of human beings have deviated nasal septum, most of them are asymptomatic and cause little or no any discomfort. However nasal septum may cause nasal obstruction and predispose to various inter related ailments like sinusitis, epistaxis, dysfunction of auditory tube otitis media and upper and lower respiratory tract infections, dental mal alignment leads to poor general health(2) DNS was classified into four different groups, sublaxation, large spurs, caudal deflection and tension septum(3). Endoscopic septoplasty is minimal invasive technique that helps to correct the deformity of the septum under direct visualization using an endoscope. Which is a latest technique as compared to seepoplasty because convention septoplasty has increased morbidity due to poor visualization, relative inaccessibility to poor visualization, relativeinaccessibility, poor illumination hence it is difficult to evaluate exact pathology. Therefore endoscopic septoplasty is used to treat the DNS and satisfactory results were observed(4). Hence attempt was made to prove that endoscopic septoplasty is safer, with least morbidity in both sexes of different age groups.

Material and Method

Sixty (60) patients 35 males and 25 females aged between 18-40 years were selected for study who were regularly visiting ENT OPD of Nimra Institute of medical science Ibrahim patnum Vijayawada (Andra-pradesh)

The patients presenting with complaints due to deviated nasal septum were diagnosed clinically, radiologically and endoscopically. The patients below 17 years, patients with acute respiratory tract infection or other nasal pathology requiring major surgery were excluded from the present study. Their occupation, past history was recorded. Endoscopic septoplasty was done in all the patients of DNS the ratio of the male with females was 1:2. The percentage of male was 58.3% and females were 41.6%. Post
operative patients called for follow up second week after the surgery; There after 90 days, 180 days respectively. If there is any complication like nasal obstruction, nasal discharge, headache, bleeding per nose and hyposmia. Nasal endoscopy was done to rule out the symptoms.

The duration of the study was about three years

**Observation and Results**

Table-1 patients were classified according to side of septal deviation. 35(58.3%) patients had left deviation, 20(33.3%)had right deviation, while 5(8.3%)had bilateral deviation.

Table - 2 patients were classified with different symptoms related to DNS 24(40%) had nasal obstruction, 12(20%)had nasal discharge, 10(16.6%)had headache, 9 (15%)had bleeding per nose, 5(8.3%) had loss of smell.

Table-3 present study of post operative complication were compared with previous studies- bleeding was observed in the study of Sulagavi was 14 %, manjunath 4%, chungetal 0.9%, mohd Nizam 0%, but in presents study 1. Similarly (b) residual deviation or deformity was observed in the study Leena Jain was 13%, suligavi 16%, chungetal 0.9%, mohd Nizam 6.67% but in present study was 5.2%.

(c) Synchae was observed in study of Suligavi was 6% ,Manjunath 4%,Chungetal 2.6%, Mohd Nizam 6.67% but in present study it was 5.50%.

(d) Septal perforation was observed only in the study of chung etal.

Table-4. The present study of relief after post endoscopic septoplasty was compared with previous studies

(a) Relief from Nasal observation was 96% in study of suligavi etal , Gupta etal ,Leena jain etal, Sathyaki, 93.3% and in present study it was 94%

(b) Relief from headache was observed 94.4% in the study ofSuligavi etal, 100% in Gupta etal,Satyak etal was 54%. In the study of Leena Jain and inMohd Nizam 80.9% but in presents study-82%

(c) Relief from nasal discharge was 100% in the study of Suligavi etal and Sathyaki etal 88%, in study of Leena 85%, in the study of Mohd Nizam and in present study it was 84.5%

(d) Relief from hyposmia 100% in the study of suligavi etal , Leena jain and sathayki , 87.5% in the study of Mohd Nizam and 86.5 in the presents study

**Discussion**

In the present study of DNS in Vijayawada population. The male patients were 35(58.3%) and females were 25(41.6%) the left DNS were 35(58.3%) and right DNS were 20(33.3%) and 5 (8.3%) were bilateral (Table-1). Nasal obstruction patients were 24(40%), nasal discharge were 12.(20%) ,headache 10(16.6%), 9(15%) bleeding per nose, 5(8.3%) had loss of smell (Table-2).These finding of DNS and associated clinical symptoms were more or less in the agreement with previous studies.(5)(6)

In the present study of post operative complications, bleeding was 1% residual or deviation or deformity was 5%. synchae was 5.50 %and there was no septal perforation(Table-3).These findings were more or less in the agreement with pervious workers (7)(8). The relief after endoscopic septoplasty was in nasal abstraction was 94 %, relief from headache was 82%, nasal discharge was 84.5%, hyposmia was 86.5. These findings were also more or less in agreement with previous studies (9)(10).

In majority of the casesetiology Could not be established but direct trauma was found to be the one of the factor, moreover these was little role of hereditary factors of DNS but it can be hypothesized that DNS could be admixture of races. Because civilized patients tend to have enlarged facialangle (11) hence DNS may be regarded as one of the disadvantages of racial admixture which needs surgical corrections. Again this admixture of race confirms because DNS will have more clinicalmanifestations in adult hood rather than children. In addition to this occupation of patients will also aggravate the symptoms of DNS.

**Summary and Conclusion**

The present of deviated nasal septum (DNS) of population in both sexes will be quite useful to the ENT surgeons, radiologist to rule out the type of DNS and its post–operative complications and degree of relief from various clinical problems but this demands further embryological,genetic and histo-pathological study of DNS because exact cause and mechanism of growth of DNS is still unclear.
This research work is approved by ethical committee of Nimra Institute of Medical Science. Ibrahim patnan Vijaywada. (Andrapradesh)

------ No conflict of Interest
------ No Funding

Table 1. Classification of the patients according to the side of septal deviation

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>No of the patients</th>
<th>Side of deviation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>Left</td>
<td>58.3%</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>Right</td>
<td>33.3%</td>
</tr>
<tr>
<td>3</td>
<td>05</td>
<td>Bilateral</td>
<td>08.3%</td>
</tr>
</tbody>
</table>

Table 2. Classification of patients with different Symptoms related in DNS

<table>
<thead>
<tr>
<th>Sl No</th>
<th>No of the patients</th>
<th>Symptoms of DNS</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>Nasal obstruction</td>
<td>40%</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>Nasal Discharge</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>Headache</td>
<td>16.6%</td>
</tr>
<tr>
<td>4</td>
<td>09</td>
<td>Bleeding per nose</td>
<td>15%</td>
</tr>
<tr>
<td>5</td>
<td>05</td>
<td>Loss of smell</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

Table 3. Comparisons of post-operative complication of endoscopic septoplasty with present study with percentage

<table>
<thead>
<tr>
<th></th>
<th>Leena Jain</th>
<th>Suligavi</th>
<th>Manjunath</th>
<th>Chung etal</th>
<th>Mohd., Nizam</th>
<th>Present study</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Bleeding</td>
<td>-</td>
<td>14%</td>
<td>4%</td>
<td>0.9%</td>
<td>0.1%</td>
</tr>
<tr>
<td>B</td>
<td>Residual deviation or deformity</td>
<td>13%</td>
<td>16%</td>
<td>-</td>
<td>0.9%</td>
<td>6.67%</td>
</tr>
<tr>
<td>C</td>
<td>synchiae</td>
<td>0</td>
<td>6%</td>
<td>4%</td>
<td>2.6%</td>
<td>6.67%</td>
</tr>
<tr>
<td>d</td>
<td>Septal perforation</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>3.4%</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4. Comparison relief of post endoscopic septoplasty with previous workers.

<table>
<thead>
<tr>
<th></th>
<th>Suligavi</th>
<th>Gupta. etal</th>
<th>Leena Jain</th>
<th>Sathyaki</th>
<th>Mohd. Nizam</th>
<th>Present study</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Nasal obstructions</td>
<td>96%</td>
<td>96%</td>
<td>96%</td>
<td>96%</td>
<td>93.3%</td>
</tr>
<tr>
<td>B</td>
<td>Headache</td>
<td>94.4%</td>
<td>100%</td>
<td>54%</td>
<td>100%</td>
<td>80.9%</td>
</tr>
<tr>
<td>C</td>
<td>Nasal discharge</td>
<td>100%</td>
<td>88%</td>
<td>30%</td>
<td>100%</td>
<td>85.7%</td>
</tr>
<tr>
<td>d</td>
<td>Hyposmia</td>
<td>100%</td>
<td>-</td>
<td>100%</td>
<td>100%</td>
<td>87.5%</td>
</tr>
</tbody>
</table>

References


Factors Affecting The Implementation of Clean and Healthy Living Behavior at Household Level (Observational Study at Sungai Paring Village, Martapura Kota District)

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Abstract

Clean and Healthy Living Behavior/Perilaku Hidup Bersih dan Sehat (PHBS) is a health behavior by individual, family, and community to help themselves improving health status. The aim of this study was to explain the factors that influence PHBS implementation at household level in Sungai Paring Village. This study was a quantitative by using cross-sectional approach. Population of this study were 2638 households. Technique sampling used purposive random sampling with sample of 91 households. The study was analyzed by chi-square test with CI 95% and significance level 0.05. The results showed that there were no relationship between knowledge (p-value = 0.103), attitude (p-value = 0.172), distance of health care facilities (p-value = 0.089) with the implementation of PHBS. Meanwhile, support from health workers (p-value = 0.001) and community leaders (p-value = 0.010) had relationship with the implementation of PHBS. Health workers, community and stakeholders should strengthen cooperation as an effort to improve the achievement of PHBS program implementation through routine monitoring and evaluation at household level.

Keywords: Clean and Healthy Living Behavior, PHBS program, Household level, Health, behavior, Sungai Paring Village

Introduction

Health degrees are not only determined by health services, but the more dominant ones are influenced by environmental conditions and people’s behavior¹. Household members need to be empowered to implement clean and healthy living behavior or perilaku hidup bersih dan sehat (PHBS) to prevent from infectious or non-infectious diseases².

Ramdaniati (2008) stated that there was an influence of knowledge and attitude toward the implementation of PHBS at household level³. Tumiwa, Rattu and Tucunan’s research (2014) states that the predisposing, enabling, and reinforcing of health behavior, attitude, facilities and infrastructure, such as support from health professionals had a great influence in encouraging members of the household to do PHBS at household level⁴. Budiman et al. (2012) said that knowledge, support and attitude of health workers could illustrate the implementation of PHBS at household level in Cimahi City⁵. Based on several studies, concluded that several factors such as level of education, knowledge, attitude, availability of

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facilities, infrastructure and support or attitude of health worker can influence the implementation of PHBS at household level.

The national target achievement of PHBS at household level based on the Ministry of Health’s strategic plan for 2015-2019 is 70%6. Based on data of Indonesian Health Profile in 2014, it was stated that the last achievement only reached 56.58%, it means that the achievement of PHBS at household level was still far from the predetermined target. South Kalimantan Province was one of the provinces that had achievement under the national target (49.74%)7. Banjar Regency had the achievement of PHBS at household level of 52.1% which also did not reached the National target8. Based on data from the Public Health Development Index in 2007 and 2013, Banjar Regency was ranked 13. Based on the result of Basic Health Research (2013) indicating that Banjar Regency can affecting Public Health Development Index of South Kalimantan Province (ranked 31 from 33 provinces). It needs to be a concern because the PHBS achievement data on the household level in Banjar Regency was not reached the target of both provincial and national9.

Data from the Banjar District Health Office in 2014 stated that Martapura Kota District had the lowest percentage of household PHBS in Banjar Regency, which was 37.1%8. Based on data from Martapura 1 Public Health Center, the lowest achievement of PHBS at household level was in Sungai Paring Village as much as 0.87% of 1846 households that had been monitored10. Based on description above, this research was conducted to explain the factors that influence the implementation of PHBS at household level in Sungai Paring Village, Martapura Kota District.

Methodology

This research was an analytic observational study. A cross sectional approach was conducted among community of Sungai Paring Village, Martapura Kota District, South Kalimantan Province, Indonesia. Population of this research were 2638 households. Sampling technique used purposive random sampling with inclusion criteria for families who have children or toddlers as many as 91 respondents. Sample calculation used Stanley Lemeshow’s formula.

Knowledge, attitudes, distance of health care facilities, and support from health workers and community leaders as independent variables. Dependent variable was PHBS implementation at household level. Informed consent sheet was filled in as a form of agreement to be a respondent. The collected data was analyzed by using SPSS software. Analysis was conducted to explain the relationship between independent and dependent variables by using chi-square test with CI 95% and significance level 0.05.

Results

There were the results of univariate (Table 1) and bivariate analysis (Table 2) between knowledge, attitude, distance of health care facilities, support from health workers and community leaders with PHBS implementation at Sungai Paring Village among 91 respondents.

Table 1: Distribution and frequency of knowledge, attitude, distance of health care facilities, support from health & community leaders and PHBS implementation

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>47</td>
<td>51,6</td>
</tr>
<tr>
<td>Good</td>
<td>44</td>
<td>48,4</td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>30</td>
<td>33,0</td>
</tr>
<tr>
<td>Positive</td>
<td>61</td>
<td>67,0</td>
</tr>
<tr>
<td>Distance of health care facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Far from house</td>
<td>73</td>
<td>80,2</td>
</tr>
<tr>
<td>Near from house</td>
<td>18</td>
<td>19,8</td>
</tr>
<tr>
<td>Support from health workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less support</td>
<td>77</td>
<td>84,6</td>
</tr>
<tr>
<td>Support</td>
<td>14</td>
<td>15,4</td>
</tr>
<tr>
<td>Support from community leaders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less support</td>
<td>74</td>
<td>81,3</td>
</tr>
<tr>
<td>Support</td>
<td>17</td>
<td>18,7</td>
</tr>
<tr>
<td>PHBS implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t do PHBS</td>
<td>85</td>
<td>3,3</td>
</tr>
<tr>
<td>Did PHBS</td>
<td>6</td>
<td>96,7</td>
</tr>
</tbody>
</table>

Note: n = frequency; % = percentage of frequency
Table 2: Relationships between knowledge, attitude, distance of health care facilities, support from health workers and community leaders with PHBS implementation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Total (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Didn’t do PHBS</td>
<td>Did PHBS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Less</td>
<td>46</td>
<td>50,5</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>39</td>
<td>42,9</td>
</tr>
<tr>
<td>Attitude</td>
<td>Negative</td>
<td>30</td>
<td>33,0</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>55</td>
<td>60,4</td>
</tr>
<tr>
<td>Distance of health care facilities</td>
<td>Far from house</td>
<td>70</td>
<td>76,9</td>
</tr>
<tr>
<td></td>
<td>Near from house</td>
<td>15</td>
<td>16,5</td>
</tr>
<tr>
<td>Support from health workers</td>
<td>Less support</td>
<td>77</td>
<td>84,6</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>8</td>
<td>8,8</td>
</tr>
<tr>
<td>Support from community leaders</td>
<td>Less support</td>
<td>72</td>
<td>79,1</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>13</td>
<td>14,3</td>
</tr>
</tbody>
</table>

Note: n = frequency; Statistical test applied: chi-square test; *significant values (<0.05)

Discussion

There is several factors that affecting PHBS practice at household level. In the results of Hasni, Nurdin and Edward’s research, respondents who have high knowledge and have the willingness to do PHBS, tend to practice PHBS\(^\text{11}\). That results was different with our research. Based on the result showed that knowledge did not have relationship with PHBS practice. This result was similiar with the research of Hapsari (2010) which states that knowledge did not have a significant influence on the practice of clean and healthy living behavior\(^\text{12}\). This research was found that respondent with less knowledge still did PHBS. To behave healthily, the community sometimes not only needs knowledge and positive attitude, or support from facilities only, but it also needs the role model from family or peers\(^\text{13}\). The low level of knowledge in the results of the study might caused by the fact of many people who claim they have never received counseling from health workers around their homes.

Attitude did not have relationship with PHBS implementation at household level. This results was in line with the research of Hanieck (2010) that stated an attitudes do not have a significant influence on the practice of clean and healthy living behavior (p-value = 0.087)\(^\text{14}\). The result of this study was not in line with Mahfudah’s research (2013), said that attitudes can influence individuals in a clean and healthy lifestyle\(^\text{15}\). An attitude has not been automatically realized in an action (overt behavior). The realization of an attitude to be a real action requires a supporting factor or a possible condition\(^\text{16}\). The majority of respondents had positive attitude, but did not implement PHBS can be affected by characteristics of the person such as emotional level\(^\text{12}\). People with high emotional and motivated to behave according to attitudes that have existed within their individually, will strive best for the behavior of clean and healthy living.

Distance of health care facilities was not influencing the implementation of PHBS at household level. This result was in line with the research of Hapsari (2010) which states that distance did not have a significant influence on the practice of clean and healthy behavior\(^\text{12}\). However, in contrast to the results of Ningsih’s research (2014) which states that the distance of health care facilities had an influence on the implementation of PHBS at household level. Ningsih’s research (2014) showed that respondents who had a long distance from
the place of health service allowed respondents to not implement PHBS at household level\textsuperscript{17}. There are certain distance limitations so that people still want to seek health services. Distance limits are significantly influenced by the type of road, type of vehicle, and transportation cost. Road facilities are still adequate and allow people to seek health care facilities even though the distance from the community’s residence is categorized far\textsuperscript{18}.

Support from health workers had influence on implementing PHBS at household level. This result was in line with Hapsari’s research (2010) which states that health worker’s support had a significant influence on the practice of clean and healthy living behavior\textsuperscript{12}. The support can be in the form of counseling or monitoring conducted by health workers in order to create healthy behavior in the community. In Hapsari’s study (2010), respondents who received less category counseling had less healthy living behavior practices\textsuperscript{12}.

Support from community leaders had influence on implementing PHBS at household level. This result was in line with Pratama’s research (2009) which states that the support of community leaders had a significant influence on clean and healthy living behavior, where the higher the role of community leaders in healthy behavior, the higher the motivation of the community to implement PHBS\textsuperscript{19}. Community leaders playing a role in the implementation of PHBS such as mobilizing the potential resources to develop healthy behaviors in the community, collaborating to create a healthy environment, and creating the conducive atmosphere to support changes in healthy behavior\textsuperscript{20}.

**Limitation**

This study was conducted among household in Sungai Paring Village and might therefore not being representative of other village in Martapura Kota District, Indonesia.

**Conclusions**

It can be concluded from this study that knowledge, attitude and distance of health facilities were not influencing someone to apply PHBS at household level. Several factors that influencing PHBS practice at household level were support from health workers and public figures, such as community leader. Community leaders can help activate PHBS programs such as increasing exclusive breastfeeding achievements and making healthy latrines, in several ways such as the formation of exclusive breastfeeding groups, or by forming healthy latrines.

Health workers should work together with community leaders as an effort to improve the achievement of PHBS at household level in Sungai Paring Village community. These efforts can be carried out by health workers socializing to community leaders regarding PHBS practices, so that community leaders can invite the community to implement PHBS at household level. Health workers and community leaders collaborating in order to monitor PHBS implementation at household level.

**Ethical Clearance**

The study was approved and received ethical clearance from the Research Ethics Committee of Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Indonesia. We followed the guidelines of the Committee on Public Health Committee on Research Ethics, Faculty of Medicine, Lambung Mangkurat University, Indonesia for ethical permission and informed consent for this study.

**Sources of Funding**

This research was conducted with self funding from Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Indonesia.

**Acknowledgements**

We would like to thank all the respondents, the community of Sungai Paring Village, who were helpful in carrying out this research. Gratefully acknowledge also to Public Health Program Study, Faculty of Medicine, Lambung Mangkurat University and government of Banjar District for giving permission to carry out this research.

**Conflict of Interest**

The authors reported no conflict of interest.

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Performance Assessment of Universal Health Coverage in Surabaya Focused on Customer Value

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²Student of Health Policy and Administration, Faculty of Public Health, Airlangga University, Surabaya, Indonesia.

Abstract

Universal health coverage is a government program in the health sector with the aim of providing service assistance to the community, however the program has not run smoothly. This was addressed in the presence of several obstacles in the field, and further research is necessary in solving the problems. The purpose of this research is to compile recommendations for improving the compliance of universal health coverage participants in Surabaya from a marketing perspective using the Customer Value method. This activity was carried out in 2017 at the universal health coverage office in Surabaya.

The method used for data collection was by analyzing existing secondary data and primary data obtained using questionnaires given to respondents with the characteristics of payment delinquencies, with a total sample of 30 respondents according to what Cohen (2007) mentioned that quantitative research has a minimum sample of 30.

Conclusions: (1) Group of respondents with the most overdue in universal health coverage payment based on sex was the female group with a percentage of 73.3%. (2) Group of respondents with the most overdue in universal health coverage payment based on the range of age was between 26 to 35 years with a percentage of 36.7%. (3) Based on the Customer Value analysis, the following conclusions were drawn from the participants who were delinquent in paying the premiums: (a) In performance variable, participants stated that universal health coverage services were not satisfying in both emergency conditions and overall services, (b) In service variable, participants stated that the universal health coverage office was difficult to access due to its location and poor service for both old and new participants, (c) In cost variable, the premium price for every service class was still less rational.

Keywords: Universal health coverage, Health Services, Universal health coverage customers.

Introduction

In January 2014, the government established a National Health Insurance program managed by Indonesia Universal Health Coverage¹. However, the program has not been running smoothly. Problems and obstacles were found along the journey. Normatively, government’s main intervention in the management of universal health coverage is both legal and financial power of the company. As an example, its funding is regulated in the Republic of Indonesia Minister of Health Regulation No. 28 in 2014 concerning Guidelines for Implementation of the National Health Insurance Program which regulated the use of the INA CBGs application in setting tariff standards and capitation¹. Law No. 40 in 2004 concerning the National Social Security System which is also a legal basis for universal health coverage has strengthened the position of universal health coverage as a center in implementing the era of National Health Insurance (JKN)². Not only rates and capitation are regulated in the law. The addition of participation in terms of marketing at universal health coverage is also regulated in the Minister of Health Regulation No. 28 of 2014 concerning guidelines for the implementation of
health insurance which also explains participation and additional participation\(^1\).

However, all the legal basis that underlies the sustainability and governance of the Universal health coverage also limits universal health coverage movement in its business development.

For example, data in the field obtained from the division of membership expansion and compliance of universal health coverage in Surabaya (2017) from a total of 85,717 participants, as many as 31,241 participants were delinquent or as much as 36.44% in percentage. Such manners were included as a problem for universal health coverage. In attempt to reduce the delinquency of premium payments every month, universal health coverage conducted routine activities, namely social approaches carried out at every related public place in Surabaya\(^3\).

Based on this background, we were interested in learning all the problems of compliance behavior from the marketing perspective faced by universal health coverage in carrying out the mandate of the National Health Insurance.

**Method of Collecting Data**

Data retrieval during the process was carried out by analyzing existing secondary data and primary data obtained using questionnaires given to respondents with the characteristics of payment delinquencies with a total sample of 30 respondents, according to what Cohen (2007) mentioned in a study that quantitatively a minimum sample is 30\(^4\).

Data collection was also carried out by conducting observations in conjunction with the routine activities of the compliance and participation division of the universal health coverage in Surabaya.

**Research Result**

1. **Characteristics of Respondents.**
   a. **Gender**
   
   the characteristics of respondents based on the sex in arrears to pay the universal health coverage premium percentage will be shown in Table 4.1 as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Gender</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Man</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>2</td>
<td>Woman</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

In Table 1 it is explained that as many as 26.7% of respondents who are delinquent in paying premiums are male, while as many as 73.3% are female respondents.

b. **Age**

Characteristics of respondents based on age who are in arrears to pay the Universal health coverage premium will be shown in Table 2 as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 – 25</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>2</td>
<td>26 – 35</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>3</td>
<td>36 – 45</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>&gt;46</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

In Table 2 it is known that the most overdue respondents are from 26 years to 35 years with a percentage of 36.7%. While at least more than 46 years old with a percentage of 16.7%.

2. **Performance Value of Universal health coverage**

On the questionnaire, the performance value is divided into 3 (three) questions regarding the ease of service during the emergency, the provision of affordable care classes, and the overall quality of services provided. The three questions will explain the percentage of the Likert scale in Table 3 as follows:
Table 3. Distribution of Respondents’ Answers Against Variables of Universal health coverage Performance Value for 2017

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>VNA</th>
<th>NA</th>
<th>D</th>
<th>AGREE</th>
<th>SA</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ease of service during an emergency</td>
<td>2</td>
<td>6.7</td>
<td>7</td>
<td>23.3</td>
<td>12</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>providing affordable care classes</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>20</td>
<td>7</td>
<td>23.3</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>the overall quality of service provided</td>
<td>4</td>
<td>13.3</td>
<td>9</td>
<td>30</td>
<td>10</td>
<td>33.3</td>
<td>6</td>
</tr>
</tbody>
</table>

Information:
VNA : Very Not Agree   NA : Not Agree
D : Disagree           SA : Strongly Disagree

In Table 3, it is known that the frequency of answers to the variable value of the performance of the Universal health coverage first item, as many as 40% expressed their disagreement with the ease of Universal health coverage services during the emergency situation. It can be concluded that as many as 23.3% of participants stated that the Universal health coverage were still not easy to use when in an emergency.

On the other hand, as many as 23.3% of participants said they agreed to Universal health coverage services during the emergency. It can also be concluded that Universal health coverage has made it easier for participants to use it during an emergency.

So that it can be concluded on the question of the first item regarding the ease of emergency services after seeing Table 4.3 on the distribution of respondents’ answers to the variable value of performance Universal health coverage is still not good in case of emergency.

The frequency of the answers on the range of performance values of the Universal health coverage third item concerning the overall quality of services provided, as many as 33.3% stated that they were less agreeing on the quality of the overall Universal health coverage services.

From the three questions on the Universal health coverage performance value variable, it can be concluded that the main cause participants delinquent to pay premiums every month is their emergency services still not properly facilitated when necessary and the whole services as well.

3. Value of Universal health coverage Services

On the questionnaire, the value of service is divided into 4 (four) questions about ease of access, ease of JKN mobile application, service of old participants, and service of new participants. Which will be explained in Table 4 as follows:

Table 4. Distribution of Respondents’ Answers to Variable Value of Universal health coverage Services in 2017

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>VNA</th>
<th>NA</th>
<th>D</th>
<th>AGREE</th>
<th>SA</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Ease of access</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>13.3</td>
<td>14</td>
<td>46.7</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Ease of JKN mobile application</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>33.3</td>
<td>6</td>
<td>20</td>
<td>11</td>
</tr>
</tbody>
</table>
In Table 3, it is known that the frequency of answers to the variable value of Universal health coverage services first item, as much as 46.7% of respondents disagree with easy access to the office's location.

The frequency of answers to the second question regarding the ease of use of JKN's mobile application services, as many as 36.7 agreed and felt that the JKN mobile application was enough to help Universal health coverage participants.

While the frequency of the questions in the third item regarding the service of the old participants, as much as 36.7% said they did not agree or it could be interpreted that the service to the old participants was still not good given to the participants.

In the fourth item question concerning the service of new participants, as many as 43.3% disagree or can be interpreted as a service for new participants is still not good. It can be concluded that participants are delinquent to pay referring to the variable value of Universal health coverage services caused by; the location of Universal health coverage services not easy to be accessed by participants, the service provided to the participants is not good and the services that Universal health coverage gives to new participants are not good enough.

4. Health Value of Universal health coverage on the variable price value of Universal health coverage, only one question item is given to the respondents, namely; Affordable premium prices per class of services which will be explained in Table 5 as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>VNA</th>
<th>NA</th>
<th>D</th>
<th>AGREE</th>
<th>SA</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Affordable premium prices per class</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>53,3</td>
<td>13</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Information:</td>
<td>VNA: Very Not Agree</td>
<td>NA: Not Agree</td>
<td>D: Disagree</td>
<td>SA: Strongly Disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Table 5, it is known that 53.3% of respondents disagree with the price of affordable services. So that we can draw conclusions that participants delinquent in paying premiums still did not agree with the price determined by the Universal health coverage services class.

**Ethical Approval:** Related departments should be assured about the confidentiality of the result of questionnaires

**Conflict Interest:** The authors report no conflict of interest.

**Source of Funding:** Self

**Conclusion**

1. Group of respondents with the most overdue in universal health coverage payment based on the sex was the female group with a percentage of 73.3%.
2. Group of respondents with the most overdue in universal health coverage payment based on the range of age was between 26 to 35 years with a percentage of 36.7%.
3. Based on the Customer Value analysis, the following conclusions were drawn from the participants who were delinquent in paying the premiums:
   (a) In performance variable, participants stated
that universal health coverage services were not satisfying in both emergency conditions and overall services, (b) In service variable, participants stated that the universal health coverage office was difficult to access due to its location and poor service for both old and new participants, (c) In cost variable, the premium price for every service class was still less rational.

Suggestions / Recommendations

1. Improve Universal health coverage services during emergency conditions by simplifying the procedure of admission, so that Universal health coverage participants feel properly facilitated.

2. Improve the overall Universal health coverage services by simplifying each procedure and prioritizing procedures.

3. Facilitate access of participants to the Universal health coverage office by collaborating with the government of Surabaya to add public transportation.

4. Provide training to front office workers regarding hospitality so that services provided to old participants and new participants with various complaints may be accurately fulfilled and affect the quality of services provided.

5. Recalculate premiums per service class so that the expected amounts are more rational.

References


Pre-referral Intervention on Severe Preeclampsia/Eclampsia Patients

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²Obstetrics Division Staff of the Social Gynecology Department/Obstetrics and Gynecology Dr. Soetomo Surabaya Hospital, Indonesia

Abstract

Objectives: To describe the pre-referral intervention on patients with severe preeclampsia/eclampsia before getting referred to Dr. Soetomo Hospital Surabaya as top referral hospital in east Indonesia in 2017.

Method: A retrospective descriptive observational study was performed in 2017. Data from medical records at Dr. Soetomo Hospital from January to December 2017. The subjects of this study are patients with severe preeclampsia/eclampsia who were referred to Dr. Soetomo Hospital in 2017 included both pregnant and postpartum patients.

Results: There are 357 patients suffered from severe preeclampsia among all obstetric 1588 patients at Dr. Soetomo Hospital. In 2017, 77 patients (21.57%) were treated conservatively while the remaining 280 patients (78.43%) were terminated directly or postpartum patients. Of the 280 patients, 258 (92.14%) were referred patients and 22 patients (7.86%) are self-referred patients. More than 50% of referred patients had been given some intervention such as O₂ installation, urinary catheter insertion, and iv line administration. In this study, 151 patients (58.53%) were given MgSO₄ while those according to administration were only 78.15%. The number of maternal deaths in severe preeclampsia/eclampsia patients were 18 patients and fetal complications that often occur are IUFD 29 babies and 25 babies born with IUGR.

Conclusion: More than 50% of severe preeclampsia/eclampsia referred patients in Dr. Soetomo Hospital had done a referral preparations but only 58.53% of referred patients given MgSO₄ as a form of pre-referral intervention.

Keywords: Preeclampsia, Pre-referral intervention

Introduction

One of the indicators of success in the health sector is the maternal mortality rate (MMR). Indonesia’s MMR in 2007 was 228 people and increased to 359 in 2012. This number is still far from the Sustainable Development Goals (SDGs) target which is 70 per 100,000 people in 2030. Preeclampsia is an obstetric problem in the world especially in developing countries that it’s increasing morbidity and mortality in both mother and fetus. The rate of preeclampsia in the world is 2% to 8% of all pregnancies. Preeclampsia-eclampsia is one of the causes of maternal death in Indonesia, which is around 12%. In 2007, 117 of 414 maternal deaths at East Java was caused by preeclampsia while in Dr. Soetomo Surabaya Hospital there was an increasing number of maternal deaths due to preeclampsia from 57% in 1999 to 60% in 2007. Pre-referral intervention...
is expected to reduce maternal and infant mortality rate due to preeclampsia-eclampsia. In Surabaya, especially in Dr. Soetomo Surabaya Hospital, there are no data regarding the pre-referral stabilization in patients with severe preeclampsia/eclampsia referred to the Dr. Soetomo Surabaya Hospital. This study tried to provide an overview of pre-referral intervention on referred patients with severe preeclampsia/eclampsia in Dr. Soetomo Surabaya Hospital and how the maternal and neonatal outcome was.

**Method**

This is a retrospective descriptive observational study by using medical records conducted at Dr. Soetomo Surabaya Hospital from January to December 2017. The population of this study were total pregnant or postpartum patients referred to Dr. Soetomo Surabaya Hospital in 2017 with severe preeclampsia/eclampsia.

**Results**

**Characteristics of referred patients with severe preeclampsia/eclampsia**

**Table 1. Characteristics of referred patients with severe preeclampsia/eclampsia in Dr. Soetomo Surabaya Hospital in 2017**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>30.43</td>
<td>-</td>
</tr>
<tr>
<td>&lt;16</td>
<td>2</td>
<td>0.78</td>
</tr>
<tr>
<td>17-34</td>
<td>176</td>
<td>68.22</td>
</tr>
<tr>
<td>&gt;35</td>
<td>80</td>
<td>31.01</td>
</tr>
<tr>
<td>Numbers of Pregnancies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primigravida</td>
<td>81</td>
<td>31.40</td>
</tr>
<tr>
<td>Multigravida</td>
<td>177</td>
<td>68.60</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>1</td>
<td>0.39</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>63</td>
<td>24.42</td>
</tr>
<tr>
<td>25.0-29.9</td>
<td>87</td>
<td>33.72</td>
</tr>
<tr>
<td>30.0-34.9</td>
<td>55</td>
<td>21.32</td>
</tr>
<tr>
<td>35-39.9</td>
<td>23</td>
<td>8.91</td>
</tr>
<tr>
<td>&gt;40</td>
<td>29</td>
<td>22.48</td>
</tr>
<tr>
<td>ANC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>251</td>
<td>97.29</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>2.71</td>
</tr>
<tr>
<td>ANC Place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwife</td>
<td>148</td>
<td>-</td>
</tr>
<tr>
<td>Public Health Centre</td>
<td>93</td>
<td>-</td>
</tr>
<tr>
<td>Obstetrician</td>
<td>152</td>
<td>-</td>
</tr>
<tr>
<td>Number of ANC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;4 x</td>
<td>43</td>
<td>17.13</td>
</tr>
<tr>
<td>&gt;4 x</td>
<td>208</td>
<td>82.87</td>
</tr>
</tbody>
</table>

During 2017, the total number of patients who came to the Dr. Soetomo Hospital was 1588 patients with 357 cases with severe preeclampsia/eclampsia both pregnant and postpartum. There were 77 patients (21.57%) were treated conservatively (giving fetal lung maturation, waiting until 34 weeks gestational age by monitoring fetal and maternal well being), while the remaining 280 patients (78.43%) were terminated directly (due to poor fetal condition, maternal condition and time to deliver) or postpartum patients. From all of the patients who directly terminated or postpartum, 258 patients (92.14%) were referred patients and 22 patients (7.86%) came by themselves to Dr. Soetomo Hospital.

The average age of these patients was 30.43 years old with the highest number in 17-34 group, which was on 176 patients (68.22%). Multigravida patients is more than primigravida with 177 (68.60%) compare to 81 (31.40%).

About the BMI, the highest BMI group was 25.0-29.9 (overweight). Almost all of the referred patient underwent antenatal care during pregnancy, only 7 patients (2.71%) did not undergo antenatal care. Mostly, the referred patients who did antenatal care were examined by an obstetrician and 208 patients (82.87%) did the antenatal care more than 4 times.

Most of the patients came from Surabaya (51.55%) and referred by secondary health facilities (72.48%) and 72.48% patients were treated only in one facility before reaching Dr. Soetomo Hospital. Twelve patients came by themselves to Dr. Soetomo Hospital, and never had been diagnosed with preeclampsia before. The transport time ranged from 8 to 443 minutes (mean: 70.07 minutes) and the distance ranged from 2.8 km to 274 km (mean: 45.25 km).
**Table 2. Characteristics of referred patients with severe preeclampsia/eclampsia based on reference data**

<table>
<thead>
<tr>
<th>Referral Origin</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Surabaya</td>
<td>125</td>
<td>48,45</td>
</tr>
<tr>
<td>Surabaya</td>
<td>133</td>
<td>51,55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Referral agent</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Midwife</td>
<td>17</td>
<td>6,59</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; level of health facility</td>
<td>50</td>
<td>19,38</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; level of health facility</td>
<td>187</td>
<td>72,48</td>
</tr>
<tr>
<td>Obstetrician</td>
<td>4</td>
<td>1,55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Numbers of providers before refers to Dr Soetomo Hospital</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>187</td>
<td>72,48</td>
</tr>
<tr>
<td>2</td>
<td>62</td>
<td>24,03</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>3,49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How to come to Dr. Soetomo Hospital</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>With transporter</td>
<td>246</td>
<td>95,35</td>
</tr>
<tr>
<td>Came by themselves</td>
<td>12</td>
<td>4,65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean of travel time (minutes)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The fastest time</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>The longest time</td>
<td>443</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean of distance between last referral place and Dr. Soetomo Hospital (km)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The nearest distance</td>
<td>45,25</td>
<td>-</td>
</tr>
<tr>
<td>The farthest distance</td>
<td>274</td>
<td>-</td>
</tr>
</tbody>
</table>

**Pre-referral interventions**

The patients had some interventions before getting referred. There is a standard procedure of prereferral management in Indonesia which every health care providers should follow which are providing oxygenation, urinary catheter insertion, infusion insertion, MgSO<sub>4</sub> administration as eclampsia prophylaxis including loading dose and maintenance dose.

There were 107 patients (41.47%) not given MgSO<sub>4</sub> before getting referred. Patients who were not given MgSO<sub>4</sub> included patients who were referred without transporter, patients with complications such as lung edema and patients not given MgSO<sub>4</sub> without information. Two patients were given a loading dose but did not match the procedure because the dose given only 2 grams intravenously. Patients who were not given maintenance doses including patients who came by themselves bringing referral note, patients with complication such as lung edema and patients who were not given according to procedure and level of health facilities.

**Table 3. Mentions about the interventions that those patients got before getting referred.**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen Equipment applied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>152</td>
<td>58,91</td>
</tr>
<tr>
<td>No</td>
<td>106</td>
<td>41,09</td>
</tr>
<tr>
<td>Urinary catheter installation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>219</td>
<td>84,88</td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>15,12</td>
</tr>
<tr>
<td>Infusion applied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>245</td>
<td>94,96</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>5,04</td>
</tr>
<tr>
<td>MgSO4 administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>151</td>
<td>58,53</td>
</tr>
<tr>
<td>No</td>
<td>107</td>
<td>41,47</td>
</tr>
<tr>
<td>Suitability of MgSO4 administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suitable</td>
<td>118</td>
<td>78,15</td>
</tr>
<tr>
<td>Not suitable</td>
<td>33</td>
<td>21,85</td>
</tr>
<tr>
<td>Loading dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>144</td>
<td>55,81</td>
</tr>
<tr>
<td>No</td>
<td>114</td>
<td>44,19</td>
</tr>
<tr>
<td>Maintenance Dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suitable</td>
<td>142</td>
<td>98,61</td>
</tr>
<tr>
<td>No suitable</td>
<td>2</td>
<td>1,39</td>
</tr>
<tr>
<td>Maternal and Neonatal Outcomes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There were 102 patients (39.53%) need ICU facilities. Most patients treated in ICU using a ventilator are patients with complications such as lung edema and eclampsia. Patients with length of stay more than 1 week are complicated patients such as eclampsia and acute kidney injury, HELLP syndrome, and DIC and all of these patients were died.
Table 4. Maternal Outcomes of Referred patients with severe eclampsia/eclampsia

<table>
<thead>
<tr>
<th>Maternal care</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU/ROI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>102</td>
<td>39,53</td>
</tr>
<tr>
<td>No</td>
<td>156</td>
<td>60,47</td>
</tr>
<tr>
<td>Ventilator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>70</td>
<td>68,63</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>31,37</td>
</tr>
<tr>
<td>Length of stay in ICU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;48 hours</td>
<td>63</td>
<td>61,76</td>
</tr>
<tr>
<td>48 hours-1 week</td>
<td>36</td>
<td>35,29</td>
</tr>
<tr>
<td>&gt;1 week</td>
<td>3</td>
<td>2,94</td>
</tr>
<tr>
<td>Maternal complication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung edema</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>43</td>
<td>-</td>
</tr>
<tr>
<td>HELLP syndrome</td>
<td>51</td>
<td>-</td>
</tr>
<tr>
<td>Cerebral hemorrhage</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Acute Kidney Injury</td>
<td>31</td>
<td>-</td>
</tr>
<tr>
<td>DIC</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PPCM</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>Without complication</td>
<td>81</td>
<td>-</td>
</tr>
</tbody>
</table>

It was found that the number of maternal deaths in severe preeclampsia/eclampsia patients were 18 patients. From these patients, only 7 patients received MgSO₄ injection with appropriate procedure, 3 patients were given MgSO₄ but the method was not appropriate, and 8 patients were not given MgSO₄ that had complication such as of lung edema, 1 patient with suspected cardiac abnormalities, 1 patient came by herself, and 1 patient with post cesarean section 25 days ago.

Causes of Maternal Death

![Figure 1. Causes of Maternal Death in severe preeclampsia/eclampsia cases at Dr. Soetomo Hospital in 2017.](image)

Table 5. Neonatal Outcomes of Referred patients with severe preeclampsia/eclampsia

<table>
<thead>
<tr>
<th>Baby born weight (gram)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1990.52</td>
<td>-</td>
</tr>
<tr>
<td>&lt;1500</td>
<td>58</td>
<td>21,40</td>
</tr>
<tr>
<td>1500-1999</td>
<td>42</td>
<td>15,50</td>
</tr>
<tr>
<td>2000-2499</td>
<td>53</td>
<td>19,56</td>
</tr>
<tr>
<td>2500-2999</td>
<td>56</td>
<td>20,66</td>
</tr>
<tr>
<td>&gt;3000</td>
<td>62</td>
<td>22,88</td>
</tr>
<tr>
<td>Apgar score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td>52</td>
<td>19,19</td>
</tr>
<tr>
<td>4-6</td>
<td>100</td>
<td>36,90</td>
</tr>
<tr>
<td>7-10</td>
<td>119</td>
<td>43,91</td>
</tr>
<tr>
<td>Fetal complication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IUGR</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>IUFD</td>
<td>29</td>
<td>-</td>
</tr>
</tbody>
</table>

The heaviest birth weight was more than 3000 grams which was 62 patients (22.88%). This data illustrates that referred patient with severe preeclampsia/eclampsia with a gestational age more than 34 weeks or late onset is more than early onset preeclampsia. The most common complication in severe preeclampsia/eclampsia patients is IUFD as many as 29 infants.

Discussion

During 2017, there were 357 cases of severe preeclampsia/eclampsia cases at Dr. Soetomo Hospital, both pregnant and postpartum. Study in Dr. Kariadi Semarang Province Hospital there were 1030 cases of preeclampsia/eclampsia during the 2013-2016, while in Dr. Soetomo Hospital in 2013-2014, Wardhana (2018) found that there were 1106 cases of preeclampsia/eclampsia (21%) from 5266 deliveries.³⁴

Based on the age, 31.01% patient with advanced maternal age. Too young or too old is a risk factor for preeclampsia. Maternal age more than 35 years old has risk of 1.5 times greater to be preeclampsia. At this age, women are more susceptible to systemic diseases such as hypertension, diabetes mellitus, and others.⁵

From the number of pregnancies, most of severe preeclampsia/eclampsia patients were multigravida compared to primigravida. Study by Erliana (2016) obtained more cases of severe preeclampsia happened in multigravida compared with primigravida. It is because many maternal factors influence such as maternal age, comorbidities, history of hypertension, etc.⁶ However,
ametanalysis study by Bartsch et al (2016), 25 studies showed nullipara was a risk factor to increased preeclampsia and found 32.2% in the preeclampsia population.7

Obesity is one of the factors that can increase preeclampsia incidence. In this study, the total number of obese patients was more than overweight and normal. One of the mechanism that links obesity with preeclampsia is inflammation. Adipose tissue produces several inflammatory mediators that can alter endothelial function.8

From the antenatal care, 7 patients did not undergo antenatal care during their pregnancy and all of them came from outside Surabaya. This was probably due to the public health centre is far from patient’s house or the patient’s awareness was low to get antenatal care. Antenatal care is an attempt to prevent preeclampsia. Initial information on antenatal care such as blood pressure before pregnancy can be used to distinguish between chronic hypertension and preeclampsia. Karima’s study at Padang Public Hospital found that there was no significant relationship between the number of antenatal care and the incidence of severe preeclampsia.9

The gestational age when admitted will affect the outcome of the baby and affect the decision that will be taken in severe preeclampsia/eclampsia patients. In this study, most of gestational age of the referred patients with severe preeclampsia/eclampsia was more than 34 weeks. This shows that most of the referral cases of severe preeclampsia/eclampsia in Dr. Soetomo Hospital are late onset. This is consistent with the theory that the incidence of late onset of preeclampsia is 75% of all numbers.10 Late onset of preeclampsia is associated with abnormalities in the maternal side such as obesity or gestational diabetes and according to the results of this study where the number of severe preeclampsia/eclampsia patients with obesity and overweight is more than normal BMI.

Dr. Soetomo Hospital as a tertiary hospital receives referrals from various health centers. The most frequent health facilities that made referrals were 2nd level of health facilities. This condition is in accordance with the referral pathway that if the patient requires further treatment which 2nd level of health facilities cannot handle, so the patient must be referred to the 3rd level of health facility immediately to get better services. However, if the case is too difficult to handle in 2nd level of health facilities, direct referrals to higher health facilities are carried out. This is expected to reduce the referral time so that patients get proper treatment immediately.

Almost 50% patients referred to Dr. Soetomo Hospital were not oxygenated. Catheter insertion is needed to determine the patient’s urine because in severe preeclampsia/eclampsia patients, the amount of fluid must be arranged so that there will be not overload condition causing further complications such as lung edema. From those who did not have a urine catheter, they included patients who came by herself and only given a referral note because they did not diagnosed with severe preeclampsia/eclampsia before.

The administration of MgSO4 is a kind of pre-referral stabilization in patients with severe preeclampsia/eclampsia. MgSO4 is drug of choice to prevent eclampsia. This drug is superior to diazepam and phentoin. Compared with placebo or without anti-seizures, MgSO4 can reduce 59% of the risk of eclampsia, 36% reduce placental abruption.11 The main purpose of giving MgSO4 in severe eclampsia patients is to prevent eclampsia. In addition, MgSO4 can also reduce maternal and perinatal mortality and morbidity even in severe eclampsia patients who do not experience seizures. Some studies found that administration of MgSO4 prophylaxis given to severe eclampsia patients was associated with a significant reduction in the incidence of eclampsia.12

The most common maternal complications that occurred in referred patients with severe preeclampsia/eclampsia in Dr. Soetomo Hospital in 2017 was lung edema and 39.53% of patients had to undergo treatment in the ICU and needed a ventilator in their care. Lung edema is one indication of ventilator used in these patients. As in Wardhana’s study, there were 50 cases (81%) of lung edema needed ICU and 37 cases (60%) needed a ventilator.4 In preeclamptic patients, endothelial dysfunction causes increasing in systemic vascular resistance and the proteinuria and systemic inflammation also cause decreasing in plasma oncotic pressure. This condition will make fluid extravasation into the surrounding tissue and lung edema can be happened easily. Acute Kidney Injury is one of the complications that can occur during the conservative treatment in severe preeclampsia patients. In this patients, the glomerulus becomes large and swollen. This event, together with the presence of overall vasoconstriction that occurs in
preeclamptic patients, cause 25-30% reduction in plasma flow and glomerular filtration compared to normal pregnancies. This condition will usually improve after labor.\textsuperscript{13}

**Conclusion**

More than 50% of referred patients with severe eclampsia/eklampsia during 2017 have been prepared properly by the referrer but not all patients are given MgSO\textsubscript{4} as a form of pre-referral interventions. Mismanagement about the administration procedure of MgSO\textsubscript{4} is still found.

**Conflict of Interest**

This article has no conflict of interest. This article has no source of funding.

**Ethical Clearance**

This article had ethical clearance from Dr. Soetomo Hospital ethical committee number 0483/KEPK/VIII/2018.

**References**


Effect of Children’s Stunted Growth on Adult’s Obesity in Indonesia: A Longitudinal Study

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1Department of Nutrition, Faculty of Public Health, Universitas Indonesia.
2Directorate Community of Nutrition, Ministry of Health, Indonesia.

Abstract

Indonesia has been facing serious nutritional problems for many decades. Undernutrition has not been resolved, but overnutrition problems occur in all stages of life. This study was conducted to determine the effect of children’s stunted growth on adult obesity in Indonesia. The research design was a longitudinal study using secondary data from the Indonesian Family Life Survey (IFLS) 1 in 1993, IFLS 2 in 1997, IFLS 3 in 2000, IFLS 4 in 2007 and IFLS 4 in 2014. The population of this study was comprised of children who were observed until they became adults. Total eligible sample was 927 subjects. Our results showed the proportion of stunting in children aged 1–5 years to be 50.2% decreased at the age of 15–19 years old (25.1%). This contrasts with the proportion of obesity that increased when subjects were aged 5–9 years (1.6%) at the age 22–26 years old (14.4%). The analysis suggest that children’s stunted growth does not affect adult obesity. Father’s obesity status, living in urban areas, and low consumption of fruits and vegetables can affect adult obesity.

Keywords: Stunted growth, Obesity, Adult, Body Mass Index

Introduction

The prenatal period is the fastest growth phase and the growth rate will decrease during infancy period. In the period before puberty, growth will stabilise and will stop when entering adulthood.1,2 However, there are still many children that fail to achieve optimal growth due to health conditions and inadequate nutrient intake.3 This can be seen from the stunting prevalence of children in the world, with 23.8% of children under 5 years of age showing stunted growth.4

Indonesia was ranked the 25th in 2015 among 132 countries with a high prevalence of stunting and was classified as country with only a few advances in stunting improvement.5 Moreover, the 2007, 2010 and 2013 National Basic Health Study results indicate that Indonesia is categorised with heavy stunting.6,7,8 If this stunting problem is not immediately address, children will bear the consequences in the future.9

Several studies show that stunted children are at greater risk of obesity.10,11,12 Obesity does not only occur in adults, but also in children and adolescents.13 Beside that, being overweight and obese during childhood and the adolescent period can cause premature death and morbidity in adulthood.14 Therefore, the aim of this study was to determine the effect of stunting in infants on adult obesity (IFLS data in 1993 - 2014).

Material & Method

A longitudinal study of a fixed cohort population by periodic monitoring of subjects at the age of 1 – 5 years to 22 – 26 years. This study used a linked patient population from The Indonesian Family Life Survey (IFLS).

The sample in this study was stunted children who were in infants in 1993 and met the inclusion criteria as follows: 1) Children aged 1 – 5 years, 2) Biological
children and live births, 3) Children who were alive until at least 22 – 26 years, 4) Having complete information of sex, age, weight and height from 1993 to 2014. In total, 927 children were eligible for the study.

Bivariate analysis used chi-squared test and multivariate analysis with General Estimation of Equation Test (GEE).

Findings
The results showed the proportion of stunting in children aged 1–5 years to be 50.2% and which decreased at the age of 15–19 years old to be 25.1%. This contrasts with the proportion of obesity that increased when subjects were aged 5–9 years to be 1.6% and at age of 22–26 years old to be 14.4%. (Table 1).

Beside that the rate of obesity in all stunted children aged 1–5 years decreased after being followed for 14 years. However, there was an increase in the obese proportion when subjects were aged 22–26 years.

Table 1. Distribution frequency of stunted and obesity based on IFLS data in 1993, 1997, 2000, 2007, and 2014

<table>
<thead>
<tr>
<th>Variables</th>
<th>1 – 5 years</th>
<th></th>
<th>5 – 9 years</th>
<th></th>
<th>8 – 12 years</th>
<th></th>
<th>15 – 19 years</th>
<th></th>
<th>22 – 26 years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>H/A(z-score)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Stunted</td>
<td>462</td>
<td>49.84</td>
<td>676</td>
<td>72.92</td>
<td>693</td>
<td>74.76</td>
<td>694</td>
<td>74.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stunted</td>
<td>465</td>
<td>50.16</td>
<td>251</td>
<td>27.08</td>
<td>234</td>
<td>25.24</td>
<td>233</td>
<td>25.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT/U (z-score)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Obese</td>
<td>912</td>
<td>98.38</td>
<td>905</td>
<td>97.63</td>
<td>906</td>
<td>97.73</td>
<td>794</td>
<td>85.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>15</td>
<td>1.62</td>
<td>22</td>
<td>2.37</td>
<td>21</td>
<td>2.27</td>
<td>133</td>
<td>14.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td>927</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Of the 927 respondents, only 449 respondents were able to be analysed in the final stage of observation. Based on the results of bivariate analysis, there were six variables significantly affecting obesity that is stunted, sex, father’s obesity, mother’s obesity, birth weight, and living area. From the latest modelling for GGE analysis, there were only three variables significantly affecting obesity at the age of 5–26 years (p< 0.05) (Table 2).

Table 2. Final Model of Adult’s Obesity

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not stunted **</td>
<td>0.982</td>
<td>0.284</td>
</tr>
<tr>
<td>Stunted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father’s Obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not obese**</td>
<td>1.275</td>
<td>0.000*</td>
</tr>
<tr>
<td>Obese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residance Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural**</td>
<td>1.031</td>
<td>0.037*</td>
</tr>
<tr>
<td>Urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 3.5 kg**</td>
<td>0.918</td>
<td>0.000*</td>
</tr>
<tr>
<td>&lt; 3.5 kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * Significant statistic p<0.05; ** Reference Group

Discussion
During the 21 years study period, policies in Indonesia have only managed to prevent 2 out of 3 children from being stunted. According to IFLS data (1993), 1 in 2 subjects had stunted growth during infancy. Other data show that 1 in 3 children under five is stunted.7,8,15 Indeed, this achievement is not satisfactory as the reduction in stunting appears to be insignificant as many children still experience growth failure in prenatal and infancy periods. These factors were caused by unmodifiable risk factors (such as, age and sex), protective factors (i.e. household income and maternal education), and non-linear factors (i.e. maternal BMI and maternal age).16
As in other developing countries, the nutrition problem in Indonesia is quite serious. The ‘undernutrition’ problem has not been overcome properly, but there is now an ‘overnutrition’ problem emerging. Results of studies between 1997 – 2014 indicated an increase in the prevalence of obesity and a decrease in stunting prevalence as age increases. According to the WHO, a double burden is caused by the occurrence of nutritional, epidemiological and demographic transitions. These three types of transitions occur relatively quickly over the course of a few decades.  

The results of our study suggest that the prevalence of obesity in young adult aged 22 – 26 years (2014) was at 14.4%. Meanwhile, the results of National Basic Health Study indicated that the prevalence of obesity in the adult population (> 18 years) was 21.8 in 2018, 14.8% in 2013, and 10.5% in 2007. According to studies, boys have a higher likelihood to be overweight to obese than girls. The result same with our study, boys aged 5–9 years had a greater likelihood of obesity compared to girls of the same age and female subjects aged 22–26 years had a likelihood of obesity greater compared to males of the same age. However, the cause of obesity in children is not completely understood. In line with age, women are greater risk of obesity than men. Studies conducted in low- and middle-income countries indicate that women are more likely to be obese when they are aged 22 or older. Moreover, a study towards women aged ≥ 18 years had a risk of 9.88 - 27.80 times for obesity. The oestrogen hormone plays an important role in obesity in women. In addition, obesity in women is also caused by high intake of fat and fast food, less physical activity, eating when not hungry, coming from rich families, highly education, easy access to food, living in urban area, unemployed, living with a partner (married), using hormonal contraception and parity more than two.

There are also reports of a significant association between living in urban areas and obesity in children, adolescents, and adults. Similarly in our study, obesity observed in subjects aged 5 – 12 years and 22 – 26 years was influenced by living in urban areas. In fact, the age group of 30 years living in urban areas have an increased risk of obesity by 8 – 9.5 times higher compared to the rural areas. However, the relationship between residence and obesity in developing and developed countries are different due to cultural, socio-economic and environmental differences.

At the age of 8 – 19 years subject also influenced by birth weight ≥ 3500 grams. The results of a meta-analysis of 66 studies from 26 countries showed that the ‘high’ birth weight was associated with childhood and adult obesity. The children living in low- and middle-income countries will be obese if they have birth weight of > 3.5 kg. The parental obesity had increased risk factors of obesity at age 8–26 years. Genetic factors have an influence of 25 – 40% on the incidence of obesity and accordingly, parental obesity is a strong predictive factor for obesity in children and adolescents. Genetic influences on obesity are also due to the presence of concomitant factors. While parents are not solely responsible for gene structure, behaviour, attitudes, lifestyle and socio-economic can also affect risk of obesity.

Many studies have observed that stunting is a related to obesity. A study by Popkin et al. in Russia, Brazil, South Africa and China showed a significant association between stunting and overweight. However, our findings suggest that promotion of balanced nutrition programme needs to be expanded through the use of the latest types of social media, such as Facebook, Instagram, telegram and WhatsApp, in order to open insight and concern for society at large.

**Conclusion**

However, our findings suggest that promotion of balanced nutrition programme needs to be expanded through the use of the latest types of social media, such as Facebook, Instagram, telegram and WhatsApp, in order to open insight and concern for society at large.

**Conflict of Interest**

The authors declare that they have No. conflict of interest.

**Acknowledgment**

This research was supported by self funding.

**Ethical Clearance**

The procedures of the IFLS survey have been reviewed and approved by Institutional Review Boards in the United States (at RAND Corporation, Santa Monica, California) and in Indonesia (Ethics Comittee of Gadjah Mada University Yogyakarta for IFLS 3 – IFLS 5, and University of Indonesia, Jakarta for IFLS 1 – IFLS 2)(https://www.rand.org).
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The Behaviour of Open Defecation by Age Groups

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Abstract

In Indonesia, Open Defecation Behaviour can be found in all age groups starting from children to the elderly, both male and female. Community Based Total Sanitation Data (2018) recorded that the number of families who still practiced Open Defecation in Pekalongan Regency were as many as 51,537 with open defecation access of 21.38%. The research aims to assess the median and trend of The Open Defecation Behaviour cases based on age groups. This research uses the nonreactive approach by referring to the secondary data from the result of Environmental Health Risk Assessment (EHRA) of Pekalongan District in 2017. The sampling unit is the households, in which respondents of 11,400 were taken by multistage random sampling, spread across 19 sub-districts. Based on the calculation of Chi-Square Test for Trend for Binomial Proportions (Cochran-Armitage), the value of $T_1 = 323.41798 > \text{table of Chi-Square } \chi^2 = 3.84 \text{ (} \alpha = 5\%)$, there were 91,200 individuals with a minimum number of Open Defecation Behaviour cases of 1,943, a maximum number of 20,857, and a median $= 11,400 \text{ (SD } = 9,242.844\text{) which was estimated to be at the age of 50 years. The findings are that there is a trend in cases of Open Defecation Behaviour according to age groups. The trend is increasing among the adults.}$

Keywords: Behaviour, Open Defecation, Age

Introduction

Behavioural development starts from infancy, children, adolescent, adult, to elderly.[1] The behaviour of an individual is influenced by several factors, one of which is age. In Indonesia, Open Defecation Behaviour can be found in all age group, from the children to the elderly.[2,3,4] In rural areas, many children defecate in the yard, gardens, and sewers.[3] Adolescents also seem to behave this way. The adult is the stage in which people should cognitively understand the disadvantages of Open Defecation Behaviour. However, many adults consider an urgent situation and a culture that is ingrained becomes a strong impetus for Open Defecation Behaviour. The elderly group of age is quite difficult to educate regarding the behaviour of defecating in healthy lavatories.[2] Open Defecation Behaviour means that the human practice of defecating outside in any open places, instead of in a healthy lavatory with a septic tank.[5] Healthy lavatories can be built as simple.[6] In other words, sanitation conditions are still relatively poor in the era of Sustainable Development Goals (SDGs) due to behavioural factors.[4] Especially in coastal areas, large riverside, rural or inland areas and areas with low economic conditions.[2,7] The main disadvantage of Open Defecation Behaviour is water sources are contaminated by Escherichia coli. The polluted water will enter the human body causing diarrheal disease. So it is not surprising that diarrheal diseases are increasing, especially among children under five and children.[8] In addition, the long-term effect will occurs that it will lead to the disorder in children’s growth, such as abnormalities in the body, known as stunting.[9] Stunting threatens children’s intelligence, children will be more susceptible to various degenerative diseases such as coronary heart disease, diabetes mellitus and obesity. Besides that, in the next few years we will find many dwarf generations. The Open Defecation case will also worsen the environment.
In Indonesia, there is no data providing the trend of Open Defecation Behaviour based on age groups. These data can actually support the planning of ‘Stop Open Defecation’ strategy according to age groups. Innovation in intervention is needed to reach the area of ‘Stop Open Defecation’ so that the strategy can be executed effectively. Research in India showed that mothers are the decision makers to provide toilet facilities in the households, however the reality showed that it really depended on the behaviour of the whole family members. Based on the data from Community Based Total Sanitation (2018), the number of families who still practiced Open Defecation in Indonesia were as many as 13,434,080, in Central Java Province as many as 1,177,564, and in Pekalongan Regency as many as 51,537. At present, Pekalongan Regency achieves sanitation access of 78.61%; Permanent Healthy Latrine access of 53.06%; Semi Permanent Healthy Latrine access of 9.66%; sharing access of 15.9%; and Open Defecation access of 21.38%. Therefore, the study aims to examine the median and trend of Open Defecation Behaviour cases based on age groups.

### Material and Method

Nonreactive approach is employed by using the secondary data in 2017 from the results of the Environmental Health Risk Assessment (EHRA) study in Pekalongan Regency, Central Java, Indonesia. The population and research sample according to the sampling technique in the EHRA study were multistage random sampling. The main sampling unit is households, the study area is all villages in Pekalongan Regency with total 285 villages with 40 respondents as the minimum sample of each village, so a sample of 40 respondents x 285 villages = 11,400 respondents in total, spread over 19 sub-districts. Respondents are mothers or daughters who are married and aged between 18-60 years. This research was limited to Open Defecation based on age. The data were indichotomic type. The Statistical Package for the Social Sciences (SPSS) software version 21.0 and Epi Info version 7.2.2.6 were used to process the data. The Median Test was used to analyse the data in order to determine the value of cut off and Chi-Square Test for Trend for Binomial Proportions (Cochran-Armitage). The results of the value of cut off and Chi-Square Test were then used to determine the trend of cases of Open Defecation Behaviour based on age groups.

### Findings

Pekalongan Regency is in the western coastal region, one of the 35 districts / cities in Central Java, Indonesia. The capital is Kajen. The area of Pekalongan Regency is around 836.1 km². According to the Pekalongan Regency Central Bureau of Statistics, in 2016 there were 880,092 people in Pekalongan Regency. Pekalongan Regency has 19 Subdistricts namely Kandang Serang, Palinggaran, LebakBarang, Petung Kriyono, Talun, Doro, Karanganyar, Kajen, Kesesi, Sragi, Bojong, Wonopringgo, Kedungwuni, Buaran, Tirto, Wiradesa, Siwalan, Karangdadap and Wonokerto. Geographically, Pekalongan Regency is a basically lowland and its southern regions are mountainous and rural areas or inland. In addition, the major rivers in Pekalongan are Sragi River and Sengkarang River and their watercourses leading to the Java Sea.

The study involved 91,200 individuals consisting of children, adolescents, adults and the elderly. The minimum number of Open Defecation Behaviour cases were 1,943, while the maximum amount were 20,857 (SD = 9,242.844), resulting Median value of 11,400 that was estimated involving individuals aged 50 years. The Median is the middle value of the Open Defecation Behaviour cases. The median is the limit or cut off to determine whether an individual is in the category of those who practice Open Defecation or those who stop practicing the Open Defecation. There were 11,155 individuals practicing the Open Defecation while 80,045 others stopped the practice. Each age group has n = 22,800 so that the total is 91,200 individuals. The proportion between the number of individuals practicing Open Defecation (x) with n in the age group of children = 0.1006; adolescents = 0.0852; adults = 0.1743 and elderly = 0.1290.

### Table 1. Cross Tables of Open Defecation Behaviour Cases by Age Groups

<table>
<thead>
<tr>
<th>Behaviour of Open Defecation</th>
<th>Age Groups</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (x)</td>
<td>Children</td>
<td>2,294</td>
<td>1,943</td>
<td>3,975</td>
<td>2,943</td>
</tr>
<tr>
<td>No</td>
<td>20,506</td>
<td></td>
<td>18,825</td>
<td>19,857</td>
<td>80,045</td>
</tr>
<tr>
<td>n</td>
<td>22,800</td>
<td>22,800</td>
<td>22,800</td>
<td>22,800</td>
<td>91,200</td>
</tr>
<tr>
<td>Proportion (x/n)</td>
<td>0.1006</td>
<td>0.0852</td>
<td>0.1743</td>
<td>0.1290</td>
<td>0.1223</td>
</tr>
<tr>
<td>Prevalence Risk</td>
<td>1.1807</td>
<td>1.0000</td>
<td>2.0457</td>
<td>1.5140</td>
<td>1.4354</td>
</tr>
</tbody>
</table>
The conformity test with Chi-Square Test ($\chi^2$) showed that 0 cells (0%) has an expected less than 5. The minimum expected count is 2,788.75 with P value = 0.0000 indicating that there were differences between age groups practicing Open Defecation Behaviour ($\alpha = 5\%$). Chi-Square Test Value of Trend for Binomial Proportions (Cochran-Armitage) ($T_1$) = 323.41798. The value in the Chi-Square table with the degree of freedom (n-1) = 2-1 = 1, $\alpha = 5\%$ at 3.84. $T_1 = 323.41798 > (\chi^2) = 3.84$, so that the trend of Open Defecation Behaviour according to age group was obtained. Based on table 1, we can calculate the Prevalence Risk value for each age group. The adolescents is a reference group, in which the value of 0.0852 becomes the denominator of all proportions in the age groups, so that the Prevalence Risk value for the adolescent group = 1.000 was obtained. Prevalence Risk for children, adults and elderly groups was 1.1807, 2.0457, and 1.5140.

**Discussion**

In Indonesia the data on Open Defecation cases is not very accurate. Generally, the data presented is about the percentage of sanitation access, Open Defecation access, the number of families who are practice Open Defecation Behaviour and the number of villages that trigger the practice, starting from the national, provincial, district or city, sub-district to village or urban village levels. The presentation is usually presented globally and the data is not distinguished by gender or age groups. One example is the data on Community Based Total Sanitation which is managed by the Ministry of Health of the Republic of Indonesia and can be accessed online by anyone. So far, sanitation intervention has not been effective in changing Open Defecation Behaviour. The category of individuals practicing Open Defecation Behaviour is located between the range of 1 to 11,400 or below 11,400. The estimation between the median test and cross tabulation shows almost the same value. Meanwhile, the total number of individuals who stop practicing Open Defecation in all age groups is 80,045, this value is in the range of values between 11,401 to 91,200. The number of individuals practicing Open Defecation from the highest to the lowest is the adult age group with 3,975 individuals, the old age group with 2,943, the age group of children with 2,294 and the adolescents age group with 1,943. The adult age group dominates those who practice Open Defecation Behaviour. Thus, the proportion of individuals practicing Open Defecation from the highest to the lowest is as follows: the adult age group = 0.1743; old age group = 0.1290; the age group of children = 0.1006 and the teen age group = 0.0852.

The trend increased within the adults from 1,943 to 3,975. In the old age group the trend declined, but not significantly. The practice of Open Defecation in children depended on the attitudes and behaviour of parents, especially mothers.$^{[1]}$ In a family, the role of a mother is very important so that toddlers or children aged between 5-12 years have the habit of defecating in a latrine. Habits from an early age will affect their behaviour when they grow up. In India, Ghana and Kenya, Open Defecation Behaviour is still dominated by the age groups of children and adults.$^{[3,9]}$ The adolescents had a lower probability in practicing Open Defecation. They had some perceptions and attitudes towards the advantages and disadvantages of Open Defecation Behaviour. Aversion as well as to defecate inside the lavatory are some factors related to self-efficacy. Different from the adolescents, the elderly changed in attitudes and behaviours into a child-like and this factor becomes a challenge.$^{[15]}$ The habit of the elderly to defecate in the river or garden seems difficult to overcome. This is due to the reducing cognitive and motoric functions so that it is difficult to be given directions in how to defecate in healthy lavatories even though latrine access is available.
Prevalence Risk in adolescents had the smallest value, meaning that the adolescent age group was a protective factor of Open Defecation Behaviour. The elderly group was at risk of practicing the Open Defecation Behaviour by 1.5140 times that of the adolescent age group. The adult age group is at risk for Open Defecation Behaviour by 2.0457 times that of the adolescent age group. The adult age group with the highest number of risk of practicing Open Defecation Behaviour. The fundamental factor of the adult age group dominates Open Defecation Behaviour was due to urgent factors, low awareness, unhealthy habits that have been ingrained for such a long time. They also chose to defecate outside because they would feel more relieved whenever they defecated in the river than in the lavatory. This phenomenon was a habitual culture so that the adult age group didn’t like to be given some instructions and they basically didn’t feel shy to defecate openly. Therefore, the habit of practicing Open Defecation have been rooted to the conscience of individuals in the adult age group. Meanwhile, adolescents can be role models and need to be involved in sanitation activities such as Community Led Total Sanitation with religious leaders, community leaders and all village officials.[7] The elderly group in the countryside listened more carefully to the instructions from religious leaders during the religious gathering. The conversation about the Open Defecation Behaviour that is related to religious law by reading the related verses from Al Quran and Al Hadith is considered to be more effective.

Conclusion

Cut off in the number of Open Defecation cases and the increasing trend within the adult group were still quite high. This proved a serious challenge in facing 100% of ‘Stop Open Defecation’ area.

Conflict of Interest: The authors inform that they have no conflict of interest.

Source of Funding: All funds used to support this research comes from the researches themselves.

Ethical Clearance: Ethical feasibility permit issued by the Health Research Ethics Commission, Faculty of Public Health, Airlangga University. Ethical feasibility standards are based on WHO-2011 and 2017 KEPPKN guidelines and follow the CIOMS 2016 guideline.

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Body Mass Index And Lung Tuberculosis In Indonesia: A Cross-Sectional In Indonesia

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Abstract

This study aims to determine the relationship of the Body Mass Index (BMI) to the incidence of Tuberculosis. This is a cross-sectional study. The subjects in this study were people aged ≥18 years who were interviewed and had complete data. We investigated Tuberculosis-related factors in Indonesia associated with body mass index by controlling other confounding variables. Statistical analysis with p value <0.05 was considered significant. The prevalence of tuberculosis in respondents is 1%. Chi square test showed a significant relationship between body mass index and tuberculosis (p <0.001). Multivariate analysis showed that people with thin BMI were 2.54 times at risk of tuberculosis compared to people with normal BMI. Active discovery of Tuberculosis cases must be carried out to increase the number of case finding by involving the participation of the community and across sectors.

Keywords: Body mass index, Tuberculosis, Cross-sectional, Indonesia

Introduction

Pulmonary tuberculosis is still a public health problem globally. Since the adoption of the strategy directly observed treatment short (DOTS) in 1995, Indonesia has made rapid progress. Case finding rates are 71% and treatment success rates are 88.44%. This figure has met the global target, namely the case discovery rate of 70% and 85% treatment success.\textsuperscript{1}

Based on data from the Global Tuberculosis Report (2017), in 2016 the estimated burden of TB problems in Indonesia has not decreased significantly with the number of incidents of 1,020,000 people with TB and a rate of 391 per 100,000 population. In 2016 pulmonary TB mortality in Indonesia was 110,000 people with TB and 42 rates per 100,000 populations in groups outside of HIV + TB, 13,000 people with TB and a rate of 5.1 per 100,000 populations.\textsuperscript{2}

One of the risk factors for TB is a low body mass index (BMI). Low BMI can affect immune system function which acts as the body’s defense against various infectious diseases. Cellular immunity is part of the immune system which is the body’s defense system against TB.\textsuperscript{3} Nutritional status parameters that are very useful for following the development of acute and chronic diseases in a person are measurements of body weight and references to normal body weight referring to BMI, i.e. weight in kilograms divided by height in square meters.\textsuperscript{4}

A study states that the level of energy sufficiency affects nutritional status.\textsuperscript{5} Nutritional disorders can increase the risk of pulmonary tuberculosis.\textsuperscript{6} The relationship between malnutrition and pulmonary tuberculosis has been demonstrated by trials in the US in the 1960s and it has been estimated that malnourished children have twice the risk of pulmonary tuberculosis.\textsuperscript{7}

In addition to BMI factors, pulmonary tuberculosis is influenced by other factors such as diabetes mellitus, ventilation, occupancy density, and lighting,\textsuperscript{8} education level, history of BCG, history of contact with TB patients, water sources, and smoking,\textsuperscript{9} temperature, humidity, floor type,\textsuperscript{10} phlegm removal behavior,
coughing behavior, length of stay in detention, history of roommates\textsuperscript{11}, age, gender\textsuperscript{12}. Irawan et al study in 2017 proved that low nutrient intake is a risk factor for contracting tuberculosis. Body mass index can be said to be a risk factor for pulmonary tuberculosis\textsuperscript{13}. This study was conducted to determine the relationship of BMI with pulmonary tuberculosis.

**Method**

This study used a cross-sectional design using data from Indonesian Family Life Survey-5 in 2014.\textsuperscript{14} The survey collects information data on individuals, households and community levels using multistage stratified random sampling. The IFLS is a survey of longitudinal households using questionnaires and anthropometric measurements. The sampling framework was based on 13 households from 27 provinces in Indonesia selected to maximize the representation of the research population and which represented around 83\% of Indonesia’s population in 1993.\textsuperscript{15} The fifth wave of IFLS included 50,148 people of all ages. IFLS-5 was conducted in 13 provinces.\textsuperscript{16} The study population was the population who were the subjects of the IFLS-5 research in 2014. While the sample was the age group ≥18 years who took the interview and had complete questionnaire data. other confounding variables. Sampling is done by means of the total population because it meets the minimum sample requirements. So the sample analyzed in this study was 10,722 respondents.

We include demographic information, individual characteristics and behavioral factors as confounding. We categorize the level of education completed by respondents to low and high education levels, gender, while marital status is classified as unmarried and married. We included smoking behavior categorized as not smoking and smoking. We also included the characteristics of housing between ventilation that was categorized as sufficient and not, type of floor that was categorized as healthy (ceramics, tiles, cement) and unhealthy (plywood, bamboo, soil), roofs that were categorized as healthy (concrete, wood, metal plates, roof tiles) and unhealthy (asbestos, bamboo and leaves).

Body mass index (BMI <20 kg / m\textsuperscript{2}: thin; BMI 20 kg / m\textsuperscript{2}: normal) originating from height and weight measured during a physical examination, these criteria are determined based on the Republic of Indonesia Ministry of Health RI in 2013.\textsuperscript{17} Height was measured by the Shorr measurement board and the weight is measured using the Seca floor-scale model developed in collaboration with UNICEF. The floor-scale model has digital readings and is accurate to the nearest 0.1 kg. In this study measurements of body weight and height were carried out by interviewers or enumerators who were competent in their fields and had received prior training. Whereas Tuberculosis was known through the question of whether suffering from tuberculosis diagnosed by a doctor or paramedic and / or taking Tuberculosis drugs. Data analysis in this study was conducted to see the risk of BMI with the incidence of tuberculosis after controlled by covariate variables using logistic regression test with 95\% confidence level.\textsuperscript{18}

**Results**

Based on the incidence of tuberculosis, it was seen that 46.73\% of respondents had a thin BMI of the size, whereas in people who did not have tuberculosis only 31.69\% had a thin BMI (table 1).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Tuberculosis</th>
<th>Non-Tuberculosis</th>
<th>OR</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=107</td>
<td>n=10615</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thin</td>
<td>50</td>
<td>3364</td>
<td>1.89</td>
<td>1.26-2.82</td>
<td>0.001</td>
</tr>
<tr>
<td>Normal</td>
<td>57</td>
<td>7251</td>
<td>68.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Category (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥48</td>
<td>39</td>
<td>2789</td>
<td>1.60</td>
<td>1.05-2.43</td>
<td>0.017</td>
</tr>
<tr>
<td>&lt;48</td>
<td>68</td>
<td>7826</td>
<td>73.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>52</td>
<td>5388</td>
<td>0.91</td>
<td>0.61-1.37</td>
<td>0.657</td>
</tr>
<tr>
<td>Male</td>
<td>55</td>
<td>5227</td>
<td>49.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td>Tuberculosis</td>
<td>Non-Tuberculosis</td>
<td>OR</td>
<td>95% CI</td>
<td>P Value</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>47</td>
<td>5812</td>
<td>0.65</td>
<td>0.43-0.97</td>
<td>0.025</td>
</tr>
<tr>
<td>High</td>
<td>60</td>
<td>4803</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>97</td>
<td>8708</td>
<td>2.12</td>
<td>1.10-4.58</td>
<td>0.021</td>
</tr>
<tr>
<td>Not Married</td>
<td>10</td>
<td>1907</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus History</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>224</td>
<td>3.97</td>
<td>1.74-7.97</td>
<td>0.000</td>
</tr>
<tr>
<td>No</td>
<td>98</td>
<td>10391</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59</td>
<td>8980</td>
<td>0.22</td>
<td>0.15-0.34</td>
<td>0.000</td>
</tr>
<tr>
<td>No</td>
<td>48</td>
<td>1635</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>45</td>
<td>1592</td>
<td>4.11</td>
<td>2.73-6.16</td>
<td>0.000</td>
</tr>
<tr>
<td>Enough</td>
<td>62</td>
<td>9023</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy</td>
<td>26</td>
<td>1054</td>
<td>2.91</td>
<td>1.79-4.60</td>
<td>0.000</td>
</tr>
<tr>
<td>Healthy</td>
<td>81</td>
<td>9561</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy</td>
<td>35</td>
<td>1520</td>
<td>2.91</td>
<td>1.88-4.43</td>
<td>0.000</td>
</tr>
<tr>
<td>Healthy</td>
<td>72</td>
<td>9095</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: BMI: Body Mass Index

Based on the incidence of Tuberculosis, only 53.27% had a normal BMI while those who were not tuberculosis were 68.31% higher. In people who have tuberculosis, only 57.94% have adequate ventilation while those who are not tuberculosis are 85% higher. In people who have Tuberculosis 24.30% have an unhealthy roof while those who do not have less tuberculosis are unhealthy, 9.93%. In people who have Tuberculosis 32.71% have unhealthy floors while those who do not have less Tuberculosis are unhealthy which is 14.32%.

Stratification analysis has been done which shows that there is no interaction in the relationship between BMI and tuberculosis. Six confounding variables were obtained with ΔOR more than 10%, namely marital status, smoking status, history of DM, ventilation, roof and floor. In addition, it can be seen if there are 3 non-confounding variables in the relationship between BMI and Tuberculosis with ΔOR of less than 10%, namely age, sex, and education level so that it is not included in the final model below.
Table 2. Final Model of Multivariate Analysis of the Relationship between BMI and Tuberculosis

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>OR</th>
<th>(95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Upper</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal (BMI ≥20.0)</td>
<td>1</td>
<td>1 1 1</td>
<td></td>
</tr>
<tr>
<td>Thin (BMI&lt;20.0)</td>
<td>2.54</td>
<td>1.69 3.79</td>
<td>0.000</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Married</td>
<td>1</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>2.02</td>
<td>1.03 3.96</td>
<td>0.040</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3.77</td>
<td>1.81 7.85</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>0.24</td>
<td>0.16 0.36</td>
<td>0.000</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2.84</td>
<td>1.79 4.51</td>
<td>0.000</td>
</tr>
<tr>
<td>Ventilation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enough</td>
<td>1</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td>3.89</td>
<td>2.62 5.78</td>
<td>0.000</td>
</tr>
<tr>
<td>Roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>1</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>Unhealthy</td>
<td>2.59</td>
<td>1.71 3.96</td>
<td>0.000</td>
</tr>
<tr>
<td>Floor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>1</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>Unhealthy</td>
<td>2.59</td>
<td>1.71 3.96</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Discussion

In this study, the proportion of Tuberculosis in Indonesia in 2014 was 1% or 107 people out of 10722 respondents. Based on the results of the study it was also found that the proportion of normal BMI in Tuberculosis was 53.27% whereas in non-Tuberculosis people it was 68.31%, while the proportion of thin BMI in Tuberculosis was higher at 46.73% whereas in people not Tuberculosis was lower namely 31.69%.

The results of this study also showed that BMI had a significant relationship with the incidence of Tuberculosis in Indonesia in 2014. The results of the bivariate analysis showed that BMI of respondents had a relationship with the incidence of Tuberculosis. After multivariate analysis, it was found that the relationship between skinny BMI and Tuberculosis was 2.54 times (95% CI: 1.69-3.79), meaning that respondents with thin BMI had a risk of 2.54 times to experience Tuberculosis compared to normal after controlling for variable marital status, smoking status, history of DM, ventilation, roof and floor.

Globally, risk factors for the prevalence of TB infections have been found to vary across regions. A low body mass index (BMI) has been shown to be associated with a risk for the development of active TB. In addition, obesity (IMT≥30 kg / m²) and overweight (25 kg / m²≤IMT <25 kg / m²) were significantly lower risk of developing tuberculosis than individuals with normal weight (BMI, 18.5 to <25 kg / m²).

The correlation between body mass index and TB was first recognized by Hippocrates. Basically it is always assumed that there is a clear relationship between nutrition and TB. TB is also associated with poverty, which can cause malnutrition. TB causes children to miss school, and in adults causes increased costs of care, lack of productivity and the stigma of this disease causing social disturbances.

But does a low BMI predispose to TB or occur after TB infection? To answer this, it is necessary to look at the long-term effects of cohort studies that measure BMI before TB infection occurs. Palmer studied 68,754 members of the US Navy, a study conducted by Edwards to more than 823,000 members of the Navy found that TB developed 3 times more in young men (10%) or more under ideal body weight.

The strong association between TB and low BMI occurred in various TB incidents in various countries and in all BMI categories. If you see a 95% CI value: 1.69-3.79, it looks tight or quite narrow. This shows the results of the research obtained have good precision. In addition, based on the power of study calculation using the Lameshow formula, a strong power of study is obtained at 90%. So the results of the study might be generalized in the target population, namely the entire population of Indonesia and the population that has the same characteristics as the sample of this study. But the study used a cross-sectional design so that the relationship of the temporality of the variables in this study could not be ascertained.

Conclusions

Based on the study showed the proportion of Tuberculosis is 1%. In the bivariate analysis a significant association of BMI was found with the incidence of tuberculosis. Besides that, it was also known that the relationship between thin BMI and incidence of Tuberculosis was 2.54 (95% CI: 1.69-3.79) after controlled confounding variables which were previously bivariate analysis were only 1.89. In this study, it was
found that most TB patients had a thin BMI so that patients and non-TB patients were expected to keep their BMI normal to prevent the occurrence of TB and recurrence of TB disease. In addition, given the low prevalence of reported Tuberculosis cases, optimization of the search for Tuberculosis cases is needed so that transmission does not continue.

Ethical Clearance

IFLS-5 had been approved by Institutional Review Boards (IRBs) in the United States at Rand Corporation and in Indonesia at Ethics Committees of Gadjah Mada University.

Source of Funding

Self funding

Conflict of Interest

Nil.

Acknowledgement

We thank RAND for accessing the data provided.

References

1. WHO. Global Tuberculosis Control, 2010.


Determining Benzene Concentration Safe Level at Gas Stations in Pancoranmas Depok, Indonesia

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Abstract

Benzene is a dangerous chemical compound contained in Gas Station product. It is one of components in gasoline containing carcinogens. Gas station workers are prone to the risk of benzene due to continuous exposure, which can endanger their health and safety. This study was aimed to determine benzene concentration safe level at gas stations in Pancoranmas, Depok. The design of this study was article review based on reviews of previous studies that were then analyzed.

The result of the study showed that benzene concentration safe level limit at gas stations in Pancoranmas, Depok, based on the calculation done was 0.3 ppm. This value was different from the values set by international and national institutions such as OSHA, NIOSH, ACGIH, ATSDR, the Indonesian National Standardization Agency and the Ministry of Manpower and Transmigration of the Republic of Indonesia. Therefore, reviews are needed to provide health and safety guarantees for the gas stations’ workers. The control recommendation for the gas stations’ workers exposed to benzene was the provision of Personal Protective Equipment (PPE) in the form of respirator organic vapor to minimize benzene exposure and green open space by planting a number of ornamental plants to absorb and reduce benzene exposure such as Spider Plant, Boston Fern, Peace Lily, Dutch Beteland Golden Pothos.

Keywords: Benzene, safe concentration, gas station worker.

Introduction

Benzene is a colorless liquid aromatic hydrocarbon compound with the characteristics of having fresh odor, evaporating quickly, is dissolved in water and easy to burn\(^1\). Cigarette smoke, gasoline burning and evaporation containing benzene (more than 5%), petrochemical industries, and combustion process are sources of benzene in the air. The higher levels of indoor and outdoor benzene are found around emission sources such as in gas stations\(^2\).

Gas Stations are public infrastructure provided for the community to meet their fuel needs. In general, gas stations sell fuel in the form of gasoline such as premium, pertalite, pertamax and pertamax plus. Gas station workers are prone to the risk of benzene due to continuous exposure, especially through inhalation. Gas station workers are constantly exposed to benzene because they are in the environment that emits benzene from the fuel pump engine when they help customers to do refueling, when refilling fuel at the storage warehouse, as well as when they inhale the exhaust from the vehicles during the refueling process. The benzene exposures endanger their health because it can increase the risk of cancer\(^3\). ATSDR (2007)\(^1\) also stated that benzene enters bodies through inhalation, oral and skin contact. Long-term exposure to benzene can cause cancer in blood-forming organs. This condition is called as leukemia. Benzene exposure is associated with the development of a type of leukemia called as Acute Myeloid Leukemia (AML).

An effort that can be taken to protect the workers against the hazard risks of benzene exposure by various institutions is through determining the Threshold Limit
Value (TLV) as the standard hazard factor in workplaces or Time Weighted Average (TWA) that is safe to workers without causing illness or health problems in their daily working time exceeding 8 hours or 40 hours per week. In Indonesia, several standards have been set TLV for benzene. In 2005, Indonesian National Standard stated that benzene was classified in group A2 (chemical that is estimated to be a carcinogen for humans) that has a TLV of 10 ppm. Moreover, the based on the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia Number PER.13/MEN/X/2011 on Threshold Value of Physical and Chemical Factors in Workplace stated that benzene is classified in group A1 (chemical proven to be a carcinogen for humans) and has a TLV of 0.5 ppm. Some international institutions also set benzene exposure threshold. The Occupational Safety and Health Administration (OSHA) set benzene exposure threshold (PEL/Permissible Exposure Limit) at 1 ppm. The National Institute for Occupational Safety and Health (NIOSH) set benzene exposure limit in TWA of 0.1 ppm. The American Conference of Governmental Industrial Hygienists (ACGIH) of threshold limit value (TLV) set benzene exposure limit in TWA at 0.5 ppm. The Agency for Toxic Substance and Disease Registry (ATSDR) set the Minimum Risk Levels (MRLs) of benzene at 0.009 ppm for acute exposure, 0.006 ppm for moderate exposure and 0.003 ppm for chronic exposure.

This study was an article review study based on reviews of several studies that have been carried out previously and then were analyzed. Salim (2012) conducted a research on the analysis of the risk of benzene exposure in gas station workers which the sample data used was 15 workers consisted of 13 workers as pump engine operators and 2 administrative workers with an average body weight of 57.73 kg, the average respiratory rate was 0.6 m3/hour, and the average working time was 8 hours/day. The study found out that the result of benzene concentration measurement in the air from 15 points in the gas station service areas and administration areas in gas stations in Pancoranmas, Depok, showed the same value of 0.02 ppm. The data benzene concentration was obtained by using Coconut shell charcoal that was then analyzed by Gas Chromatography (GC). Although the benzene concentration was below the TLV set by the Republic of Indonesia Ministry of Labor, the fuel pump operators are prone to the carcinogenic effects in lifetime exposure. The next review was according to the research done by Tualeka (2013) about the safe limit of ammonia gas concentration in working environment. The average body weight of the data of 6 experimental white rats was 0.1405 kg with the average respiratory rate was 0.0013 m3/hour and the duration of exposure to ammonia gas was 8 hours every day. The data was used to determine the ammonia concentration safe limit as a reference to determine the ammonia threshold value in workplace.

According to the previous researches and differences in the determination of benzene TLV in working environment, and there has been no research on benzene concentration safe level in the Indonesian working environment, it is necessary to study the determination of concentration safe level (C safe) in working environment with benzene exposure. Gas station areas as working environment that have high benzene exposure should have benzene concentration with safe limit to prevent health and safety problems for workers. Therefore, based on the explanation above, the researcher conducted a study on determining the benzene concentration safe level at gas stations in Pancoranmas, Depok. According to William (1985), the safe limit of toxin in the air for workers can be used to predict the safe toxin concentration in working environment if there is no TLV determination and it also can be used as a comparison with the TLV set by some institutions.

The purpose of this study was to determine the benzene concentration safe level (C safe) in gas stations in Pancoranmas, Depok, which was preceded by calculating the body surface area (BSA) of the workers, the body surface area (BSA) of white rats as the experimental animal, the highest dose of toxin without effects on the Experimental Animals (NOAEL), the Km factors in animals (Animal Km), the Km factors in workers (Human Km), and the safe limit for toxin dosages for workers (SHD/Safe Human Dose).

**Findings:**

A. **The Characteristics and Body Surface Area of the Experimental Animals (White Rats):** Compounds can be used to determine the potential of chemicals that cause damage when entering the human body. Toxicity test usually used experimental animals, white rats, as the object. In general, human response to toxicity is qualitatively similar to the animals'. Therefore, this fact forms the basis of extrapolation from animal to human data.

Tualeka (2013) found out the characteristic data from 6 experimental white rats in the forms of weight
(W/Weight), respiration rate (BR/Breathing Rate) and exposure time (t/Time) according to the data in Table 1.

Furthermore, based on the body weight data of the experimental animals, the Body Surface Area (BSA) can be calculated by using the following formula\(^{11}\).

\[
\text{Animal BSA} = 0.09 W^{0.67}
\]

**Description:** BSA: Body Surface Area (m\(^2\)), W: Weight (kg)

Table 1. The Distribution of Characteristics and Body Surface Area of the Experimental Animals (White Rats)

<table>
<thead>
<tr>
<th>White Rats</th>
<th>W (kg)</th>
<th>BR (m(^3)/hour)</th>
<th>t (hour/day)</th>
<th>BSA (m(^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1405</td>
<td>0.0013750</td>
<td>8</td>
<td>0.024165</td>
</tr>
<tr>
<td>2</td>
<td>0.1405</td>
<td>0.0013755</td>
<td>8</td>
<td>0.024165</td>
</tr>
<tr>
<td>3</td>
<td>0.1410</td>
<td>0.0013809</td>
<td>8</td>
<td>0.024223</td>
</tr>
<tr>
<td>4</td>
<td>0.1410</td>
<td>0.0013809</td>
<td>8</td>
<td>0.024223</td>
</tr>
<tr>
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<td>0.0013657</td>
<td>8</td>
<td>0.024050</td>
</tr>
<tr>
<td>6</td>
<td>0.1405</td>
<td>0.0013754</td>
<td>8</td>
<td>0.024165</td>
</tr>
<tr>
<td>Average</td>
<td>0.1405</td>
<td>0.0013</td>
<td>8</td>
<td>0.024165</td>
</tr>
</tbody>
</table>

According to Table I, the results of the calculation analysis showed that the average Body Surface Area (BSA) of white rats was 0.024165 m\(^2\).

B. The Characteristics and Body Surface Area of the Workers: The characteristics data of gas station workers were obtained from the research conducted by Salim (2012)\(^8\) which included weight (W), worker breathing rate (BR) and length of working time (t/Time), according to the data in Table 2, whereas height (h) uses the average value of adult male height in Indonesia which is 159 cm.

Based on the data of the workers’ weight and height, the Body Surface Area (BSA) can be calculated by using the following formula\(^{11}\).

\[
\text{BSA} = \sqrt{W.h/3600}
\]

**Description:** BSA: Body Surface Area (m\(^2\)), W: Weight (kg), h: Height (cm)

Table 2. The Distribution of Characteristics and Body Surface Area of Gas Station Workers

<table>
<thead>
<tr>
<th>Workers</th>
<th>W (kg)</th>
<th>BR (m(^3)/hour)</th>
<th>t (hour/day)</th>
<th>h (cm)</th>
<th>BSA (m(^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>0.6</td>
<td>8</td>
<td>159</td>
<td>1.49</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>0.54</td>
<td>8</td>
<td>159</td>
<td>1.39</td>
</tr>
<tr>
<td>3</td>
<td>44</td>
<td>0.54</td>
<td>8</td>
<td>159</td>
<td>1.39</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>0.6</td>
<td>8</td>
<td>159</td>
<td>1.5</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.39</td>
</tr>
</tbody>
</table>

According to Table 2, the result of the calculation analysis showed that the average body surface area (BSA) of workers was 1.59 m\(^2\).

C. Animal Km and Human Km: The determination of safe dosage of toxin for workers is firstly done by calculating Animal Km and Human Km by using the following formula\(^{11}\).

1. Animal Km

\[
\text{Animal Km} = \frac{W \text{ animal}}{\text{BSA animal}}
\]

**Description:** Animal Km: Km factor in animals, W: Weight of the experimental animals (white rats), BSA: Body Surface Area of the experimental animals (white rats)

The calculation result for Animal Km can be seen in Table 3. The average Animal Km of white rats was 5.81.

Table 3. The Result of Animal Km Calculation of the Experimental Animals (White Rats)

<table>
<thead>
<tr>
<th>White Rats</th>
<th>Animal Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.81420952</td>
</tr>
<tr>
<td>2</td>
<td>5.81420952</td>
</tr>
<tr>
<td>3</td>
<td>5.82102947</td>
</tr>
<tr>
<td>4</td>
<td>5.82102947</td>
</tr>
<tr>
<td>5</td>
<td>5.80052067</td>
</tr>
<tr>
<td>6</td>
<td>5.81420952</td>
</tr>
<tr>
<td>Average</td>
<td>5.81</td>
</tr>
</tbody>
</table>

2. Human Km

\[
\text{Human Km} = \frac{W \text{ human}}{\text{BSA human}}
\]

**Description:** Human Km: Km factor in humans/workers, W: Workers’ Weight, BSA: Workers’ Body Surface Area
The result of Human Km calculation can be seen in Table 4. The average Human Km of gas station workers was 35.96.

Table 4. The Result of Human Km Calculation on Workers at Gas Stations in Pancoranmas Depok

<table>
<thead>
<tr>
<th>Workers</th>
<th>Human Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33.56</td>
</tr>
<tr>
<td>2</td>
<td>31.65</td>
</tr>
<tr>
<td>3</td>
<td>31.65</td>
</tr>
<tr>
<td>4</td>
<td>34.00</td>
</tr>
<tr>
<td>5</td>
<td>35.26</td>
</tr>
<tr>
<td>6</td>
<td>39.31</td>
</tr>
<tr>
<td>7</td>
<td>37.58</td>
</tr>
<tr>
<td>8</td>
<td>31.91</td>
</tr>
<tr>
<td>9</td>
<td>35.26</td>
</tr>
<tr>
<td>10</td>
<td>37.58</td>
</tr>
<tr>
<td>11</td>
<td>30.88</td>
</tr>
<tr>
<td>12</td>
<td>45.23</td>
</tr>
<tr>
<td>13</td>
<td>41.94</td>
</tr>
<tr>
<td>14</td>
<td>36.81</td>
</tr>
<tr>
<td>15</td>
<td>36.81</td>
</tr>
<tr>
<td>Average</td>
<td>35.96</td>
</tr>
</tbody>
</table>

D. Noael (No Observed Adverse Effect Level): One of the objectives of the research in toxicology field is to evaluate substances’ safety. To determine chemical concentration safe level, toxicity test is done to determine the highest dose without causing effects on the experimental animals or No Observed Adverse Effect Level (NOAEL).

Swaen et al. (2010)\(^{12,13}\) stated that the NOAEL of benzene was 3.0 mg/m\(^3\) or equivalent to 0.22 mg/kg obtained from the calculation of the average respiratory rate, average length of exposure and average body weight of white rats as follows.

$$\text{NOAEL benzene (mg/m}^3\text{)} = \frac{3 \times 0.0013 \times 8}{0.1405} = 0.22 \text{ mg/kg}$$

E. Safe Human Dose: The benzene safe level for workers exposed to benzene or Safe Human Dose (SHD) was determined by using the following formula\(^{11}\).

$$\text{SHD} = \frac{\text{Animal Km}}{\text{Human Km}}$$

Description: SHD: Safe Human Dose (mg/kg), Animal Km: Km factor in animals, Human Km: Km factor in humans/workers

Based on the formula, the result of SHD calculation obtained from the NOAEL value, the average animal Km, and the average human Km was:

$$\text{SHD} = \frac{(0.22 \times 5.81)}{35.96} = 0.04 \text{ mg/kg}$$

F. Benzene Concentration Safe Level: Benzene concentration safe level in working environment (gas station) was calculated by using the following formula\(^{11}\).

$$\text{C safe} = \frac{(\text{SHD})(W)}{(\alpha)(\text{BR})(t)} \text{ mg/m}^3$$

To convert mg/m\(^3\) to ppm, the following formula was used.

$$\text{C safe} = \frac{\# \text{ mg/m}^3}{(\text{MW})} \times 24.45 \text{ ppm}$$

Description: C safe: Concentration of toxin in the air that is safe for workers (mg/m\(^3\)), SHD: Safe Human Dose (mg/kg), W: Weight (kg), \(\alpha\): % of substances absorbed by the lungs, BR: Human breathing rate (m\(^3\)/hour), t: Working time (hours), MW: Molecular Weight

Based on the above formula, the results of the benzene concentration safe level calculation obtained from the SHD value, the average body weight, the percentage of absorption of substances, the average breathing rate of workers and the average length of working time was:

$$\text{C safe (mg/m}^3\text{)} = \frac{(0.04)(57.73)}{(50\%)(0.6)(8)} = 0.96 \text{ mg/m}^3$$

$$\text{C safe (ppm)} = \frac{\# \text{ mg/m}^3 \times 24.45 \text{ ppm}}{\text{BM}} = \frac{0.96 \times 24.45}{78.11} = 0.3 \text{ ppm}$$

Thus, it can be determined that the benzene concentration safe level (C safe) in gas stations (working environment) in Pancoranmas, Depok, was 0.96 mg/m\(^3\) or 0.3 ppm.

Conclusion

The benzene concentration safe level (C safe) in gas stations (working environment) in Pancoranmas, Depok, based on the calculations done in this study was 0.3 ppm. This value is different from the TLV determined by some international institutions such as OSHA, NIOSH, ACGIH and ATSDR. This value is also different from
the value set by some institutions in Indonesia such as the National Standardization Agency and the Ministry of Manpower and Transmigration of the Republic of Indonesia. Therefore, reviews are needed to provide health and safety guarantees for workers exposed to benzene, especially in Indonesia.

Workers at gas stations who are prone to benzene exposure need control efforts. The recommended control is the provision of Personal Protective Equipment (PPE) in the form of respirator organic vapor to minimize benzene exposure\textsuperscript{14} and green open space by planting a number of ornamental plants to absorb and reduce benzene exposure such as Spider Plant, Boston Fern, Peace Lily, Dutch Beteland Golden Pothos\textsuperscript{15,16,17}.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Not required. This is an article review research from studies that has been carried out by several previous researchers.

**References**

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Relationship Patterns of Rest with Blood Chromium Levels of Workers at Leather Industry Magetan

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Abstract

Operational processes in the leather industry use chemicals. One of them uses chromium sulfate as a tanner. Various studies have shown that there are health problems in tanning workers if exposed to chromium. The purpose of this study is to find out the relationship between resting patterns and levels of chromium in the blood of workers. Using a cross sectional design, there were 10 workers studied specifically handling the tanner’s process with a minimum ten-year tenure. The results showed that all respondents had chromium levels exceeding the standard according to Jantzen namely 1.6 µg/L-5.1 µg/L. The pattern of rest includes staying up late has a weak correlation with the levels of chromium in the blood, total rest also has a weak correlation with the levels of chromium in the blood, as well as rest at night. The metabolic process in the body plays a role in removing chromium toxins as long as workers carry out adequate resting activities. In conclusion, exposure to chromium during the tanning process causes high levels of chromium in the blood. The existence of a weak correlation between the break pattern variables shows that these variables do not affect significantly. Suggestions that workers use personal protective equipment so as to minimize exposure to chromium and take advantage of rest periods optimally.

Keywords: Chromium Sulfate, Rest Pattern, Chromium Levels In Blood.

Introduction

The leather industry or leather tanning is one of the community commodities that can support the economy in several regions in Indonesia. The leather industry produces finished leather that can be made into sandals, shoes, bags, jackets, and other fashion accessories. One process in the leather industry is the tanning process. In this process it aims to change the raw skin that is prone to damage due to the activity of microorganisms into tanned skin which is more resistant to these destructive factors using chemicals.

One of the chemicals used in the tanning process is using chromium sulfate. This is because chromium is able to react and form bonds with amino acids, collagen proteins¹. In addition, leather that is tanned using chrome has several advantages, including being suitable for the production of a variety of leather goods and having better compatibility with chemicals for the process of retanning and fatliquoring².

According to research Bregnbaket al (2014)³, as many as 80 (66%) allergic patients have a positive history of contact dermatitis caused by exposure to chromium through skin products. In addition, based on research Julander et al (2010)⁴ which examined skin deposition of workers in gas turbine production companies and space propulsion, it was found that although workers wash their hands several times after work, they will still be exposed to chromium exposure on the skin can contribute to deposition and risk of allergies.

Sleep or rest habits are very important factors in maintaining a healthy body. Because with enough sleep,
our focus and concentration will be maintained as long as we carry out activities. In addition, with enough rest, the natural processes that occur in the body also work optimally. The time, duration, and quality of sleep can affect endocrine, metabolic, and neurohormonal functions related to health. Sleep is an active time in which different brain wave patterns with unique physiological functions act in a progressive sequence. Sleep follows a pattern of rapid eye movement (REM), known as stage R, and non-REM (NREM) sleep throughout the night in a repetitive cycle itself approximately every 90 minutes. We spend 75% a night on NREM sleep and 25% on REM sleep. Enough sleep can regenerate damaged body cells to be new, expedite the body’s growth hormone, rest the tired body due to all day activities, increase the body’s immunity from disease attacks, increase concentration and physical ability, and improve the body’s metabolism.

Epidemiological and experimental studies have pointed to the relationship between lack of sleep behavior and the development of serious metabolic and endocrine consequences, especially diabetes mellitus. An interesting study was conducted on a group of 11 young men who underwent periods of sleep deprived of experimental sleep and extended periods of sleep after a normal initial six-night sleep duration. Glucose tolerance and acute insulin response to glucose are significantly altered during periods of lack of sleep.

The purpose of this study was to look at the relationship of rest patterns with chromium content in the blood of respondents in the Magetan leather industry.

**Material and Method**

Type of research is a descriptive study using quantitative analysis method. The design of this study is cross sectional where sampling of chromium levels in water resources and blood workers is done at one time in order to determine the level of risk of exposure to worker chromium in the tanning process. This research was conducted on leather tanning workers in 10 UKM in the area of UPT Leather Industry and Magetan Leather Products in East Java which was held in February 2018. The number of samples in this study were 10 workers using the total population method taken from 10 SMEs in the Leather Industry UPT area and Magetan Leather Products that work on the tanning process using chromium.

**Findings:** Chromium Levels in Skin Tanning Workers Blood: Results of examination of chromium (Cr) in the blood of workers tanning process:

![Figure 1. Testing Results of Chromium Levels in Worker’s Blood](image)

Figure 1 shows that the average levels of chromium in the blood of tanned workers is 36.1 µg/L with a minimum chromium level in the blood of 23.6 µg/L and a maximum of 48.3 µg/L. Based on Jantzen (2013), the chromium content in blood plasma is 1.6-5.1 µg/L so that the levels of chromium in the blood of tanned workers are all above the standard value according to Jantzen.
Resting Pattern

1. Stay Up at Night: Results correlation between the variables stay up all night with the chromium levels in the blood of respondents can be seen in Table 1 as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R$</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium Value</td>
<td>-0.190</td>
<td>10</td>
</tr>
<tr>
<td>Stay Up at Night</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the correlation test between the habit of staying up at night and the levels of chromium in the blood of workers showed that the correlation coefficient showed a correlation value of -0.190 with a very low negative relationship direction. The correlation value is negative, meaning that the more frequent tanned workers stay up at night, the lower the chromium level in the blood.

2. Total Rest: The results of the variable correlation between total rest or sleep at night with chromium levels in the blood of respondents can be seen in table 2, as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R$</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium Value</td>
<td>-0.355</td>
<td>10</td>
</tr>
<tr>
<td>Total Rest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows the test results of the correlation between the total number of workers who tanned tanners with chromium in blood. The correlation coefficient shows a value of -0.355 with a negative relationship direction and is in the area of a low relationship. This means that the more frequent the rest, the lower the level of chromium in the blood of tanning workers.

3. Sleeping at Midnight: The results of the variable correlation between sleeping at midnight and the levels of chromium in the blood of skin tanning workers can be seen in table 3, as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R$</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium Value</td>
<td>-0.348</td>
<td>10</td>
</tr>
<tr>
<td>Sleep at Midnight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows the results of the correlation between the habits of workers sleeping at midnight with levels of chromium in the blood. Correlation results showed a correlation coefficient of -0.348 with a low negative relationship and relationship strength. This means that the more often leather tanning workers sleep at midnight (sleeping between 23.00 WIB-01.00 WIB), the lower the chromium content in the body of the worker.

One reliable indicator to find out the exposure of chromium to workers in the tanning industry is blood serum. This is because the toxic material that enters the body will be distributed by the blood so that the blood of workers exposed to chemicals or toxic substances can be seen clearly and validly. Based on the research, the average value of chromium in the blood of tanners is 36.1 µg/L. According to the research conducted by Jantzen et al. (2013), the chromium content in the blood is 1.6 µg/L-5.1 µg/L so that the chromium content in the worker’s blood exceeds the standard value proposed by Jantzen\textsuperscript{7}.

Workers in the leather industry are accustomed to being exposed to chemicals used during the tanning process. One of them is exposed to chromium sulfate as the most used tanner in the leather industry. Chromium material can enter the body through the respiratory system. This is because chromium sulfate is in the form of powder which has the potential to spread into the air if it is not done carefully. In addition, exposure to chromium sulfate is the most risky, namely through contact with workers’ skin. This is because chromium sulfate is mixed with water in the tanning process so that exposure to chromium through the medium of water becomes very possible and has great potential to enter the body of the worker through the skin.

The content of chromium in the blood of workers that exceeds the standard value will potentially cause health problems in the body. According to research conducted by Ateeq et al. (2016)\textsuperscript{8}, that the use of chromium in the tanneries industry results in reproductive abnormalities, respiratory problems and stomach. However, skin disorders are a dominant problem due to direct contact with workers’ skin. Chromium sulfate has the potential to bind proteins to the skin and produce complex antigens that lead to hypersensitivity and dermatitis. During the tanning process, occupational exposure to toxic chemicals and microbial agents, namely mycotoxins and endotoxins, is one of the main reasons for health hazards. These findings indicate that exposure to chromium work...
can cause reproductive abnormalities, skin dermatitis and asthma-related problems in tanning workers.

This research is in line with research Danadevi et al (2004)\textsuperscript{9} which shows that DNA damage is positively correlated with blood chromium concentration. The mechanism of Cr poisoning has been linked to oxidative stress. Excessive reactive oxygen production causes lipid peroxidation, which adversely affects cell structure, nucleic acids and lipids. Other studies have shown that the high content of chromium in the blood correlates with increased oxidative stress and DNA damage. This study also shows that long-term exposure to chromium will be absorbed by the body and distributed to various tissues of the body and exposed organs of workers. DNA damage and levels of blood chromium in the blood can be an efficient biomarker for tanners who are exposed to chromium\textsuperscript{10}.

Based on the results of statistical tests show that the correlation coefficient indicates a very low strength of the relationship between staying up variables, while the variable total rest and sleep at midnight has a low relationship strength. Variables staying up late, total rest and sleep at midnight have a correlation coefficient that has a negative sign so that the higher the variable value, the lower the chromium level in the blood of the respondent.

Sleep or rest habits are very important factors in maintaining a healthy body. Because with enough sleep, our focus and concentration will be maintained as long as we carry out activities. In addition, with enough rest, the natural processes that occur in the body also work optimally. Sleep is a condition that is repetitive, changes in state of state that occur during a certain period\textsuperscript{11}.

Sleep or rest at night has an important role in the body’s metabolic processes. By having adequate rest, workers can concentrate on the work that will be done tomorrow so that it can reduce the number of workplace accidents in the workplace. According to Patricia et al (2005)\textsuperscript{11}, sleep also has a role to restore disease, control pain, reduce fatigue, increase blood circulation to the brain, increase protein synthesis, balance the mechanisms against diseases of the immune system, help the body detoxify and remove toxins in body, increases cell repair and growth, improves healing and decreases tension.

Lack of sleep or disturbed sleep is clearly detrimental to our health and performance during the day. Starting from lack of motivation, decreased ability to concentrate and memory, to bad moods. Condition of sleep deprivation also decreases a person’s immune system. The most obvious effect of sleep deprivation is on skin that looks dull and not fresh\textsuperscript{12}. The impact of sleepiness/overslept during the day can threaten work safety, including driving a vehicle, and a bad night’s sleep, can reduce the ability to fulfill daily tasks and not enjoy life activities\textsuperscript{13}. Insomnia is also a sleep disorder that can interfere with other body functions. Insomnia can result in decreased production of the hormone melatonin so that the process of repairing damaged body cells does not work perfectly, memory disorders, mood disorders, loss of enthusiasm and motivation so that daily activities can be disturbed and easily emotional. Insomnia can also lead to diseases such as muscle pain and hypertension\textsuperscript{14}.

**Conclusion**

The content of chromium in the blood of tanners of all respondents exceeds the normal level of chromium in the blood. The results of the analysis of the relationship between rest patterns with chromium content in blood indicate a weak relationship so that further research is needed regarding other variables that are more likely. Suggestions for SME entrepreneurs to provide personal protective equipment to reduce the impact of chromium exposure In addition, it is expected that workers do not carry out activities at night which can interfere with rest periods.

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**Conflict of Interest:** The authors declare no conflict of interest.

**Ethical Clearance:** The study was approved by the institutional Ethical Board of the Public Health, Airlangga University

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12. Prasadja A. Wake up! Get Fit Due to Sleep Properly Copyright. Jakarta: Wisdom; 2009.


The Behavior of Adolescent Mosque toward Earlier Introduction Tuberculosis Diseases in Kekait Village West Lombok

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Abstract

Background: Tuberculosis incidence rate is still quite high in Indonesia. Behavioral knowledge, attitudes, and skills of mosque adolescent about early recognition of tuberculosis disease is very important to know in order to be able to support government programs in prevention of transmission and increase the findings of new suspects in the community. The purpose of this research is to know the knowledge, attitudes, and skills of an adolescent mosque in the early introduction of tuberculosis disease.

Method: The type of research used was descriptive with the Household Survey approach of all adolescent mosques with a total sample of 40 people with sampling using the Purposive Sampling method. Data collection is done using a questionnaire that has been tested by validity and reliability and the data obtained are presented in the form of a frequency distribution table. While the data analysis used in this study is univariate analysis.

Results: An overview of the knowledge of adolescent mosques about the introduction of Tuberculosis is still lacking as many as 16 respondents (40.0%). While the attitudes of adolescent mosques about the early introduction of tuberculosis are sufficient, namely as many as 17 respondents (53%). Awareness of respondents who are still minimal also influences adolescent behavior in recognizing various health problems, one of which is tuberculosis.

Conclusion: The lack of knowledge and attitudes of adolescent mosques in the early introduction of tuberculosis has an impact on skills in recognizing the signs and symptoms of tuberculosis.

Keywords: Behavior, youth mosque, early recognition, tuberculosis.

Introduction

Tuberculosis disease prevention efforts have been done through various health programs, but the results are still not quite as expected and the tuberculosis incidence rate is still quite high in Indonesia. Based on data from West Nusa Tenggara Province Health Office in West Lombok regency in the number of smear positive tuberculosis patients is 560 people. The achievement of Case Detection Rate (CDR) of 42.98% which is still far from the target of 70% of CDR. The result of the hearing with the Tuberculosis officers at the Gunung Sari health care center obtained information on the occurrence of dropout treatment (Tuberculosis defaulters) because the patient felt healed, and there are still some events Multi-Drug Resistant (MDR). There is still a shortage of officers handling Tuberculosis programs, as well as a wide range of areas and weak community participation and awareness in supporting Tuberculosis control programs.

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The stigma that is not good in the community against Tuberculosis sufferers is still there so people do not want to come to check their health. Coughing complaints experienced are considered a normal cough. And still, there is a presumption of sickness experienced because it is handled so there are still people who come to the shaman medication. The low level of public knowledge so that ignorance about the signs and symptoms of tuberculosis itself, as well as feel the old treatment. Early introduction of tuberculosis disease in West Lombok regency has never involved adolescent mosques, whereas adolescent mosques have strategic value to be empowered.

The potential of adolescents to improve their knowledge, attitude, and skill directly in the community is very good because the level of curiosity of adolescents is very high. This is certainly in line with government programs to increase community participation in efforts to improve health status. This strategy can exploit adolescents potential to increase the coverage of Tuberculosis patients. From the description on the background of the problem can be asked the formulation of the problem of how the behavior of knowledge, attitudes, and skills of an adolescent mosque in the early recognition of tuberculosis disease. While the purpose of this paper is to know the knowledge, attitudes, and skills of an adolescent mosque in the early introduction of tuberculosis disease.

**Material and Method**

This study is descriptive survey research with a household survey approach. Primary data was obtained directly from the adolescent mosque by using questionnaires as an instrument of data retrieval research and from interview and observation of researcher directly, meanwhile secondary data obtained from the district health office of West Lombok. The population in this study are all adolescent mosques in Kekait village Gunungsari District West Lombok regency, which amounts to 40 adolescent mosques. The sample in this research is 40 adolescent mosque using the purposive sampling method. Data obtained from the questionnaires.

### Results

**Distribution of Respondents based on Age**

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15-20 year</td>
<td>8</td>
<td>20.0%</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 20 year</td>
<td>32</td>
<td>80.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Primary Data 2018

From table 1 the age of respondents is at most in the age group > 20 years is as many as 32 respondents (80.0%).

**Distribution of Respondents based on Sex**

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>23</td>
<td>57.5%</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>17</td>
<td>42.5%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Primary Data 2018

From table 2 shows that the most respondents are male sex that is as much as 23 respondents (57.5%).

**Knowledge of Youth Moslem**

<table>
<thead>
<tr>
<th>No</th>
<th>Knowledge</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>11</td>
<td>27.5%</td>
</tr>
<tr>
<td>2</td>
<td>Fair</td>
<td>13</td>
<td>32.5%</td>
</tr>
<tr>
<td>3</td>
<td>Lack</td>
<td>16</td>
<td>40.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Primary Data 2018

From table 3 shows that the majority of mosque youth knowledge about Tuberculosis disease is less than 16 respondents (40.0%) and the lowest is good category (11.50%).
Mosque Youth Attitudes

Table 4. Frequency Distribution of Teens Attitude Mosque About Early Introduction Tuberculosis

<table>
<thead>
<tr>
<th>No</th>
<th>Attitude</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>10</td>
<td>25.0%</td>
</tr>
<tr>
<td>2</td>
<td>Fair</td>
<td>17</td>
<td>42.5%</td>
</tr>
<tr>
<td>3</td>
<td>Lack</td>
<td>12</td>
<td>30.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Primary Data 2018

From table 4 shows that the majority of mosque teens attitude about early recognition of tuberculosis (TBC) disease is enough that 17 respondents (53%) and the lowest is good category as many as 10 respondents (6.7%).

Mosque Youth Skills

Table 5. Frequency Distribution of Young Mosque Skills About Early Introduction Tuberculosis

<table>
<thead>
<tr>
<th>No</th>
<th>Skill</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>11</td>
<td>27.5%</td>
</tr>
<tr>
<td>2</td>
<td>Fair</td>
<td>20</td>
<td>50.0%</td>
</tr>
<tr>
<td>3</td>
<td>Lack</td>
<td>19</td>
<td>47.5%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary Data 2018

From table 5 shows that the majority of mosque adolescent skills about early recognition of tuberculosis disease is enough that 17 respondents (42.5%) and the lowest is good category as many as 11 respondents (27.5%).

Discussion

The Knowledge of Youth Mosques in Early Introduction of Tuberculosis Disease: In the knowledge variables in this study, data were collected through questionnaire instruments. The interview is a method used to collect data, where researchers get information from a target research. Interviews can also be helpful in observation. The purpose of the interview is not just to get an oral number but also to get a direct impression of the respondent, assess the truth of the respondent, read the respondent’s expression, explain the question if not understood and provoke a jammed answer.

From the result of research, the knowledge of adolescent mosque in early recognition of Tuberculosis disease is the least category which is 16 respondents (40.0%), and the smallest is the knowledge of good category respondent is 11 respondents (27.5%). The knowledge of youth of the mosque in early recognition of Tuberculosis disease is needed as an effort to prevent the spread of disease in society. Level of knowledge of adolescent mosque in early recognition of Tuberculosis disease influenced by several factors one of education and training.

Knowledge can be the basis for a person before the person adopts the behavior. So knowledge is one important part that needs to be known in the analysis of one’s behavior. Knowledge can be influenced by factors such as formal education. Knowledge is closely related to education, which is expected that with a high education then someone will be more knowledgeable. If seen from the distribution of education, education most of the respondents can be classified as being heading low because of more graduates of junior high school and elementary school.

Respondents in this study have wrong answers in answering certain questions. This shows that the level of knowledge of some new respondents to the level of know. Though the know stage is the lowest level of knowledge, because the respondent can only mention, describe a little, define, and ask. Respondents have not reached the level of conclusion and level of problem solving.

The knowledge is also the result of human sensing of certain objects influenced by intensity, especially influenced by the sense of hearing and sight. Based on it can be concluded that high knowledge is not absolutely influenced by formal education but can also be caused by the sensing process with the exposure of respondents on health-related information. The results showed that the majority of respondents age ≥20 years with the same percentage of 20.0%. With the age of a person, there will be changes in physical and psychological aspects. Growth on the physical aspects matures the development of organs while the psychological or mental aspects affect the level of thinking a person so that more mature and mature. However, with increasing age, the brain’s ability to capture knowledge will decrease. These results indicate that the age of respondents has maturity so that it can affect the level of thinking, but its ability to capture or absorb knowledge can decrease.
The Attitude of Youth Mosque In Early Treatment of Tuberculosis Disease

Attitude is a variable that needs to be observed because attitude can be the basis for behavior formation. Based on the scale of Likert opinion assessment attitude is divided into 5 categories namely: strongly agree, agree, doubtful, disagree and strongly disagree. In this questionnaire, attitude is measured using Likert scale with the gradation of questions from very positive to the very negative. A positive attitude means good behavior in accordance with the values and norms of life prevailing in society. While the negative attitude is an attitude that is not proper with values and norms of life prevailing in society or even contradictory.

The results showed that the majority of mosque adolescent attitude about early recognition of tuberculosis disease was enough that 17 respondents (53%) and the lowest was a good category as many as 10 respondents (6.7%). Attitudes according, is a closed response to a stimulus but involves the factors of opinion and emotions concerned (happy-not happy, agree-disagree, positive-negative, etc.). The difference between attitudes and behavior of respondents can be caused by a closed reaction of respondents to the researcher so that the information obtained may not be able to describe the actual situation. When viewed from the item statement of a certain attitude, will be illustrated statements which are actually still unknown respondents.

In accordance with the theory attitude is a closed reaction to an object that is a tendency to behave (behave) with certain patternsto the object. Attitude is a response in an abstract form that cannot be seen, so it is still possible for respondents to lie.

Mosque Teens Skills In Early Treatment Of Tuberculosis Disease: In this variable, interviewed by using a questionnaire to find indications of youth behavior of the mosque. According, behavioral measurement can be done by measuring behavior indirectly. Indirect behavior measurement can be done by interviewing activities that have been done several hours, days, or months ago. The results of this study indicate that the majority of adolescent youth skills about early recognition of tuberculosis disease is enough that 17 respondents (42.5%) and the lowest is a good category as many as 11 respondents (27.5%).

According to, basically a form of behavior can be observed through attitudes and actions. But it does not mean that behavior can only be seen from attitudes and actions alone. Behavior may be potential ie from the form of research, motivation and perception. With the perception of the individual is aware to understand the circumstances surrounding the environment as well as about things that exist within the individual concerned. There are three main components in the perception process: the selection component, the interpretive component (interpretation), and the component are translated to the behavioral. In addition, awareness also has an effect on adolescent behavior in recognizing various health problems one of them tuberculosis disease. Awareness is the stage where a person realizes or knows first about the stimulus.

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Ethical Clearance: Ethical approval was granted by The Faculty of Medical, Udayana University, Health Research Ethics Committee (No: 2018.03.1.0945).

References


Health Information Systems (HIS) as a Tool for
Transformative Learning of Health Care Practitioners
in Resource Constraint Environment

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Abstract

The increase in the quantity of medical research output do not translate into the improvement of patient care and treatment. This is because healthcare professional in resource constraint environment do not learn and implement these new research outcomes. These studies investigated how transformative learning could be incorporated as a tool on existing Health Information system (HIS) to assist healthcare professionals. The study employed a case study approach in collecting data. Data was collected using semi-structured open-ended interviews. It was revealed that structured learning programs or tools were necessary but not available to facilitate the implementation of learning new research outcomes despite the hospitals having some standalone HIS in place. Based on the findings the researcher proposed an Integrated Health Information System framework (IHISF) which was underpinned by transformative teaching and learning theory and tool. This is to assist physicians in remote hospitals to learn and implement newly published research findings in their practices. The IHISF did not only meant to assist doctors to learn but to help them share new ideas with their counterparts in other remote regions.

Keywords: Health Information System, Physicians, Transformative learning, self-reflection, ICT.

Introduction

The proliferation of recent medical devices and the speedy healthcare research, regularly produces giant amounts of results and revised ways of treatment and care for patients, which, if enforced in practice, will potentially save lives and improve the standard of life of patients. Nevertheless, the increase in new research output do not mechanically translate into improved patient care and treatment. There is a broad proof that there is a considerable gap between the health care that patients receive and the new practice that researchers suggest. This is also referred to as “research and practice gap”, evidence and practice-gap or knowing and doing gap. This is because of physicians’ failure to learn the outcomes of those health care research innovations in other to translate them into their practices. The failure to translate new research findings into practice is exacerbated in cases where freshly trained physicians from university are deployed to rural communities were health care facilities are restricted and overladen with high number of patients. The physicians are unable to reflect on what they learned from university and to adopt new innovative research into their practices. Reflection on previous practices in order to unlearn these practices and learn new practices is termed transformative learning. A range of things are projected to account for the problem of “unlearning so as to learn”. Though physicians have difficult time adopting new practices, they appear to own a good harder time which is “unlearning” old-fashioned ones. Unlearning “old-fashioned” health care practices in order to learn new health care research based practices may be improved through Information and communication Technology (ICT). These new technologies play a significant role for instructional directions, information sharing of different tasks. Coleman contends that there is a great potential in using information system(IS) as one of the supportive systems within the health care system to handle pressing challenges facing health care systems in developing countries. However, Ehealth initiative group resolutely maintains that the recognition of health information system and its associated technologies not an end unto itself but a means to an end.
The objective of this paper is to investigate the level of HIS usage and its potential as a transformative learning tool for physicians in resource constraint environment. Based on the findings, an Integrated Health System HIS framework is compiled to help physicians learn and implement newly research findings in their practices.

The proceeding sections of this paper are presented as follows: related work, method, results and discussion, proposed Integrated Health care system Framework (IHISF) and finally the conclusion of the paper.

Related work

Transformative learning of healthcare professional's quandary

Disorienting Dilemma: Transformational learning involves ever-changing existing beliefs and thought patterns through the employment of discourse and demanding reflection. Ideally, the learner develops an open and accommodating idea of the subject or world. Beyond subject content, transformative learning develops skills for progressive autonomous thinking. According to Mezirow, transformative learning will involve any combination of religious, political, emancipatory, or developmental elements. Transformational learning happens in formal or informal learning environments and is expedited by educators or self-reliant. Transformational education seeks to transmit new information, skills, and ways of thinking, but beyond transmission of information, it serves to awaken the learner to a brand new manner of viewing and examining the world. Transformative learning permits participants to interact in knowledge construction, acting with the facilitators to use new information and broaden existing schemes of meaning. Mezirow further reiterates that this can be accomplished through an eleven-phase process which are; a disorienting dilemma, self-examination, critical assessment of assumptions, recognition of discontent and identification with similar others, exploration of recent choices, planning, getting knowledge for plans, experimenting with new roles, building confidence, reintegration, and renegotiation of relationships. Throughout these stages, the learner uses critical reflection and discourse to judge information, skills, roles, and views. Key elements of Mezirow’s theories, including the disorienting dilemma, essential reflection, discourse and action, All of Mezirow’s transformative learning method is related to healthcare-sparked transformation.

The next paragraph will elaborate on Health Information System (HIS) as a transformative learning tool.

Health Information System (HIS) as a transformative learning tool: Sound and reliable data is the foundation of decision-making across all health system building blocks, and is crucial for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and funding. Health Information System (HIS) according to WHO is a system, which provides the foundation for the generation of good-quality data, and is a major building block of a health system. It integrates collection, processing, reporting and use of information essential for improving effectiveness and efficiency of health services through improvement of management at all levels within the health system. (HIS) is classify into two major halves: a clinical half and administrative/statistical part.

The distinction between these two is the means data is used. In clinical work, they are connected to a true patient name or a novel personal identifier. Decisions regarding this patient are created based on this information. Therefore, there is a high demand for data accuracy and correctness. Within the administrative or statistical part of the system, data are separated from the patient and are not any longer utilized in decision making regarding individual patients. Therefore, the demand for absolute correctness in every individual case is not therefore high. Instead, the usefulness of the information at this level is extremely dependent on definitions, comparable use of codes etc. The information from an administrative or statistical system might not in any case be copied back to the patient once more.

The next section will elaborate on the methodology applied in this research.

Methodology: The aim of the study was to investigate the level of HIS usage and its potential as a transformative learning tool for physicians in resource constraint setting to learn new ideas emanating from current health research. In order to achieve these objective six hospitals (3 district hospitals and 3 regional hospitals) were selected from North West province in South Africa. Secondly, hospitals were purposefully selected based on their geographical locations, which is situated across North West province of South Africa.
For confidentiality that was requested by the hospital directors, the names of the hospitals are anonymized in this research paper. Given the character of the study, a case study approach provided the most effective technique for data collection. Participants for the study were drawn from the whole population doctors and nurses. Two doctors and two nurses were selected for participation. A composite number of twelve doctors and twelve nurses voluntarily took part in the research (N=24).

Data was collected using semi-structured, open-ended interviews. The interviewees were asked to respond to the subsequent questions in their own words:

1. What form of Health information system do you have in your hospital?
2. What’s this Health information system used for (if there’s any)?
3. Is there any part of the HIS that assists you as a doctor or nurse to learn new procedures?
4. How do you as a doctor learn new research findings, and technology that have been recently discovered?
5. How do peer-to-peer information shared to boost your practice?
6. What part of HIS will you recommend to the hospital management to include in helping your daily routine job?

The interviews lasted for one hour with every respondent and were audio-recorded and transcribed by the researcher. Another independent researcher checked integrity of data entry from the study. Content analysis techniques was used to transcribe the code as prescribed by Fraenkel. After the initial coding, the independent researcher and the main researcher met to check the consistency of their various interpretation of the transcripts and then coded them. The main themes were identified. The various broad categories that were noted and discussed below.

Findings and Discussion

1. Availability of HIS and usage in resource constraint environment: The respondents indicated that there is a limited functionality of HIS in their hospitals. Some of the functionalities support administrative duties in the hospital while others support clinical duties. The administrative duties as indicated by the physicians were as follows;

Patient administration systems which helps them to admit, discharge and transfer patients. This system keeps track of patient’s movement of care in an inpatient setting. The respondents further indicated that the patient administration systems help them to register patients demographics, and date of visit by patients. One physician stated, “We have Patients administration and Billing system (PAAB) in our hospitals”. This system is used to submit claims and monitor submission and reimbursement status of the patients. There were other administrative systems, which were also found in the hospitals like Personnel management system, which manages human resource information for staff, including salaries and benefits. Moreover, there was Staff scheduling and time management system, which assists in scheduling and monitoring staffing needs, tracks employee work schedules and employee attendance.

The interviewees further stated that there were other systems for clinical duties. There was Laboratory information system for supporting collection, verification, and reporting of laboratory tests. In addition, was Pharmacy information system for supporting medication ordering, dispensing, and inventory control for drug compatibility checks and allergy screening. One very important system which the respondents made mention of was Electronic medical record (EMR) facilitates capturing and reporting of patient’s health history, problem lists, treatment and outcomes which allows clinicians to document clinical findings, progress notes, and other patient information. However, this system is not fully utilized because of lack of ICT skills of the physicians. Another system, which was available but underutilized, was Telemedicine and telehealth system, which supports remote delivery of care.

The usage of HIS as a tool for transformative learning of new research finding and improved practice: The respondents indicated that the HIS in their facilities do not give them any special function to be able to learn and improve on their practices. Health professionals only get to know of any new practices and procedures through monthly face-to-face briefing or workshops organized by the department of health in their respective regions. There is little or no reflection on what the physicians already know which can be brought into his practice because of little time at the disposal of physicians. Physicians treat high number of patients per day, which gives them no time to reflect. Mezirow, indicates that critical reflection is very important and forms an integral a part of shaping physicians behaviours.
towards new assumptions\textsuperscript{17}. There is no concept of HIS as an adult learning tool for interaction between doctors, and researcher using the web. Liaw and others\textsuperscript{20}, state that electronic learning using network technologies to provide and facilitate transformative learning is crucial to assist doctors. Mezirow\textsuperscript{17} additionally states that it is a dialogue involving the assessment of beliefs, feelings, and values. He further states that, “discourse is learner-centered, participatory, and interactive. It involves group deliberation and group problem solving\textsuperscript{15}. This implies that doctor’s action, which is exhibited in their daily routine, can be improved through accessing materials, and sharing ideas at their work.

The need of Integrated Health Information System framework (IHISF): Based on the findings stated above a transformative teaching and learning tool, which forms part of HIS is proposed to assist physicians learn, and implement newly research findings in their practices. A set of applications and processes, which use available electronic media to deliver electronic learning to physicians, will be designed as an Integrated Health Information System framework (IHISF).

The IHISF to be built will be based on transformative learning ideas. Transformational learning involves ever-changing existing beliefs and thought patterns through the employment of discourse and demanding reflection\textsuperscript{9}.

For transformative learning to occur ICT systems are involved and ICT needs to be seamlessly integrated and grounded in the context of the learner. The ICT system evolves around networked-delivered interactive multimedia courses and network-based tutoring which constitute the main learning features.

The Integrated Health Information System framework (IHISF) consists of different elements, the Learning Management System (LMS), the Visual Authoring Tool, the doctor’s Interactive e-learning setting and Key-guided Search Tool. The elements declared above are described within the following paragraphs:

- The Learning Management System (LMS): this is often a complex administrative system that is employed to deliver electronic content in a form of lessons and to prepare the physicians who participate in the teaching activities.
- The Visual Authoring Tool: this is often custom developed software system facilitating the efficient creation of lessons. Experience authors construct straightforward lessons with this tool.
- The doctor’s Interactive e-learning environment: this is often at the presentation tier where user interaction is concentrated. It focus is on efficient user interface (UI) style and accessibility.
- The Keyword Search Tool: The database holds all he accessible content together with their corresponding description. The keyword search tool permits exploring through keyword with the aim to permit users find content.

Conclusion

This research article investigated how physicians in resource constraint environment learn and incorporate new research finding emanating from medical research field into their daily routine practices. It was revealed that many hospitals in resource constraint environment have HIS for supportive and administrative functions instead of clinical functions. It was further learnt that new research findings and ideas generated in the field of medicine are not easily learned and integrated into practice by the doctors.

Based on the findings the researcher proposed an Integrated Health Information System framework (IHISF) which was underpinned by transformative teaching and learning theory and tool to assist healthcare physicians in remote hospitals to learn and implement newly research findings in their practices. The IHISF did not only meant to assist doctors to learn but to help them share new ideas with their counterparts in other remote regions. The IHIS will also serve as framework for the government in these deploy resources to these areas equitably.

Conflict of Interest: None

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Ethical Clearance: Taken from UNISA Ethics Committee.

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Evaluation and Comparison of Root Proximity of Maxillary and Mandibular Interradicular Sites for Mini Implant Placement Using Orthopantomogram and Cone Beam Computed Tomography

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ABSTRACT

The purpose of this study is to evaluate and compare the root proximity of maxillary and mandibular interradicular sites using orthopantomogram (OPG) and cone beam computed tomograph (CBCT) for the primary stability of mini implants. The cone beam computed tomographic images and orthopantomographic images of 70 subjects were taken. The interdental sites from distal of canine to mesial of second molar are examined for root proximity. The root proximity was measured at four levels from cementoenamel junction in 70 CBCT and OPG images. The results showed a statistically significant difference between the values obtained from CBCT and OPG images; the root proximity was least 6mm above the cementoenamel junction in maxilla and mandible in the range of 1.09-3.62mm, 1.45-4.17 mm respectively. The study concluded that CBCT images are more accurate and reliable. At 5mm from CEJ in the region between the first molar and second premolar in maxilla and in the area between first molar to first premolar in mandible the root proximity is least and adequate for mini implant placement.

Keywords: Orthopantomogram, CBCT, Implants

Introduction

The expanding demand on orthodontic treatment procedures with minimal patient compliance and maximal anchorage consideration had caused the popularity of using temporary anchorage devices mainly miniscrews or mini implants during active treatment. The mini implants can be used for anchorage control in all three planes namely sagittal, vertical, transverse planes. The stability of the mini implant plays a role in providing the absolute anchorage required and it requires an optimal site for placement which should provide increased contact with the underlying cortical bone without any interference to the adjacent vital structures. Pantomographic and cephalometric skull radiographs have limited views of the dentition and surrounding structures, and may not truly depict the anatomical relationship of structures, in as much as they only provide two-dimensional views.¹ The introduction of Cone Beam Computed Tomography (CBCT) in orthodontics provides a three dimensional view of oral and craniofacial structures aiding as an eminent diagnostic tool. Due to the reduced radiation exposure when compared to conventional CT, CBCT plays its main role in diagnosis and treatment planning in orthodontics.² ³ Poggio et al looked at the mandibles and maxillae of 25 patients to determine “safe zones” for mini-implant placement using cone
Another study by Motoyoshi et al. evaluated specifically the correlation between cortical bone thickness and success rates of mini-implants. A minimum thickness of 1mm of cortical bone was shown to be necessary for increasing success rates. This study showed that knowledge of the thicknesses of cortical bone throughout the jaws is directly linked to the success of mini-implants. In the present study, we are comparing the accuracy in assessment of root proximity of the teeth to the implant site using Orthopantomograph and Cone Beam Computed Tomography for the purpose of placement of mini implant in an ideal site without interfering the roots of the adjacent teeth and to provide an absolute anchorage for orthodontic treatment. So in this study the root proximity at the interradicular sites mesial to second molar and distal to canine is evaluated and compared using Orthopantomograph and Cone Beam Computed Tomography.

Material and Method

In this study, cone beam computed tomographic images and orthopantomographic images of 70 subjects in the age group of 18 to 45 years who never underwent orthodontic treatment were selected.

The patients selected for the study were without facial asymmetry, missing permanent teeth, cleft lip/ cleft palate, without any systemic diseases, without periodontal diseases and periapical pathology. Patients who never had orthodontic treatment, without any prosthetic implants in the measuring sites, without any pathology like cyst/tumors/fractures of maxilla and mandible. The Kodak CS 9300 3D system (figure 1) is the CBCT device used with voxel size between 0.15mm and 0.30mm. The image reconstruction time was approximately 4.5 minutes. The 120 images acquired are analysed using Kodak CS 3D imaging software version 3.5.7 and the images are oriented in three planes of space so that the measurement errors produced from non standardized head postures could be minimized. The horizontal axis of the software is aligned parallel to the anatomic occlusal plane in the sagittal view and is adjusted to pass through the buccal cusps of maxillary first molars in the coronal and axial view. Interdental sites from the distal aspect of the maxillary canine to the mesial aspect of the maxillary second molar are examined. The regions were between

1. Canine and first premolar (3–4),
2. First and second premolars (4–5),
3. Second premolar and first molar (5–6), and
4. First and second molars (6–7).

Root proximity is the term used when the roots of adjacent teeth are 1.0mm or less apart, as measured radiographically. To measure the root proximity at the four interradicular sites (3-4 to 6–7), transverse planes are prepared along a line parallel to the occlusal plane(figure 2) Next, the interdental sites were equally divided into four sectors of 2 mm intervals from cementoenamel junction and were labeled L1 to L4 from bottom to top.

In the CBCT images, at each transverse planes (L1 to L4), root proximity is defined as the shortest distance between tangent lines to the proximal root surfaces(figure 3). In the panoramic radiographs of 70 subjects, the hardcopies are made and the values are measured manually on the radiograph using aerospace digital caliper when viewed on a x-ray viewer by a single operator. (figure 4) The interdental areas (3-4 to 6–7), are divided into four levels from the cementoenamel junction towards the apex and the four levels are separated by a distance of 2mm and the root proximity is measured.
deviation was obtained and in the groups showing normal distribution, one-way analysis of variance was used for intergroup comparisons. For the comparison of the independent set of data, an independent t test was performed. The results were evaluated at the $P<0.05$ significance level.

**Results**

The measured data of root proximity obtained on evaluating 70 images of CBCT and OPG of maxilla and mandible at the inter radicular sites mesial to second molar and distal to canine at four levels from CEJ. The data obtained for root proximity using OPG and CBCT are compared.

**Graph 1: Comparison of Mean Values for Root Proximity in the Interdental Spaces from Mesial to Second Molar and Distal to Canine of Maxilla in OPG and CBCT.**

**Statistical Analysis**

The measured data obtained from both OPG and CBCT were tabulated separately and are evaluated statistically. Statistical calculations were carried out using SPSS (Statistical Package for Social Sciences) 16.0 software. The descriptive statistical mean, standard
Discussion

The success of orthodontic treatment greatly depends upon the anchorage control. Numerous techniques have been advocated in orthodontics to reinforce anchorage. Evolution of skeletal anchorage system has made the orthodontist to achieve absolute anchorage. Primary stability of mini implants due to mechanical interdigitation plays a major role in its success rates which in turn are influenced by 3 factors, placement technique (operator factor), bone quality (host factor) and implant design (material factor). Under operator factor, precise placement technique of the implant is essential to preserve the integrity of the cortical bone without damaging the roots of the adjacent teeth. Assessment of interradicular distance is important as it relates to both safety and stability of microimplants. Kuroda et al reported that the proximity of the miniscrews to the root is a major risk factor for miniscrews. Root proximity is the term used when the roots of the adjacent teeth are 1 mm or less apart, as measured radiographically. The clinical evaluation of root proximity is based on routine radiographic procedures. The orthopantomograph provides distorted two dimensional views of the three dimensional maxilla and mandible whereas cone beam computed tomography provides three dimensional images of maxilla and mandible. However, cone beam computed tomography cannot be taken in all patients due to cost and radiation factor, but orthopantomographs are routinely taken in orthodontic profession. The form of maxilla and mandible specifically the density and thickness of the cortical bone is determined by the masticatory muscle force. The thickness of the cortical bone is closely related to the facial vertical dimensions.

Under material factor, primary stability of mini implants is determined by various implant designs like diameter, length, thread pitch width, thread design, thread sharpness and surface characteristics. Numerous studies have already evaluated about the material factor determinants for the primary stability of mini implants.

The diameter of the mini implants used in clinical practice varies from 1.2-2 mm. So, to place the mini implants without contacting the adjacent root structures, it has been considered that a minimum of 3-4 mm of bone is required in the interradicular region, with approximately one mm of bone between mini implant and the adjacent root structures. The results of the study on evaluating the root proximity of maxilla and mandible in the region between first and second molar, first molar and second premolar, second premolar and first premolar, first premolar and canine using OPG and CBCT suggests that the root proximity decreases gradually from cementoenamel junction to apex which is from level 1 to 4. The root proximity is least at level 4 in both maxilla and mandible which is consistent with the study done by Sawada et al who concluded that the distance between the roots increases in the direction of the root apex and it is necessary to assure root proximity of at least 2.5 mm for implant placement.

The root proximity is in the range of 1.09-3.62 mm in maxilla and 1.45-4.17 mm in mandible at 4 mm from the cementoenamel junction. These results were also in accordance with study done by Joorok Park et al who concluded that the interdental space increases from cementoenamel junction to apex with average of 1.62-3.35 mm in maxilla and 1.99-4.00 mm in mandible and also Sebastian Baumgaertel et al in their study on buccal cortical thickness in maxilla and mandible concluded that the placement of mini implants more
than 4mm apical to the alveolar crest is required. The root proximity is less in mandible when compared with maxilla. The root proximity is minimum and acceptable at levels 3 and 4 which is 4mm and 6mm from CEJ, but the attached gingiva also should be considered. Placing implants in movable mucosa is known to cause tissue irritation and inflammation of gingival tissue, resulting in loss of the implant. According to Lim WH et al the height of the attached gingiva upto 6mm from alveolar crest is considered to be adequate for mini implant placement. Based on the results of the present study, the cortical bone thickness is significantly less mesial to maxillary second molar when compared with the other areas. This is consistent with the study by Schnelle et al who concluded that adequate bone existed mesial to the maxillary first molar than the distal of maxillary first molar. According to Dalstra et al, a micro implant (outer diameter, 2.0 mm; inner diameter, 1.2) should have cortical bone thickness of more than 1mm in the peri-implant bone tissue for initial stability of the mini implant. The amount of bone seen in between maxillary first molar and second premolar at 5mm above the CEJ (i.e.) level 6 is 1.11 ± 0.06mm where as in mandible region mesial to second molar to distal canine in maxilla and mandible, the area between first molar to first premolar in maxilla and in the area between first molar to first premolar in mandible, where the root proximity is less and adequate bone support can be achieved for miniscrew stability.

Conclusion

The study evaluated the accuracy of measurements of root proximity between OPG and CBCT in the maxillary and mandibular interradicular sites at four levels from CEJ in the region mesial to second molar and distal to canine in maxilla and mandible. CBCT is more accurate and reliable in evaluating the root proximity of the maxillary and mandibular interradicular sites and the adequate root proximity for mini implant placement is 5mm from CEJ in the region between the first molar and second premolar in maxilla and in the area between first molar to first premolar in mandible.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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Effects of Breast Feeding and its Impact on Oral Health—A Review

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ABSTRACT

During infancy and early childhood, breastfeeding is one of the most important activities. For the first six months of life, the only source of nutrition for a healthy infant is breast milk as specified in the policy statement of the AAP section. It is beneficial to both mother and the child. To infants it offers ideal nutrition, resistance to infectious diseases, enhanced immune system since it contains secretory immunoglobulins (IgA, IgG), reduced risk of chronic diseases and allergy, physical and developmental growth benefits. The most common infection encountered during childhood is Acute otitis media (AOM), commonly referred to as middle ear infection. In US, children aged through 0 to 4 years, the health care visits with AOM as primary diagnosis was 575 per 1000 visits in 2007. AOM begins as an upper respiratory tract infection that can lead to Eustachian tube dysfunction which can eventually result in hearing loss in children[1,3]. To mother, the benefits of breast feeding include increased physiologic postpartum recovery and reduced long term risk of obesity, osteoporosis and breast and ovarian cancers[1]. As recommended by HHS Healthy people 2010 goals, one of the consequences of continued breastfeeding beyond six months is compromised dental health. However there is no valid link has been made between breastfeeding and dental cavities[1,4].

Keywords: Breastfeeding, Nutrition, Oral microbiome.

Introduction

Dental Caries: The two primary elements required to form a dental caries are:

1. Cariogenic bacteria
2. Simple carbohydrates (in the form of free sugars)

Cariogenic bacteria are microbes (Streptococcus mutans, Lactobacillus species) that can cause caries in tooth by digesting carbohydrates (sugars) and releasing acids in turn. These acids can demineralise the tooth enamel causing caries. However the tooth enamel can be remineralised (effectively regrown) by the components of saliva, therefore the demineralisation process is not necessarily irreversible. When the process of demineralisation exceeds the process of remineralisation, caries begins[3,4].

Early Childhood Caries/Baby Bottle Tooth Decay: Early childhood caries (ECC) refers to decay in deciduous teeth (milk teeth). The deciduous teeth erupt around 6 to 12 months of age in infants. Tooth decay in milk teeth can be caused by cavity causing bacteria which is transferred from mother (or primary caregiver) to the infant. This can happen when the mother puts the baby’s feeding spoon in her mouth or cleans a pacifier in her mouth.

Prenatally, the baby’s mouth is more like a sterile gut. Soon after birth, the baby’s mouth get colonised with bacteria which result in formation of oral microbiome. The appearance of ECC is partly related to the age at...
which a child’s oral microbiome is colonised with cariogenic bacteria. More earlier this occurs, more likely the child develops ECC\cite{3,5}.

Apart from breast feeding, the condition which more likely can cause ECC is enamel hypoplasia (less/thinner enamel). The factors that can cause hypoplasia include genetic/systemic conditions, malnutrition, vitamin D deficiency, traumatic and premature birth etc. and hence, ECC\cite{3}.

Caries in early childhood can significantly affect the overall quality of life in infants.

**Does Breastfeeding Cause Ecc??**

This is an ongoing debate whether breastfeeding causes early caries in infants. A combination of sugars, low amounts of saliva and a low pH in saliva is required for caries causing bacteria namely S. mutans. Breastmilk in fact contains lactoferrin that actually kills S. mutans\cite{3,4}.

Breastmilk contains immunomodulatory factors that can establish normal intestinal flora. In additional to this breast milk components also establish a healthy oral microbiome which can change with time with eruption of new teeth.

However, breast feeding duration, frequency of breastfeeding and nocturnal breastfeeding during sleep are more often correlated with the development of ECC. During nocturnal breastfeeding, the tongue fills the mouth and holds the nipple against the teeth surface, thereby prolonging the exposure of cariogenic bacteria over the substrate resulting in caries\cite{6}.

Per Brian Palmer stated "Human milk alone does not cause dental caries. Infants exclusively breastfed are not immune to decay due to other factors the impact the infant’s risk for tooth decay. Decay causing bacteria (S. mutans) is transmitted to the infant by way of parents, caregivers and others (2002)"

A study by Erickson 1999, concluded that breast milk is more identical to water and does not cause tooth decay and another study of his inferred that immersing teeth in breastmilk can make it stronger. According to the review done by Lavigne 2013, there is no evidence that prolonged breastfeeding can increase the risk of ECC.

Despite all these researches, a study done by systemic review and meta-analysis conclude that breastfeeding up to 12 months of age is not associated with an increased risk of dental caries and it also renders some protection. Breastfeeding beyond 12 months of age (during eruption of deciduous teeth) may increase the risk of dental caries. This can also be due to the introduction of carbohydrate rich diet during weaning period in infants\cite{6}.

**Role of Mothers in Prevention of Dental Caries:**
Mothers play an important role in the prevention of caries in infants. They should be properly educated regarding transmission of infection from mothers having dental caries to children, breastfeeding, weaning, brushing techniques and routine dental visits of child.

As recommended by World Health Organisation, healthy diet and proper feeding habit is essential for prevention of oral diseases which includes ECC, dental erosion, defects in development, diseases of oral mucosa and periodontal diseases\cite{7}.

Mothers should take the following points into note in order to prevent ECC in infants

- Do not share saliva with the baby through feeding spoons or pacifiers.
- Wipe the gums of the child after each meal with clean wet gauze or cloth.
- Do not encourage nocturnal bottle/breast feeding
- Place only plain milk/breast milk in bottle. Avoid adding sugars, juice or soft drinks.
- Do not dip the pacifier in honey or milk, use clean and plain pacifier.
- When the first tooth erupts, brush them gently with child tooth brush and a smear of fluoride toothpaste (size of rice grain) until the age of 3
- Between the age of 3 to 6 years, brush the teeth with fluoride tooth paste (size of a pea)
- Supervise brushing until your child can be counted on to spit and not swallow toothpaste.
- Right from his/her first birthday encourage to drink from a cup.
- Encourage healthy eating habit\cite{5}.
- Visit dentist so that they recommend an antibacterial mouthwash or chewing gums that contains xylitol which can reduce the amount of bacteria in mouth\cite{8}.
Conclusion

An anthropologist’s quoted “If breastmilk caused decay-evolution would have selected against it. It would be evolutionary suicide for breastmilk to cause decay” [9]. According to the guidance provided by Public Health England (December 2018), breastfeeding upto 12 months of age is associated with decreased risk of tooth decay. They also provide links between dental damage and breastfeeding beyond 12 months[9]. The result of one of the cohort studies done on breastfeeding and dental health(july 2017) conclude that breastfeeding≥24 months increases the risk of having ECC. Adopting early preventive measures to dental caries is essential to provide the whole beneficial effects of breastfeeding to infants.[10]

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A Quick Review on the Cellular Changes in Epithelial Dydyplasia

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ABSTRACT

Epithelial dysplasia, a term becoming increasingly referred to as intraepithelial neoplasia, is the sum of
various disturbances of epithelial proliferation and differentiation as seen microscopically. Individual
cellular feature of dysplasia are called epithelial atypia. Studying on individual dysplastic feature in
microscope is a little difficult during the early period on viewing neoplastic tissue when comparing to the
normal structure. This article briefly views on each dysplastic features along with referral hand drawn images
for easy understanding.

Keywords: Dysplasia, Pleomorphism, Nucleus, Atypia.

Introduction

The histological epithelial alterations were divided
as in previous publications into dysplasia (slight,
moderate and severe) or carcinoma in situ. As reported
elsewhere 1,2 the thickness of the squamous epithelium
of the cervix was divided into three equal parts: BP
(basal-parabasal zone), IM (intermediate zone), and S
(superficial zone bordering the lumen). This division was
achieved by the aid of a translucent ocular grid. The grid
measured 10 mm in length (having 10 divisions) and 5
mm in width. The occurrence of mitotic figures in each
part of the epithelium was recorded. The classification
of dysplasia and carcinoma in situ is in accordance with
the one proposed by the WHO International Reference
Center. 3,4 The criteria for the histological classification
are as follows:

Slight Dysplasia: The full thickness of the epithelium
is composed of cytologically atypical cells, i.e. cells
with abnormal, irregular nuclei. Undifferentiated cells
are present in the BP compartment (the nuclei being
rounded or elongated with a maximum nuclear diameter
perpendicular to the epithelial border). The nuclear
density is higher in the BP compartment and decreases
markedly towards the surface. The cytoplasm in the cells
in the IM zone and in the S zone is abundant, suggesting
cell maturation. Cells with basal cell hyperplasia, but
without atypical nuclei in the IM and S compartment,
are not included in the group of mild dysplasia.

Moderate Dysplasia: Undifferentiated cells are present
both in the BP compartment and in part of or throughout
the IM compartment with a similar nuclear density in
these zones. The rest of the epithelium contains atypical
cells with abundant cytoplasm and has a lower nuclear
density.

Severe Dysplasia: Undifferentiated cells are present in
the BP, IM and deeper half of the S compartments. The
nuclear density is similar in these zones. The superficial
half of the S compartment contains atypical cells with
abundant cytoplasm, and has a lower nuclear density.
Carcinoma in situ: Undifferentiated cells occupy the
whole thickness of the epithelium and the nuclear density
is similar in all three compartments. The uppermost cell

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layers covering the luminal border of the epithelium, however, could be flattened (up to three layers in thick epithelium), 23 with irregular, pyknotic nuclei arranged parallel to the luminal border.

The neoplastic cell is characterised by morphologic and functional alterations, the most significant of which are ‘differentiation’ and ‘anaplasia’.

**Differentiation**: Differentiation is defined as the extent of morphological and functional resemblance of parenchymal tumour cells to corresponding normal cells. If the deviation of neoplastic cell in structure and function is minimal as compared to normal cell, the tumour is described as ‘well-differentiated’ such as most benign and low-grade malignant tumours. ‘Poorly differentiated’, ‘undifferentiated’ or ‘dedifferentiated’ are synonymous terms for poor structural and functional resemblance to corresponding normal cell.

**Anaplasia**: Anaplasia is lack of differentiation and is a characteristic feature of most malignant tumours. Depending upon the degree of differentiation, the extent of anaplasia is also variable i.e. poorly differentiated malignant tumours have high degree of anaplasia. As a result of anaplasia, noticeable morphological and functional alterations in the neoplastic cells are observed.[1-4]

As a result of anaplasia, noticeable morphological and functional alterations in the neoplastic cells are observed. Histopathological features of epithelial dysplasia (Krammer et al., 1978) are:[3]

1. Loss of polarity of the basal cells
2. Presence of more than one layer of cells having a basaloid appearance
3. Increased nuclear cytoplasmic ratio
4. Drop-shaped rete processes
5. Irregular epithelial stratification
6. Increased number of mitotic figures (a few abnormal mitoses may be present)
7. Presence of mitotic figures in the superficial half of the epithelium
8. Cellular pleomorphism
9. Nuclear hyperchromatism
10. Enlarged nucleoli
11. Reduction of cellular cohesion
12. Keratinization of single cells or cell groups in the prickle layer

**Loss of Polarity of the Basal Cells**: Normally, the nuclei of epithelial cells are oriented along the basement membrane which is termed as basal polarity. This property is based on cell adhesion molecules, particularly selectins.

Early in malignancy, tumour cells lose their basal polarity so that the nuclei tend to lie away from the basement membrane. Cell polarity refers to the intrinsic asymmetry observed in cells, either in their shape, structure or organization of cellular structure or organization of cellular components.[1-4]

**Presence of More Than One Layer of Cells Having a Basaloid Appearance**: A cell, usually of epidemis, resembling a basal cell, basal cell hyperplasia- the development of basal cells that are several layer thick.[1-4]

**Increased Nuclear Cytoplasmic Ratio**: Generally, the nuclei of malignant tumour cells show more conspicuous changes. Nuclei are enlarged disproportionate to the cell size so that the nucleocytoplasmatic ratio is increased from normal 1:4 to 1:1.[1-4]

**Drop-Shaped Rete Processes**: Rete pegs that are wider in the deeper portion than they are superficially. Nodular, bulbous or tear rete ridge and extremely elongated rete processes (drop shaped) in one of the classical identification in tumor cells. This is due to increased proliferation of cell and loss of architecture of the rete process.

**Irregular Epithelial Stratification**: A Stratified squamous epithelium consists of squamous (flattened) epithelial cells arranged in layers upon a basal membrane. Only one layer is in contact with the basement membrane; the other layers adhere to one another to maintain structural integrity. In case of tumor, this architecture of cell arrangement is lost which is called as irregular epithelial stratification. This is because of increased and atypical proliferation of cells.

**Mild Dysplasia**: Slight nuclear abnormalities, most marked in the basal third of the epithelial thickness and minimal in the upper layers, where the cells show maturation and stratification. A few, but no abnormal mitoses may be present, usually accompanied by keratosis and chronic inflammation.

**Moderate Dysplasia**: More marked nuclear abnormalities and nucleoli tend to be present with changes most marked in the basal twothird of the epithelium, nuclear abnormalities may persist up to the surface, but cell maturation and stratification are evident in the upper layers. Mitoses are present in the parabasal and intermediate layers, but none is abnormal.
Severe Dysplasia: Marked nuclear abnormalities and loss of maturation involve more than two-third of the epithelium with some stratification of the most superficial layers. Mitoses some of which are abnormal may be present in the upper layers.[1-4]

Increased Number of Mitotic Figures: The parenchymal cells of poorly differentiated tumours often show large number of mitoses as compared with benign tumours and well-differentiated malignant tumours. During the mitosis (M phase) of the cell cycle, the dividing cell undergoes a series of events.

During the prophase portion of mitosis, the chromosomes become visible as extended double structures and the chromosome pairs become shorter and thicker. In metaphase, the chromosomes become aligned on the equator of the cell. During anaphase, chromosome pairs split and move toward opposite poles of the cell. In telophase the chromosomes reach their respective poles and soon after, the cell divides into 2 daughter cells, each with a complete set of chromosomes.

Mitosis counts have long been the gold standard by which we have routinely evaluated cell proliferation in neoplasms. The identification of abnormal mitotic figures is generally acknowledged to be a feature of malignancy, and in certain tumors, their identification may provide prognostic information. Abnormal or atypical mitotic figures are more important in malignant tumours and are identified as tripolar, quadripolar and multipolar spindles in malignant tumour cells[1-4]

Presence of Mitotic Figure in Superficial Half of Epithelium: It is apparent that despite cytoplasmic maturation the abnormal nuclei of some superficial cells retain some of the properties of immature cells, namely the capacity to undergo mitosis or to replicate its DNA. It is conceivable that this phenomenon occurring in mature cells in slight and moderate dysplasia may antedate the arrest of cytoplasmic maturation present in the superficial cells of more severe lesions.

The study of the lateral distribution of mitosis in the atypical epithelium demonstrated the occurrence of foci of dividing cells alternating with foci of non-dividing cells. This finding was similar to that reported for DNA syntheizing cells in cases with cerebral epithelium containing epithelial atypias, and suggest the existence of proliferating and non-proliferating (i.e. resting) compartments. The existence of such compartments has earlier been reported in experimental solid tumors[1-4]

Cellular Pleomorphism: The term pleomorphism means variation in size and shape of the tumour cells. The extent of cellular pleomorphism generally correlates with the degree of anaplasia. Tumour cells are often bigger than normal but in some tumours they can be of normal size or smaller than normal[1-4]

Nuclear Hyperchromatism: Characteristically, the nuclear chromatin of malignant cell is increased and coarsely clumped. This is due to increase in the amount of nucleoprotein resulting in dark-staining nuclei, referred to as hyperchromatism. Nuclear shape may vary, nuclear membrane may be irregular and nuclear chromatin is clumped along the nuclear membrane[1-4]

Enlarged Nucleoli: Malignant cells frequently have a prominent nucleolus or nucleoli in the nucleus reflecting increased nucleoprotein synthesis. This may be demonstrated as Nucleolar Organiser Region (NOR) by silver (Ag) staining called AgNOR material.[1-4]

Reduction of Cellura Cohesion: The cells lose their attachment to the neighboring cells, because of the faulty or reduced attachment of their desmosomes.[1-4]

Keratinization of Single Cells: Pre-mature production of keratin within the cytoplasm of individual cells or a group of cells.

Keratins are associated filaments provide a scaffold for epithelial cells and tissues to sustain mechanical stress, maintain their structural integrity, ensure mechanical resilience, protect against variations in hydrostatic pressure and establish cell polarity. Keratin and its filaments are involved in cell signaling, cell transport, cell compartmentalization and cell differentiation. Keratin proteins regulate the response to pro-apoptotic signals and have the ability to modulate protein synthesis and cell size in epithelial cells. Keratins also participate in wound healing.

Most epithelial cells, migrating cells and developing cells require some form of cell polarity for their function. Epithelial cell establish an apical –basal polarity which results from the differential distribution of phospholipids, protein complexes and cytoskeletal components between the various plasma membrane.

The oral epithelium is stratified squamous type consisting of cells called keratinocytes. These cells undergo a process of maturation during which the cells produced by the mitotic division in the basal layer migrate to the surface where they are shed off and are replaced by the maturing cell population.

In case of tumor, these group of malignant epithelial cells in the form of islands invades to the underlying connective tissue and on maturation produce keratin in whorl pattern called individual cell keratinization (keratin pearls). These keratin pearls are well appreciated in well differentiated squamous cell carcinoma and less seen in moderately differentiated squamous cell carcinoma.[1-4]
1. In case of loss of polarity of the basal cells there is disorganization and excessive cell growth.

2. The architecture of cell arrangement is lost which is called as irregular epithelial stratification. This is because of increased and atypical proliferation of cells.

1. More than one layer of basaloid (basal cell-like) appearance is seen, this is due to increased...
Conclusion

Histologically differentiating between normal and dysplastic features under the microscope is of utmost importance. Proper identification and the art of reading a slide under a microscope holds the strength in producing accurate histopathological diagnosis, thereby providing the right treatment outcome. Therefore clear knowledge on each dysplastic feature and the alteration is a key factor in histopathological diagnosis and reporting.

Ethical Clearance: Not required since it is a review article

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Fibula Free Flap in Reconstruction of Mandibular Defects

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ABSTRACT

Purpose: To study a series of cases where vascularised fibula flap was used in mandibular defect.

Patients and Method: The investigators designed a retrospective study composed of patients with any pathology or defect who underwent reconstruction of mandible with vascularised fibula free flap from 2014 to 2018. All patients were evaluated for age, gender, location and type of defect, incorporation of adjoining skin paddle and muscle, number of fibula osteotomies, ischaemia time, anticoagulant regimen, length of hospital stay, flap failure rate, dental implant rehabilitation. All patients with a minimum follow-up of 6 months post-operatively, were included in this study.

Results: The study sample composed of 8 patients with average age of 40 years. Immediate reconstruction done in all patients. In two patients, the fibula was double barrelled. Skin island was included with the fibula in all patients. Two patients underwent dental rehabilitation using implants with double barrel reconstructions. Hematoma at the recipient site was the commonest post-operative complication, although its frequency was low. A low donor site morbidity was seen. Average stay in hospital was about 10 days. Post-operatively all patients ambulated normally and none used assisted devices. A reconstruction plate was used to achieve the ideal contour of the jaw in most cases. Aesthetic results were usually good, especially in young patients. The overall success rate was good. Conclusion: The fibula has many assets which make it the ideal choice for bony reconstruction of mandible skeleton and adjoining soft tissue with predictable results.

Keywords: Mandible Reconstruction, Fibula free flap.

Introduction

Partial or complete resection of mandible can be unaesthetic and at the same time cause functional difficulties. Large defects involving the mandibular region due to destruction of bony segments and soft tissues have long been the consequences of extensive surgical ablations.

Immediate reconstruction of mandible and adjoining soft tissues has been performed using fibula tissue transfer from past 3 to 4 decades and has proved to be a reliable morphofunctional reconstruction technique. Fibula free flap was first described by Taylor and colleagues in 1975 [1], and Hidalgo [2] introduced it for mandibular reconstruction in 1989.

Fibula free flap (FFF) provides several advantages over other donor sites. These include ample bone length, ease of flap dissection and shaping with less blood loss, a possibility of 2 team approach, long pedicles with large calibre vessels and minimal donor site morbidity. Its vascular supply is recipient independent, making it favourable for reconstruction in irradiated or poorly vascularized tissues. The fibula is nourished by its periosteal blood supply. Hence, multiple osteotomies of the fibula to confirm the mandible are feasible without devascularising individual segments. Moreover FFF offers tremendous bicortical bone stock for dental implant placement and a versatile cutaneous unit for concomitant soft tissue reconstruction. Also FFF based on separate septocutaneous perforators is of benefit to extensive substitution to externally cutaneous and internally oral linings [10].
The aim of this study is to report a case series with our experience in using vascularized fibula flap in various combinations of bone, muscle and skin for reconstruction of mandible.

**Patients and Method**

A retrospective analysis of 8 patients who had undergone reconstruction for mandibular defects operated on between 2014 to 2018 in Department of Maxillofacial Surgery, Sree Balaji Dental Hospital, Chennai, India was done and informed consent was obtained from all the patients involved in this study. Inclusion criteria included patients with any pathology or defect demanding reconstruction, with a minimum follow-up of 6 months. Exclusion criteria included only unwilling patients.

All patients underwent fibula free flap transfer via a midlateral incision over the fibula with a modification if skin paddle was included. Pre-operatively the extent of defect was determined using panoramic radiograph and/or computed tomography (CT). Jewer et al.’s [11] HCL classification (Fig. 1) for mandible was used in this study. Hand Doppler and Duplex colour Doppler [12], was performed to detect any anatomical variation or pathology of the peroneal circulation, patency of the anterior and posterior tibial vessels and identification of skin perforators. No arteriograms were used. Allen’s test of arterial occlusion of the foot was also done routinely for all patients.

![HCL classification of mandibular defects](image)

**Fig. 1: HCL classification of mandibular defects. C - central segment, L - lateral segment excluding condyle, H - lateral segment including condyle**

A lateral approach [13] under tourniquet was used for flap harvesting. Proximal and distal ends of at least 6 cm of fibula were left in situ to maintain ankle and knee joint stability. The skin island was centred at the middle and/or lower thirds of the leg. Recipient needs dictated the size of the fibula and its cutaneous paddle. A two-team approach was used in all patients. The cephalic team prepared the recipient site and neck vessels, while the other team harvested the flap and reconstructed the defect.

Data collected through the chart reviews included age at reconstruction, gender, diagnosis, defect location and size, flap ischaemia time, fibula bone length, skin paddle, use of soleus and/or flexor hallucis muscle, number of fibula osteotomies, anticoagulant regimen, length of hospital stay, duration of follow-up, esthetic satisfaction, post-operative complications (flap problems, fistula formation, bone exposure, miniplate complications, infection, donor site disabilities), dental rehabilitation.

**Results**

Eight consecutive patients with various etiologies, underwent reconstruction of mandible with FFF (Table 1). There were 2 males and 6 females, with average age of 40 years. Immediate reconstruction was done in all patient.

According to the classification proposed by Jewer et al., for mandibular defects, 1 patients were of H-category, 5 L-category, 1 LC-category, and 1 of C-category (Fig. 2).

A lip-split incision with skin crease extension in the neck was used for mandibular reconstruction (Fig. 3). Anastomosis to the facial vessels was commonly done to the facial or lingual or superior thyroid branch of ECA and a branch/trunk of IJV was done for mandibular reconstructions.
Skin paddles were harvested in all patients, with all the cutaneous units placed as intraoral linings (Fig. 4). Donor sites were closed primarily in 7 patients with harvested skin paddles and one required split thickness skin graft (Fig. 5). A suction drainage was inserted before wound closure, and an elastic bandage was used as dressing.

The number of osteotomies of the fibula to recreate the mandibular shape was two (range 0–3) (Fig. 6), depending on the location and extent of the defect. A reconstruction plate was prebent intraoperatively (Fig. 7) to be symmetrical with the contralateral jaw and was used to attach the fibula segments to it. 2 of patients were reconstructed with a ‘double-barrel’ technique (Fig. 8). Titanium miniplates and screws were used to fix the osteotomy segments.

The flap artery and vein were anastomosed to the recipient vessels. No autogenous vein graft was used. All the donor and recipient vessels were topically irrigated with heparinized saline solution before microanastomosis. Return of flap circulation was judged by bleeding of periosteum, bone and skin paddle. The total ischaemic time was 2-3 hours. Post-operatively pharmacologic regime was a low molecular weight heparin during the first few days for thrombosis prophylaxis. All patients were ambulated within 3–5 days and none of them used any assisted devices. Hospital stay was approximately 10 days in all cases.

<table>
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<th>Table 1: Patient characteristics</th>
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<td><strong>Number of Patients</strong></td>
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<td>Flap failure rate</td>
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Fig. 2: a) C- Category, b) LC category mandibular defects

Fig. 3: Midline lip – split with skin crease extension in neck, Visor incision
No Venous stasis was reported in our patients. Following 2 veins were anastomosed for all our FFF patients as a protocol. A significant donor site morbidity was seen in one of our patients but none had any permanent disability. Two patients reported back for dental implant rehabilitation in double-barrel technique reconstructions. An overall success rate was good with our study.

Discussion

The vascularized fibula flap in combination with skin and muscle has become a flap of choice for mandibular reconstruction. Eight consecutive patients were evaluated with a minimum follow-up of 6 months following reconstruction. Irrespective of the etiology of the defect, FFF was preferred for reconstruction. The ease of harvesting, use of two-team approach, availability of good bone length, feasibility of obtaining a skin paddle, muscle or both, perform multiple osteotomies, ability to double barrel the flap, presence of good caliber vessels
including two veins, minimal donor site morbidity, make it the flap of choice for most mandible reconstructions.

The most important finding from our series is the functional and aesthetic rehabilitation that all the patients have received. The FFF provides a better base for oral rehabilitation than that offered by other kinds of reconstruction.

Soft tissue flaps like latissimus dorsi free flap or rectus abdominis free flap, achieve good bulk to fill the defect, however they do not address the bony skeleton particularly the mandible, alveolus. The scapula osteocutaneous free flap offers the potential to address these needs but it may not always be suitable for placement of osseointegrated implants [14, 15]. Further disadvantages include inability to harvest the flap simultaneously with the extirpative procedures, difficulty in orienting the bone to provide mandiblereconstruction and the relatively short pedicle length. The disadvantages of iliac crest myo-osseous flap are its potentially excessive bulk, limited soft tissue mobility in relationship to the bone and short pedicle length [16, 17].

The composite radial forearm flap is not adequate for the quantity and quality of bone it can supply [18]. The FFF provided the best bone source for functional reconstruction of mandible in terms of quality and esthetic contouring of the face. This flap has an added advantage of providing sufficient height of bone using ‘double-barrel technique’. Use of stereolithographic models for pre-operative planning of the osteotomy cuts and the shape of the jaw, should be considered to achieve better and quicker results. Long term studies of a larger population is required to further support the data provided in this article. Considering the advantages and versatility with less complications and limitations, FFF should be considered as gold standard in reconstruction of mandible defects.

**Conclusion**

The various advantages of fibula free flap with minimal complications and limitations make it the most versatile flap for reconstruction of mandible defects. Hence, fibula microvascular free flap should be considered as the, ‘gold standard in reconstruction of mandibledefects’. However, long term studies with a larger population is needed.

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Role of Saliva in the Osseointegrated Implants—A Review

**Article**

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**ABSTRACT**

Biocompatibility of dental implants is affected by corrosion, and their functional ability and useful lifetime. It can cause a lot of problems or even failure of the implant. The oral environment is affected by the electrolytes and oxygen compositions that are produced differ from that of tissue fluids. This is a review and update of the interaction of dental implants with the environment, and effects of secretion contamination on the load of implant prostheses.

**Keywords:** saliva milieu, materials of dental implants, pH of saliva, systemic diseases.

**Introduction**

Biocompatibility of dental implants is affected by corrosion, and their functional ability and useful lifetime. It can cause a lot of problems or even failure of the implant. Corrosion is defined as reaction of a metal within its environment so as to result in destruction. The environment of interest in this case is the maxillary and mandibular bone, soft tissues, and saliva. The electrolytes and oxygen compositions that are produced differ from that of tissue fluids. The pH of saliva can vary in areas around dental implants. There are 2 electrochemical reactions that occur in corrosion of metals. An oxidation reaction occurs at the anode, and a reduction reaction occurs at the cathode. Cathodic reactions consist of reduction of the dissolved oxygen in the electrolyte.

The above reactions will occur simultaneously on a metal surface exposed to body tissue and fluids. The anodic reaction consists of dissolution of the metal according to kinetic equation. When the implant components are under the tissue, metal ions may migrate into the tissue, causing possible irritation or systemic effects. Soft tissues (fibers and cells) are interposed between dental implants and bone. Corrosion reactions may occur on a metal surface exposed to body tissue and fluids.

Most metallic dental prosthesis components (overdentures, crowns) attached to titanium implants, initiate corrosion events that involve the metallic prosthesis part (overdenture), as anode and the implant inside the bone as cathode. Several types of corrosion, including general, galvanic, pitting, crevice, fretting, and stress, will be discussed. Mechanical and chemical effects may cause generalized corrosion. The mechanical breakdown of the film, which surrounds the metal, may occur when the film is stressed and ruptures. The chemical breakdown occurs when the film is removed or penetrated chemically (e.g., by chloride ions, which are present in body tissues and saliva). These pits may nucleate at the site of a metallurgical defect, inclusion, or scratch on the surface of an implant. Nucleation of pits is not completely understood, but tests [ASTM F-746] have been designed to assess the susceptibility of specific implant metals into pitting. Another problem of local- ized corrosion in implants materials is crevice corrosion. Many examples of crevice corrosion have been found in dental implants. Chloride ions from saliva move into the crevice and cause more damage.
Infiltration of saliva between implants and implant-supported structures creates galvanic cells between the dental alloys, which are responsible for crevice corrosion. The major electrolytes in salivary secretions are sodium, potassium, chloride, calcium, phosphate, and bicarbonate. Minor electrolytes include fluoride, thiocyanate, magnesium, sulfate, and iodide. The length of time of secretion largely causes the effect of flow rate on the electrolyte composition of parotid and submandibular saliva.

By contrast, sodium and chloride concentrations are high in the early hours of the morning, while potassium is high in the early afternoon. While calcium and phosphate concentrations appear to remain stable during the day, the calcium concentrations increase at night. Several factors can change the pH of saliva. Infection can change the values of pH of saliva, making the values more acidic. Sulfur and the sulfur-bearing ions, which come from certain foods, can contribute to corrosion of dental implants. The above mentioned factors, pH of saliva, and chloride concentrations can provide ions in saliva milieu.

**Discussion**

Environmental effects on dental implants. The infiltration of saliva between the elements of prosthetic appliance brings different types of dental alloys into permanent contact. The dental alloys, which have been brought into contact, form a galvanic cell. An electric current resulting from their potential difference is generated in the cell.

The in vitro study by Reclaru and Meyer measured galvanic currents between samples in saliva milieu at temperature 37°C and pH 5. The samples were made of Ti/gold based alloys, Ti/palladium, and Ti/non precious alloys. They concluded that Ti/gold and Ti/palladium alloy were more resistant to crevice corrosion. These alloys caused negligible galvanism. Titanium is used as a metal for biocompatible materials. However, the corrosion of Ti is cased in the prophylactic fluoride-containing environment. The commercial dental gels and rinses containing fluoride from 1000 to 10,000 ppm with a pH of saliva ranging from 3.5 to neutral may be harmful to titanium implants. Therefore, the corrosion of dental implants seems to depend not only on fluoride concentration but also on pH of saliva.

Several investigations tried to explain this phenomenon. Jaarda et al concluded that interchanging implant prosthetic retaining screws could affect the long-term survival of implant fixtures or implant prostheses. Many problems associated with screw-retained implant restorations and chemical reactions caused by galvanic corrosion are faced by using a grade I pure titanium metal.

Many factors determine the failure of osseointegrated implants. They are systemic conditions, such as alteration in bone metabolism, hormone balance, smoking habits, and local conditions. These conditions are quality and quality of bone, traumatic surgi cal technique, occlusal conditions, composition of dental implants, and corrosion of the metal of implants.

Nowadays in the United States, there is a common procedure to put endosseous titanium implants into fluoride solution before they are placed into the bone cavity. This treatment results in a blue discoloration of the titanium surface. It has not been found in further references in the relevant literature review.

The Effects of Salivary Contamination on the Preload of Implant Prosthetic Screws: It is known that uneven occlusal loads cause repeated compression and then tension of implant components. The manner in which forces are applied to implant restorations within the oral environment dictates the likelihood of system failure. If a force is applied a ways far away from a weak link in an implant or restorative, bending or torsional failure might result from moment masses. Excessively long cantilever bridge or bar sections may result in interface breakdown, bone re- sorption, prosthetic screw loosening, and bar/bridge fracture. This imposed moment load may be destructive to implant systems.

The tensile force needed to keep the parts tightly together during all static and functional conditions is called “preload.” Screw loosening is a common problem with implant-retained prostheses.

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In this study, the major role of saliva on...
the dental implants was examined. Many studies in animal models and human beings showed that metal ions were released from implant surfaces. These ions contribute to osteolysis.26,27 Macrophages participate in the elimination of metals ions. They may remain free in the intercellular spaces. Metal ions can be titanium particles and associated with a corrosion process.28,29 Numerous investigators30–32 have reported the presence of macrophages of failed orthopedic and dental implants.

In general, it is known that pure titanium metal has a high reactivity with oxygen. A surface oxide spontaneously covers metal if it is exposed in air at room temperature. This oxide layer determines the corrosion resistance and interface chemistry of the metal.33 It has been reported that the surface oxide layer of titanium plays an adhesive role in determining the biocompatibility. However, some reports showed that this layer might not be sufficiently protective in the saliva environment.33,34

Sawase et al studied the application of oxygen ions to titanium surfaces (i.e., in vitro and in vivo in rabbits models). A plasma source ion implantation method was used to increase the thickness of the surface oxide layer. Their results indicated an improved corrosion resistance in vitro, and this layer did not influence the bone formation around titanium implants in vivo.34

Duffo et al concluded that the pH of saliva plays an important role in the corrosion of a titanium implant. A high corrosion was observed when the samples of implants were immersed in a lower pH (5.2) as in chronic inflammatory processes. The following diseases affect the pH of saliva: (i.e., acid value of pH):

1. Neurologic disorders. Parkinson disease and other extrapyramidal disorders, Alzheimer disease and other primary dementias, common disorders of the cranial nerves36
2. Disturbances of renal function.37
3. Hormone dysfunction. Diabetes mellitus, diseases of the parathyroid (hypercalcemia and hypocalcemia disorders), thyroiditis, adrenocortical diseases.36
4. Hypertension, hyperlipidemia, malnutrition (gastrointestinal system).38 Peptic ulcer disease, inflammatory bowel disease, diseases of the gall bladder, and bile ducts.36
5. Disturbances of respiratory tract.39 Sarcoidosis, Sjögren’s syndrome, and rheumatoid disease.38

Denture stomatitis, squamous cell carcinoma, and immunopathologic mucosal lesions.11,40

Cortada et al41 performed measurements of the ion release in artificial saliva using the titanium implant. They concluded that the titanium oral implant coupled with a chromium-nickel alloy releases a high quantity of ions. Whereas the implant coupled with the titanium superstructure presented a low value of ion release.41 The effects of electrolytes such as sulfuric acid, acetic acid, and phosphoric acid cause dissolution of the material of dental implants.42

Ravnhol43 measured the pH values when corrosion occurred around titanium implants and found it about 10. The researcher concluded that if the buffer systems of adjacent tissues in vivo are not able to cope with the high pH generated around the titanium, local tissue damage may ensue. Taher and Jabab44 observed that the titanium alloys showed high corrosion resistance when the pH of saliva was adjusted to 7.2.

Conclusions

After much study of the previous studies, the following conclusions can be drawn:

1. It is clear that the corrosion of titanium implants is affected not only by the concentration of electrolytes but also by the pH of saliva,
2. The salivary contamination affects the preload of implant prosthetic screws, and
3. We do not know the effects of corrosion products on the soft tissues.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Buffered Local Anesthesia in Dentistry—A Review

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ABSTRACT

Local anesthetics (LA) are one among the safest drugs used in dentistry. The disadvantages include burning sensation upon injection, slow onset of action etc., Buffering of local anesthetics is introduced to counteract these undesirable qualities. The advantages of buffering of local anesthetics include quicker onset, more reliable and comfortable for the patient. This article provides an overview on buffering of local anesthetics.

Keywords: Buffering, Local Anesthesia, Ph

Introduction

An unpleasant sensory and emotional experience associated with actual or potential tissue damage is defined as pain (1). The management of pain is a crucial factor in dentistry since it dictates the behavior of patient during the present appointment, as well as ensures compliance for future visits. In dentistry, the employment of LA as a means of pain control has been one of the medical marvels of the twentieth century. Lignocaine hydrochloride is the most commonly used anesthetic agent since its clinical availability in 1941. Hence, it is considered as the “gold standard” to which all new LAs are compared (2). However, the method employed to reduce pain, may be a source of both pain and anxiety. Anxiety can increase pain perception and may create a barrier to receiving optimal and necessary dental care (2). Various factors such as the speed of injection, pressure during administration, injection site, pH, volume and temperature of the anesthetic solution have been attributed to the degree of pain associated with LA administration (3). Buffering the drug to a neutral pH can make the injection more comfortable to the patient.

Alkalisation of Local Anesthetic Solutions: To raise the pH of LA solution a basic solution can be added. Sodium bicarbonate is the most commonly used basic solution. This process of adding a basic solution to the LA solution is termed as buffering. However currently this terminology is not acceptable. Hence alkalisation is a described as a more accurate term.

A buffer is defined as a solution that tends to resist a change in its pH whether acid or a base is added to it. When a basic solution is added to the LA solution there is an increase in the pH. The tissues will function as buffers as they tend to minimize the change in pH, when an acidic LA solution is injected. When too much of basic solution is added, the rapid increase in pH causes the precipitation of non-charged basic ions from the solution. This will be detected as a white clouding of the solution. Provided precipitation does not occur, alkalisation does not adversely affect the efficacy of the LA solution. As precipitation increases with time, alkalized LA solutions should generally be freshly prepared and used promptly.

Mechanism of Action: The LA contains spontaneously uncharged molecules (the base) and positively charged molecules (the cation) (2). The uncharged free base form of the solution is responsible to diffuse through
the nerve sheath, revert to the charged form within the axoplasm, and block the sodium channels to induce non-depolarizing nerve block (2). The relative proportion of the base and the cation varies with the pH of the solution or the targeting tissues (2). The higher the pH of the solution, more the free base form of the solution exists. The dissociation constant (pKa) also determines the relative proportion of ionic form (2). When the pH of the solution equals the pKa of the LA there exist equal amounts of base and cation in the solution.

Epinephrine is often used as an addition to LA agents to achieve prolonged anesthetic effects. However, a lower pH is required for LA to prolong the shelf life of epinephrine. The pH of LA without epinephrine is about 5.5 (2). When epinephrine is added to lidocaine, to maintain a lower pH value, sodium bisulfite or hydrochloric acid are commonly used in the solution. Thus, the mean pH (± standard deviation, SD) of the solution of 1% lidocaine with 1:1,00,000 epinephrine is 4.24 (± 0.42), and 2% lidocaine with 1:1,00,000 epinephrine is 3.93 (± 0.43) (4). The acidity of lidocaine increases the hydrogen ions in the local tissue environment and thus results in injection pain and increases onset time (2,5), which causes discomfort for patients during the injection.

The alkalinisation of the lidocaine with sodium bicarbonate can increase the pH value of the solution thereby reducing the pain during anesthetic administration (3). When it interacts with the hydrochloride acid in LA, sodium bicarbonate creates water and carbon dioxide (CO2). Catchlove (6) concluded that CO2 could potentiate the action of LA by serving as a direct depressant on the axon, concentrating LA inside the nerve trunk, and converting LA to active cations through its effect on pH at the site of action inside the nerve. CO2 potentiates the action of LA by 1) a direct depressant effect of CO2 on the axon, 2) concentrating LA inside the nerve trunk (diffusion trapping) and 3) will convert the LA to the active cation through its effect on pH at the site of action inside the nerve (6).

The alkalinisation of lidocaine has been widely evaluated in the medical field. In a systematic review, Davies (7) included 22 randomized clinical trials (RCTs) in humans and concluded that buffering LA with sodium bicarbonate could reduce injection pain while not affecting efficacy. A more rapid onset can be achieved by increasing the number of uncharged base molecules in the solution (5). An approach of the addition of sodium bicarbonate immediately before anesthetic administration to increase the pH value of the solution in dentistry was reported by Malamed in 1992 (8). CO2 also has independent anesthetic effects that enhance the anesthetic solutions action sevenfold.

**Advantages of Buffered Local Anesthetics:**
Alkalinisation has potential advantages like the higher pH of the solution may result in less stinging pain being experienced by the patient. The pH of the injected solution may quickly approach that of the normal tissue pH after injection. The faster formation of a mixture with charged and uncharged forms will result in more rapid drug diffusion and a quicker onset of nerve blocking. Buffering is particularly useful in body sites with low tissue buffering capacity where there can be a delay in the rise of pH after injection.

Buffered lignocaine was revealed as the most efficacious anesthetic agent; however, articaine and lignocaine were found to be equally effective (9). DiFazio et al (10) Zahl et al (11) Benson et al (12) and Sinnott et al (13) found that anesthetic formulations with higher pH values had a faster onset. It would seem that the higher pH adjusted anesthetic formulations have more uncharged base available initially. Therefore, a faster onset would theoretically result. However, a statistically faster onset with the lidocaine sodium bicarbonate formulation was not reported in some studies (14). Galindo et al (15) and Christoph et (16) also did not find pH-adjusted agents to have a faster onset. In the infiltration anesthesia, the onset of the block is generally rapid so there is minimal time to be gained. Alkalinisation of LA to reduce the onset time of regional anesthesia or major nerve blocks is not useful.

There is decreased tissue irritation from the more physiologic pH of the buffered solution (9). Buffering increases the concentration of uncharged lignocaine particles the faster onset of nerve blockade may help explain the decreased sensation of pain (17). Alkalinised LA solution will reduce pain on injection and will result in a quicker onset of anesthesia (16). Malamed et al (19) and Kashyap et al (18) both reported more comfortable injections with alkalized 2% lignocaine when used for the inferior alveolar nerve block; The reduction of stinging pain due to infiltration anesthesia and the block of small peripheral nerves is the major advantage of alkalinisation of LA solutions. A study by Chopra R et al reported that there was no difference in the pain perception between lignocaine and buffered lignocaine (20).

**Conclusion**

The induction of LA is dependent upon the patient’s physiologic process of converting the cationic...
to the anionic form, and back to the active form. This dissociation process is dependent upon the patient’s tissue pH and the pH of the administered drug and is responsible for delayed onset of action, and overall inconsistency of anesthesia. Buffering of LA before injection takes the physiology out of the process and provides an alternative to the in vivo process. The recent introduction of the sodium bi-carbonate and delivery devices developed to accommodate the dental anesthetic cartridges has offered the dental profession an easy way to accomplish chairside anesthetic buffering.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** Not required for review manuscript

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Evaluation of Intensity of LED Curing Light on the Depth of Cure of Composite- An in Vitro Study

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ABSTRACT

Aim: To evaluate the effect of intensity of curing light on depth of cure of resin based composite material and also to bring about the awareness to the dentists community regarding the maintenance of intensity of curing light unit.

Materials and Method: The resin based composite material of A2 shade was tightly packed into a plastic mould (fig1D) of diameter 6mm and depth 5mm. The sample size for each group was 10 in numbers, which was irradiated from the top, for each varying intensity, with light tip in nearest contact. An LED Light Curing unit was used throughout this study; the input voltage to the curing light was controlled by a regulated dc power supply. Four different settings of voltage 2.9V , 3.0V , 3.1V and 3.2V which yielded the light intensity as 200mW/cm2, 250mW/cm2, 300 mW/cm2 and 375 mW/cm2, the power supply to the curing light then was set to this voltage level i.e. 5V and the intensity was verified according to the ISO test method to determine the depth of cure of the resin-based composites.

Results: Statistical difference between the groups and among the groups were calculated using Students ‘t’ test. Results clearly shows a statistically significant difference in depth of cure with varying intensity of light used.

Conclusion: Depth of cure is comparatively low when intensity of curing light is low. These measurements provide valuable baseline information about the specific depth of cure for different intensities of curing light on resin-based composite materials used by dentists.

Keywords: Intensity of light, depth of cure, composite

Introduction

Due to increased aesthetic demands, fear of mercury toxicity and government regulations, the use of amalgam has declined significantly over the past decade. Resin based composites have largely replaced dental amalgam as the direct material of choice for restoring posterior teeth. In addition to being light-polymerized, tooth-colored and repairable, the cavity preparations for composite restorations are also more conservative when compared to amalgam due to the use of micro-mechanical and chemical retention. Direct composite is today the material of choice to restore small-to-medium sized occlusal and proximal cavities in posterior teeth on the condition that the bonding and filling procedures can be adequately performed (1). To fill posterior cavities,
an incremental filling or layering technique, generally involving the placement and curing of composite in layers with a maximum thickness of 2 mm, has been favored over a bulk-fill technique or the filling of the entire cavity with a single composite portion. The main advantages of the layering technique includes more optimal cure throughout the depth of composite and lower polymerization shrinkage with the associated reduced shrinkage stress. On the other hand, layering is more time-consuming and technique-sensitive than bulk-fill placement with the additional risk of void entrapment between layers as well as operative field contamination due to the prolonged working time. There is a constant need to simplify the clinical procedure for direct posterior composite restorations. Several factors affect light curing of a resin based composite: the material’s composition (including opacity), the choice of photoinitiators and the concentration of the initiators. The peak wavelengths and bandwidth of the curing light, the intensity of the light and the irradiation time also have profound effects on the depth of cure. Discoloration, pulpal irritation, post-operative sensitivity and eventual failure of restoration are the main problems resulting from inadequate polymerization. Different variables affecting light energy absorption by the composite have been examined for their effect on the polymerization contraction. Since the polymerization contraction is closely associated to the degree of cure of the restoration in a very complex way, this parameter is designated as an important indicator for the extent of polymerization. It is important to determine the factors that affect light curing and how these factors influence the depth of cure of resin based composites. Knowing the depth of cure of a particular shade of material would guide a dentist in regard to the thickness of a composite layer that could be adequately cured clinically. There is a substantial lack of awareness among dentists of the need for maintenance and regular checking of the light intensity of the light curing units. A numerous number of methods, such as hardness tests, interaction with color dyes, translucency changes, double-bond conversion, nuclear magnetic resonance microimaging, tactile tests, penetration tests and scraping tests have been used to measure the depth of cure of resin-based composites.

There are many studies in literature that have examined the types of curing light used in composites, but provide no information about the light intensity or wavelength characteristics. Therefore the aim of this study was to evaluate the effect of intensity of curing light on depth of cure of resin based composite material and also to bring about the awareness to the dentists community regarding the maintenance of intensity of curing light unit.

**Materials and Method**

We used a curing light [LY – A 180, classic rechargeable LED Light Curing unit] throughout this study; the input voltage to the curing light was controlled by a REGULATED DC POWER SUPPLY [ATTEST, Maharashtra, India] (fig1B) and intensity was measured with a LED light meter [Radiometer, LM – 1, Woodpecker]. The positive and negative nodes in the curing unit circuit was connected to the positive and negative nodes of the Regulated Power Supply and the input voltage was adjusted to produce different intensities of light. Those intensities were measured using a specialized light meter (fig1A) which contains a photosensitive diode that quantifies the blue light output.

With the apparatus set up (fig1c), we were able to calibrate the light intensity as desired. We had four different settings of voltage 2.9V, 3.0V, 3.1V and 3.2V which yielded the light intensity as 200mW/cm², 250mW/cm², 300 mW/cm² and 375 mW/cm². After extrapolated the input voltage needed to deliver a curing-light intensity of 300 mW/cm² for 400- to 515nm wavelength bandwidth, the power supply to the curing light then was set to this voltage level i.e. 5V and the intensity was verified according to the ISO test method to determine the depth of cure of the resin-based composites.

The resin based composite material of A2 shade was tightly packed into a plastic mould (fig1D) of diameter 6mm and depth 5mm. The sample size for each group was 10 in numbers. Each sample was irradiated from the top, for each varying intensity, with light tip in nearest contact (fig1E). Each sample was irradiated for 20 seconds. After irradiation, sample was removed from the mould. Then from the bottom of the sample, the uncured material was scraped out with a plastic spatula. Using a digital Vernier caliper (fig1F), an instrument which measures 1/100th of a millimeter, the remaining length of the sample after scraping out was measured. The depth of cure was recorded as 50 percent of the remaining measured length as required by the ISO (International Organization for Standardization. ISO 4049:2000).
Figure 1: A) specialized light meter B) Regulated DC Power Supply C) The positive and negative nodes in the curing unit circuit was connected to the positive and negative nodes of the Regulated Power Supply and the input voltage was adjusted D) composite material of A2 shade was tightly packed into a plastic mould. E) sample was irradiated from the top, for each varying intensity, with light tip in nearest contact. F) Digital Vernier caliper

Results

Table 1 shows the depth of cure varies based on the intensity used.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Mean depth of cure (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mW 2.9V</td>
<td>1.50 ± 0.13</td>
</tr>
<tr>
<td>250mW 3V</td>
<td>1.87 ± 0.17</td>
</tr>
<tr>
<td>300mW 3.1V</td>
<td>2.48 ± 0.19</td>
</tr>
<tr>
<td>375mW 3.2V</td>
<td>2.47 ± 0.16</td>
</tr>
</tbody>
</table>

Statistical difference between the groups and among the groups were calculated using Students ‘t’ test [table 2]. Results clearly shows a statistically significant difference in depth of cure with varying intensity of light used.
Table 2: Compare depth of cure based on Intensity of curing light using Student’s ‘t’ test

<table>
<thead>
<tr>
<th>Intensity comparison</th>
<th>Mean difference</th>
<th>‘t’ statistics</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
<td><strong>Group 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>375mW 3.2V</td>
<td>300mW 3.1V</td>
<td>-0.016</td>
<td>-1.94</td>
</tr>
<tr>
<td></td>
<td>250mW 3V</td>
<td>0.591</td>
<td>7.918</td>
</tr>
<tr>
<td></td>
<td>200mW 2.9V</td>
<td>0.961</td>
<td>14.568</td>
</tr>
<tr>
<td>300mW 3.1V</td>
<td>250mW 3V</td>
<td>0.606</td>
<td>7.408</td>
</tr>
<tr>
<td></td>
<td>200mW 2.9V</td>
<td>0.976</td>
<td>13.188</td>
</tr>
<tr>
<td>250mW 3V</td>
<td>200mW 2.9V</td>
<td>0.370</td>
<td>5.434</td>
</tr>
</tbody>
</table>

Discussion

In general practice, assessment of the effectiveness of a curing unit is presumably based on whether the surface of a light-cured resin is hard. The surface hardness of the restoration is not a reliable index, because even an inferior curing unit was able to polymerize the surface as well as an effective unit\(^{(7)}\). Adequate curing of a resin-based composite is paramount to its clinical performance. In composite resins, camphorquinone is the light-sensitive component, which responds to irradiation by creating free radicals and initiates the polymerization process.\(^{(14)}\) The photoinitiator used in most composites is activated by light in 400- to 515-nm wavelength, with 470 nm being the wavelength of peak absorption for the most commonly used photoinitiator\(^{(8)}\).

To be effective, a curing light must have sufficient energy in the 400- to 515-nm range to effectively activate the mass or increment of composite being irradiated\(^{(8)}\). The light also must be capable of generating sufficient energy density, or intensity, to cure through the entire thickness of the mass or increment. This study evaluated the effect of intensity of curing light on resin based composites. The ISO technical specification 10650 was based on commercial curing lights available at the time the specification was developed. It has been reported that the minimum QTH light intensity required to adequately cure most resin composites is between 300 and 400 mW/cm\(^2\). The suggested minimum intensity of 300 mW/cm\(^2\) could be achieved by most curing lights available in the global market at that time\(^{(9)}\). It is well known that numerous factors influence the light output of curing units, including line voltage\(^{(10)}\), deterioration of the bulb and filter, contamination of the light tip end, and breakage of photoconductive fibers. Lower than optimal light intensity may lead to impaired polymerization of the light-cured resins, even though curing times recommended by manufacturers are followed, and adversely affect the resin’s physical properties\(^{(8,10)}\). When the light intensity of a curing unit decreases below an adequate level as determined by a radiometer, dentists should inspect the unit for deterioration of the parts such as lamps, filters, and fiber optic bundles. The results of this study showed that 33 (82.5 percentage) of the 40 tested samples met the ISO depth-of-cure requirement of 1.5 mm when cured according to the ISO methods and 7 (17.5 percentage) did not. Marginal decrease in the intensity from the recommended intensity of 300mW/cm\(^2\) to 250 mW/cm\(^2\) and 200mW/cm\(^2\) has a significant negative effect on depth of cure of resin based composite.

The ISO scraping test used to determine depth of cure requires minimal instrumentation and can be performed easily in a dental office\(^{(3)}\). The ISO defines depth of cure as 50 percentage of the length of the composite specimen after the uncured material is removed with a plastic spatula\(^{(11)}\). Curing lights must provide sufficient energy to the composite to produce acceptable polymerization and hardness in the composite resin. It has been reported by Fan et al\(^{(3)}\) that an energy density of 6 to 12 J/cm\(^2\) was sufficient to cure most resin composites to a depth of 1.5 mm. Knowing the depth of cure of a particular shade of material would guide a dentist in regard to the thickness of a composite layer that could be adequately cured clinically\(^{(12)}\). It may be that the absolute values of depth of cure found are material specific, but we believe that the relationships found between curing units, between exposure times, and between light guide distances are universal.\(^{(13)}\) Another observation was that the light intensity of LEDs is significantly higher than that of QTHs, which may be due to the difference in the output light spectrum and clinical age of devices. This finding is consistent with a study by Hegde et al.\(^{(14)}\) There is a substantial lack of awareness among dentists of the need for maintenance and regular checking of the light intensity of the light curing units.
Application to Dental Offices: Using the curing lights in their offices, dentists can readily adopt the ISO method to establish the depth of cure of various composite materials used in their practices. Knowing the depth of cure of a particular shade of material would guide them in regard to the thickness of a composite layer that could be adequately cured clinically. Clinicians often experience difficulty in placing the light tip close to the resin surface when curing resin composites. While both intensity and DOC decrease with increasing distance, the relationship between these factors and distance may not be similar for all lights and may depend on the characteristics of individual lights.

Conclusion

The results of this study show that varying curing-light intensity of 200, 250, 300 and 375 mW/cm² has a significant effect on depth of cure. Depth of cure is comparatively low when intensity of curing light is low. These measurements provide valuable baseline information about the specific depth of cure for different intensities of curing light on resin-based composite materials used by dentists.

Source of Funding: Nil

Ethical Clearance: Not required for an in vitro research manuscript

Conflict of Interest: Nil

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Micro Flora—A Challenge in Endodontic Management: A Review

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ABSTRACT

Microorganisms are major source of infection of the root canal system. A wide range of microbial flora are isolated from the root canals. A proper understanding of the root canal microorganisms are very important for the success of root canal treatment. This review highlights the microbial flora involved in endodontic pathology and its role in our treatment procedure.

Keywords: Micro-organisms, Retreatment, Endodontic flare up, Endodontic infections.

Introduction

Endodontic infection is the major etiologic agent of apical periodontitis [1]. Physical and chemical factors can also induce periradicular inflammation but scientific evidence clearly states that progression and perpetuation of apical periodontitis are mainly caused by microorganisms[2]. The ultimate aim of endodontics is to completely eradicate the microorganisms from the root canal system thereby preventing the progression of apical periodontitis [3]. Thorough understanding of the root canal anatomy, biomechanics of the root canal preparation and three dimensional hermetic obturation are very essential for the success and long term outcome of the endodontic treatment[4]. This article gives an insight of the microbiology of root canals and its importance for endodontic success.

The Endodontic Microflora: The development in the field of microbiology has led to the recognition of various types of microorganisms which causes root canal pathology.

Bacteria are broadly classified into Gram positive and Gram negative. Most of the apical periodontitis are caused by multifunctional causes. Some of the microorganisms like Actinomyces, Spirochetes and Fusobacterium are responsible for primary endodontic infections. The residual microflora of the oral cavity typically contains $10^{10}$ bacteria[5].

Gram negative bacteria
1. Treponema
2. Fusobacterium
3. Porphyromonas
4. Prevotella
5. Tannerella

Gram positive bacteria
1. Streptococcus sp
2. Camphylobacter sp
3. Neisseria
4. Corynebacterium
5. Anaerobic lactobacilli
Along with the microbial flora some of the viruses are also isolated from the root canal system especially herpes species, cytomegalovirus and Epstein barr virus are also found to be causes of infection in primary endodontic and also the failure of root canal endodontics[6].

**Features of the Microorganisms**

a. Can exist with and without oxygen  
b. Can thrive well in nutrition  
c. Can be antibiotic resistant  
d. Can damage the adjacent viable tissues[7].

**Biofilms:** Biofilm is a group of bacteria where interacting sessile cells are irreversibly attached to the solid substratum and also between microorganisms. They are three dimensional structured community with fluid channels for transportation of nutrition and waste products[8]. Caldwell et all stated that, they have the tendency to self organise (autopoiesis), they can result in environmental perturbations (homeostasis), they are more effective when associated than in isolate(synergy) and respond to environmental changes as unit rather than single individual (communality) [9].

**Importance of Understanding Microbiology for the Success of Non-Surgical and Surgical Endodontic Treatment:** The presence of microorganisms in the dental pulp is directly proportional to the development of periapical disease. There is a favorable outcome when chemomechanical preparation of the infected root canal using antimicrobial agents, followed by obturation and coronal restoration is performed. Due to persistent or secondary intraradicular infection failure of root canal treatment occurs [10].

Microorganisms found in failed endodontically treated teeth have either remained in the root canal from previous treatment or have entered during or after treatment via leakage. It is difficult to differentiate between the microorganisms remaining from primary infections and new microorganisms contributing to the secondary infection. The remaining microorganisms from primary infection should have maintained the viability throughout the treatment procedure. This might occur as a result of an inability of chemomechanical instrumentation and because of inaccessible locations of bacteria in isthmuses, accessory canal and apical regions of canals[11].

**Conclusion**

Microorganisms are the major cause of failure in endodontics. Proper understanding of the pathophysiology of the causative agents is very essential for long term success of root canal treatment.

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**REFERENCES**


Hemisection of Mandibular First Molar: Clinical Management—A Case Report

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ABSTRACT

Hemisection refers to the surgical separation of a multi-rooted tooth with the extraction of one root along with the overhanging crown. It is performed to retain the original tooth structure and attain the fixed prosthodontic prosthesis. Loss of the posterior teeth leads to teeth drifting, loss of masticatory function and loss of arch length, which requires prevention and maintenance measures. Management of periodontally involved molars with extensive decay is challenging and is limited to dental extraction and replacement with implants.

Keywords: Hemisection, prosthesis, implant, periodontally compromised.

Introduction

The term tooth resection denotes the excision and removal of any segment of the tooth or root with or without its accompanying crown portion. Various resection procedures are Root amputation, Hemisection, Radisection and Bisection. Hemisection refers to the surgical separation of a multi-rooted tooth with the extraction of one root along with the overhanging crown. It is performed to retain the original tooth structure and attain the fixed prosthodontic prosthesis. Hemisection is defined as the removal of half of a tooth performed by sectioning the tooth and removing one root (1). Advances in dentistry have provided an opportunity to maintain a functional dentition for a lifetime (2). Loss of the posterior teeth leads to teeth drifting, loss of masticatory function and loss of arch length, which requires prevention and maintenance measures (3). Management of periodontally involved molars with extensive decay is challenging and is limited to dental extraction and replacement with implants (4). Nevertheless, treatment strategy to retain such teeth involves periodontal, prosthodontic and endodontic assessment to allow for stronger survival.

Selected root removal allows improved accessibility and plaque control which leads to bone formation and reduced pocket depth. Continued periodontal breakdown may lead to a total loss of tooth structure. Unless these defects are repaired or eliminated, the health of the tissues cannot be restored to normal form and function. Thus post-treatment these teeth can be used as an individual unit or as an abutment for placement of prosthesis which can restore the masticatory function (5).

Periodontal indications for root resection are: a tooth with a severe vertical bone loss involving only one root of multi-rooted teeth; through and through furcation destruction; unfavourable proximity of roots of adjacent teeth preventing adequate hygiene maintenance in proximal areas and severe root exposure due to dehiscence (6).
Endodontic indications for the prosthesis failure of an abutment within a fixed partial denture: If a single or multi-rooted tooth is periodontally involved within a fixed prosthesis, instead of removing the entire fixed partial denture, if the remaining abutment support is sufficient, the root of the involved tooth is extracted (6).

Endodontic failure: Hemisection is useful when there is furcal perforation or the root canal of one of the roots cannot be instrumented (6) due to calcific obstruction, perforation or ledging.

Vertical fracture of one root: The poor prognosis is seen in vertical root fracture. If vertical fracture traverses one root while the other roots are unaffected, the offending root may be removed (6).

Severe destructive process: This may occur as a result of furcation or subgingival caries, traumatic injury and large root perforation during endodontic therapy (6).

Indications for hemisection include:

- the tooth affected by caries
- vertical root fracture
- periodontal disease
- iatrogenic root perforation where only one root of a multirooted tooth is affected, the surviving root is easily accessible and treatable by endodontic treatment,
- the surviving root is capable of supporting a dowel and core restoration
- the surviving root is aligned as to provide proper retention for the resulting fixed prosthesis.

Contraindications to using a tooth root as an abutment can include:

- poorly shaped roots or fused roots
- poor endodontic candidates or inoperable endodontic roots
- patient not willing to undergo surgical and endodontic treatments and undertake the care for the final restoration.

Risks of this treatment modality include increased risk of caries in the area of the resection due to increased difficulty in cleansing the area. Wide span fixed prosthesis causes increased stress on abutment teeth and leads to periodontal mobility.

The treatment modality that is chosen depends on the grade of furcation, amount of attachment loss present, remaining bone level in relation to the roots and the furcation region, morphology of the roots and long-term prognosis of the involved tooth.

Case Report: A 69 year old female patient reported to the Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Chennai presenting with a chief complaint of pain and swelling in right mandibular first molar since 2 weeks. The pain was intermittent, aggravated on chewing food and relieved on medication. The patient also complained of food lodgment in the inter-dental area between right first and second molar teeth. His medical history was non-contributory to the condition.

Clinical Examination: On examination, the tooth was sensitive to percussion with respect to 46, and probing pocket depth measured 10mm in the distal aspect of 46 fig1(a) and there was grade 2 mobility, periodontal abscess in 46 on examination. And 3mm pocket depth in the mesial root of 46 was found clinically.

Radiographic Examination: On radiographic examination, severe vertical bone loss was evident surrounding the distal root and involving the furcation area. The bony support of the mesial root was completely intact Figure 2(A).

Endodontic Procedure: Vitality test was done by gutta-percha stick method and showed negative results. Considering the clinical and radiographic evaluation, primary endodontic therapy was performed by resection of the distal portion of the tooth along with the root. The canals of the roots were biomechanically prepared using the step-back technique. The canals were obturated by lateral condensation method using gutta-percha. To obtain good seal and strength for the tooth glass ionomer cement was used Figure 2B.

Hemisection: After adequate local anesthesia, a crevicular incision was given from the first premolar to the second molar. Full thickness flap was reflected to expose the furcation area. Then granulation tissue was removed by curettes to expose the bone. The vertical cut was made in the bifurcation area using tapered fissure carbide bur. The adequate cut was given to ensure the separation of the resected tooth portion. The distal root was removed and the socket was irrigated adequately.
with sterile saline to remove bony chips and debris Figure 1(C). The furcation area was rounded off to avoid further periodontal irritation. The flap was then repositioned and suturing was done with single interrupted 3/0 black silk sutures to obtain primary closure Figure 1(B). Forces acting along the long axis of the mesial root was redirected by reducing the occlusal table. The patient was recalled after one week for suture removal. The case was followed up for 6 months for the survival of the resected molar Figure 2D. A fixed bridge was fabricated using adjacent 2nd molar and the resected molar as abutments to replace the edentulous area Figure 1D&E.

Figure 1: Intra-oral clinical photographs of Hemisection of 46 : A) 10mm probing depth in distal root of 46 ; B) Suture placed after hemisection ; C) Hemisected distal portion of 46 ; D) Tooth preparation done in 46 and 47 ; E) FPD luted in 46 and 47

Figure 2: Intra-oral Periapical Radiograph of Hemisection of 46 : A) Pre operative radiograph ; B) Post obturation radiograph ; C) Immediate IOPA after hemisection ; D) 1 month follow up.
Discussion

Root-resection therapy is technique sensitive and complex, proper case selection is essential \(^7\). Root resection is a treatment option for molars with periodontal, endodontic, restorative or prosthetic problems. Therapeutic measures performed to ensure retention of teeth varies in complexity. Management of mandibular molar that has lost its bone support surrounding the root or that has a Class II furcation involvement often is a disappointing process for both clinicians as well as patients. The treatment, management and long-term retention of mandibular molar teeth exhibiting such invasions have always been a challenge to the clinician.

One of the methods to treat these type of cases is hemisection. The hemisection is a useful alternative treatment to extraction to save the multi-rooted teeth by endodontic approach, which includes the root canal treatment of the remaining roots and restoring them with suitable restorative material and splinting it with the adjacent tooth to decrease the risk of displacement followed by a fixed prosthodontic prosthesis to maintain the occlusal balance.

Hemisection is one of the option to be considered before the extraction of posterior teeth especially in the patients with severe vertical bone loss, furcation destruction, unfavorable proximity of roots of adjacent teeth, preventing adequate hygiene in maintenance of proximal areas and severe root exposure \(^9\).

Endodontic/restorative conditions which require hemisection are the prosthetic failure of abutments within a splint, endodontic failures, vertical fracture of one root, the non-restorable portion of a multi-rooted tooth \(^6\). The retained root is endodontically treated and the furcations area is made self-cleansable by removing the lip of root carefully. Since hemisected teeth fail by root fractures, it is important to restore them adequately by an extra-coronal restoration \(^10\).

Buhler (1988) observed 32% failure rate in hemisection cases attributed to endodontic pathology and root fracture while other authors (0-9%) have shown greater success in hemisection cases in the long term studies \(^4,6,9\). In the present case, the good prognosis was observed with proper occlusion, absence of mobility and healthy periodontal condition up to 4 months of follow-up. Concurring with previous reports, hemisection is a valid treatment option for the molar teeth, which otherwise have to be extracted due to the extensive lesion \(^10\). Thus, conservative management of molar teeth can not only preserve the tooth but also reduce the financial burden, psychological trauma and occlusal dysfunction.

Conclusion

Hemisection is an alternative, conservative and effective treatment over conventional treatment or extraction of periodontally and endodontic affected teeth. Hemisection should be discussed with patients during consideration of treatment options. The prognosis of hemisected teeth is similar to that of endodontic treatment provided that case should be selected properly and the restoration should be of acceptable design based on the occlusal and periodontal needs of the patient. A guiding principle of conservative treatment should be to try and maintain what is present.

Source of Funding: Nil

Conflict of Interest: Nil

Ethical Clearance: Written informed consent was obtained from patient. Ethical clearance not required for a case report.

REFERENCES


Application of Metagenomics Analysis in Carious Lesions: A Review

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ABSTRACT

Metagenomics using next generation sequencing technologies has produced bacterial profiles and genomic profiles to study the relationships between microbial diversity, genetic variation, and oral diseases. Several oral metagenomic studies have examined the oral microbiome of periodontal disease and caries. Gene annotations in these studies support the association of specific genes or metabolic pathways with oral health and with specific diseases. The roles of pathogenic species and functions of specific genes in oral disease development have been recognized by metagenomic analysis. This review gives an overview on the interaction between oral microbiomes that determine a state of health or disease.

Keywords: Metagenomics, PCR, bacteria, dental caries.

Introduction

Dental caries is the most prevalent oral disease and the primary causes of tooth loss in the western world. At present, periodontitis and dental caries are mostly diagnosed at late stages of disease, often leading to costly and invasive dental treatment. Therefore, new diagnostic approaches capable of identifying periodontitis and dental caries at preclinical stages, favouring preventive treatment strategies, are urgently needed.

As development of DNA sequencing technologies have progressed, metagenomics has become a popular approach to microbial analysis. Metagenomics is a DNA sequencing approach in which a large amount of genomic DNA is randomly sheared, and shotgun sequenced. Several recent studies have used a metagenomic approach to examine microbial roles in oral diseases.

The oral cavity harbours a diverse microbiota comprising more than 700 unique bacterial species. The microbiota plays a pivotal role in maintenance of oral homeostasis, as various oral habitats are colonized by characteristic bacterial community profiles organized in local biofilms. However, ecological changes, for example in relation to increased sugar intake, insufficiently performed oral hygiene or fluctuations in the immune response can induce structural and functional alterations of local oral biofilms. Such alterations may in turn change the relation between the host and the resident microbiota from symbiosis to dysbiosis, thereby fuelling initiation and progression of periodontitis and dental caries.

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Meta genomics in Studying Oral Microorganisms:
Metagenomics is another DNA sequencing approach that is used to study uncultivated oral microbial communities. In this approach, whole genome shotgun (WGS) sequencing is used. Entire DNA samples are randomly sheared by a “shotgun” method and sequenced by either classical Sanger sequencing or NGS. The comprehensive sequences can then be analysed to obtain
either bacterial profiles based on 16S rRNA genes or
 genomics profiles based on whole genomes.(1)

For obtaining bacterial profiles by metagenomics,
the DNA sequences are grouped (binned) by conserved
 gene sequences (such as 16S rRNA) that are represented
in individual genomes of different microorganisms.
 Metagenomics requires less PCR amplification than 16S
rRNA sequence analysis, and therefore, more accurately
quantifies individual bacterial species in samples.
For obtaining genomic profiles by metagenomics, the
 shotgun sequence reads are filtered for high-quality
sequences, and contaminating human sequences are
removed. The filtered sequences are then assembled,
based on sequence overlaps, to form longer genomic
sequence contigs. Coding sequences in the contigs
are identified by computational algorithms. Whole-
genome information in the bacterial samples is collected
including protein coding regions, RNA genes, repeats,
 mobile elements, and plasmids. Genes are annotated
via data mining and database searches using different
algorithms.(2)

Abnormal genetic segments that are associated
with health or disease conditions, such as pathogenicity
islands, plasmids, and genes acquired from HGT can be
identified.

Although most current studies employ 16S rRNA
sequence analysis because of its low cost and lesser
computational requirements, 16S rRNA sequence
analysis only provides information on microbial
taxa. Metagenomics provides more comprehensive
information on the oral microbiome. Metagenomic
analysis will become more common in oral microbiology
research as improvements in sequencing technologies
occur and new algorithms are developed for high-speed
computational analysis. New sequencing technologies
will produce longer sequence reads, high accuracy,
shorter processing times, and significantly reduced
costs. Many new computational algorithms will help
speed the handling of sequence metadata, allow for rapid
searching of multiple databases, efficient data mining,
and the integration of different genomic information.

Microorganisms in Carious Lesions: Carious lesion of
the oral cavity is one of the most common disease among
the primary, mixed dentition and adult age groups.
Carcinogenesis itself is the outcome of multifactorial
events that includes plaque microflora, susceptibility of
host immune system, dietary habits, and most importantly
maintenance of oral hygiene. Plaque formation per
se is conceived as a physiologically normal event,
which otherwise is disrupted and removed by effective
brushing techniques. However, when maintenance of
oral hygiene suffers the bacterial flora within the plaque
begins to mature with early and late colonizers which in
the availability of carbohydrate rich substrates becomes
preferentially populated by acidogenic and acid-tolerant
species.

Higher prevalence of Streptococcus mutants has
frequently been associated with carcinogenesis though
not all caries patients test positive for S. mutans. While
S. mutans is known to occur at higher prevalence, several
other acidogenic species have also been reported to co-
prevail within the niche areas such as supra- and sub-
gingival plaque substance and dentinal caries. Some of the
most commonly reported bacteria include Lactobacillus,
Granulicatella, Gemella, Haemophilus, Veillonella,
Actinomycetes, Rothia, Selenomonas, Atopobium,
Neisseria, Eikenella, Fusobacterium, Leptotrichia, and
Enterococcus(3,4,5,6)Several studies have indicated co-
existence of above bacteria in various combinations,
though the detection depended on the source of sample
saliva, mature plaque or dentinal caries from primary,
secondary or mixed dentition age groups.(7,8)

Recent Studies of Oral Microbiome Using
Metagenomics:

- Belda-Ferre and colleagues employed a
metagenomic approach to compare bacterial
profiles in 6 supragingival dental plaque samples
(from six subjects—two healthy, two with a low
number of active caries, and two with a high
number of active caries) and in two cavity samples
from which sufficient DNA for sequencing was
obtained. They found that the array of bacterial
species in the caries samples differed from the array
of bacteria found in healthy individuals. Bacilli
and Gammaproteobacteria were more common
in the healthy samples—whereas, some typically
anaerobic taxa like Clostridiales and Bacteroidetes
were more common in the caries samples. It is
interesting that higher levels of Streptococcus
sanguinis and Aggregatibacter sp. were found in
the healthy samples—whereas, higher levels of
Streptococcus gordonii and Leptotrichia buccalis
were found in the caries samples. They also found
that strains of *Veillonella parvula* were present in all samples but were more abundant in the caries samples. The bacterial profile analysis indicated that tooth cavities were almost complete absent of *S. mutans*, the originally identified etiological agent, but by a complex community formed of numerous bacterial species including the most common genera, *Veillonella*, *Corynebacterium*, or *Leptotrichia*. They proposed that *S. mutans* might initiate caries and interact with other bacterial species and other species could colonize the niche leading to disease development. For example, it was previously reported the synergistic effect of *S. mutans* and *Veillonella alcalescens* in which the mixture of both species produced more acid than either one of them separately. The analysis also found that diversity of the bacterial community diminished as caries advanced. Individuals who have never suffered from dental caries do not have *mutans* streptococci but have high recruitment of other species such as *S. sanguinis*. This finding is consistent with a previously reported analysis showing reduced bacterial diversity concomitant with caries development. The reduction in bacterial diversity in caries development may result not only from the harsh acidic environmental but may also be caused by antagonistic factors, such as the mutacins produced by acid tolerant *S. mutans*.\(^9\)

- **One well-known example in the oral cavity is the competition between *S. sanguinis* and *S. mutans* in which *S. sanguinis* produces H2O2, which inhibits *S. mutans*, while *S. mutans* produces mutacins, which inhibit *S. sanguinis* leading to Competition and coexistence between *Streptococcus mutans* and *Streptococcus sanguinis* in the dental biofilm.\(^10\)**

- **Advantage of Metagenomics in Dental Caries:**

  The prospects for important contributions from oral metagenomics toward understanding oral carious lesions are many. First, metagenomics promises to provide reliable bacterial profiles unencumbered by the biases inherent in culture-dependent microbiologic methods or PCR-dependent molecular biologic methods. Bacterial profiles will help to identify “keystone” microorganisms in dental caries. The healthy bacterial profile may be used to build new therapeutic treatments or to manipulate the oral microbiome by introducing probiotic microorganisms or by selectively inhibiting “keystone” pathogens. Second, many reference genomes will be assembled or completed. Multiple genomes can be compared with study microbial genome evolution. The reference genomes of new oral microorganisms will provide chances to study the roles of these microorganisms precisely in the oral cavity. Third, metagenomics will identify new genes or genetic variations (e.g., pathogenicity islands, HGT) that may be associated with oral diseases. Disease-related genetic variations may be used to develop new diagnostic markers for clinical applications. Finally, bacterial profiles can be associated with genomic profiles through
metagenomics to understand which microorganism(s) and which genes or metabolic pathways play keystone functions in dysbiosis of dental caries.

**Conclusion**

Metagenomics is in an early stage of application to the oral microbiome. However, both bacterial profiles and genomic profiles can be examined and compared in metagenomics to study relationships between microbial diversity, genetic variations, and oral diseases. Current data suggest deep complexity of the oral microbiome. Various studies provide a model in which three levels of interactions are involved in the oral community and, consequently, determine oral health or disease. The first level includes the molecular interactions among biological molecules, such as DNA, RNA, protein, and metabolites. These molecules interact with each other intra-cellularly or inter-cellularly in bacterial cells, and determine microbial growth. The second level includes biological interactions between microbes and microbes and host, such as neutralism, amensalism, antagonism, mutualism, commensalism, or parasitism. The different biological interactions shape the composition of the oral microbiome. The third level includes the relationship of microorganisms with the oral environment. For example, oral environmental changes, such as high-sugar diet, low-pH, smoking, and fluoride use, may affect oral microbial diversity. These three levels of interactions work together to determine the microbiome and to affect pathogen capacities. Dental caries are a consequence of the effects of the microbiome on the host. A systems biology approach is required to explain the complex interactions of microbiome and host. The advances in metagenomics will lead the way for understanding oral disease.

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**REFERENCES**


Need for Evidence Based Dentistry in Clinical Practice—A Review

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ABSTRACT

Evidence based dentistry is an effort towards oral health care and is a process to systematically collect and analyze scientific evidence to answer a particular clinical situation. It is a logical, common sense, patient-oriented approach which is not different from the regular treatment except that it takes into consideration the uniqueness of each patient. Evidence-based dentistry (EBD) forms an important asset to practice modern dentistry and to educate upcoming dental care professionals. It is important for dentists to be able to keep up with developments in diagnosis, prevention and treatment of oral disease, as well as newly discovered causes of diseases, especially in regards to patient safety. For everyday practice, EBD offers increased personal satisfaction in the knowledge that the patient’s healthcare requirements are met by a treatment that is based on scientific evidence.

Keywords: Evidence based research, Evidence based approach, Systematic review, Dentistry.

Introduction

To make clinical decisions, dentists rely on various factors which includes clinical experience, textbooks, journal articles and previous educational experience. Therefore, for practicing modern dentistry and to educate upcoming dental care professionals, evidence-based dentistry becomes a valuable asset. Research evidence has become a need for dentistry in 21st century. The aim of evidence-based dentistry is to help practitioners provide their patients with optimal care. Often doubts arise in practitioners mind if the new innovations are better than our present clinical approach. EBD requires compilation of the best available evidence with clinical expertise and patient preferences but it cannot replace the clinical judgment [1]. It focuses on answering clinical questions using a critical appraisal of research, assessing the dental literature, finding the relevant and valid scientific studies and applying such results of such investigations to improve clinical care [2]. Hence, helps to solve any clinical problems faced by dentists in their day to day practice.

Evidence based approach is well suited for the present scenario as it will incorporate the best Available scientific evidence for decision making in order to maximize the potential for successful clinical outcome and in turn providing the best patient care [3]. Proper application of the available literature for a clinical situation and if inculcated properly in our practice can make huge difference in our approach and so in the outcome of the treatment. This article is a review from the available literature and using it for better results.

History: Though Dentistry came much after medicine but has adopted the same language and conversations. So, the definition given for evidence based medicine
Evidence based dentistry is defined as an approach to oral health care that includes integration of systematic assessments of clinically relevant scientific evidence, relating to patient’s oral and medical condition and history, the dentist’s clinical expertise, and the patient’s treatment needs and preferences [11].

The establishment of journal on evidence based dentistry 1st appeared as a supplement to the BDJ in 1998 and later it became a stand-alone journal in 2000. The 1st center for evidence based dentistry established in the year 2000 in Davangere (India). In the year 2001 the journal of evidence based dental practice was first established in United States [12]. The DSM-Forsyth center for evidence based dental research was established in Boston in 2003 [6].

**EBD Process:** EBD is a conscious process to identify the best and most up-to-date research that addresses a patient’s clinical problem. The research is based on conjunction with patient’s values, aspirations and preferences, combined with the practitioner’s own clinical proficiency and judgment, to offer more effective ways of managing clinical problems [13, 14].

Evidence-based dentistry has two main goals:
1. Best evidence/research and
2. The transfer of this in practical use.

This involves four basic phases:
1. Asking evidence-based queries (framing an answerable query from a clinical scenario)
2. Searching for the best evidence
3. Reviewing and critically appraising the evidence
4. Applying this data in a way to help the clinical practice.

Carr and McGivney [15] have suggested an additional phase that is the
5. Evaluation of performance of the techniques, procedures or materials.

There are two types of researches that are of considerable importance in dentistry: Qualitative and evidence-based. EBD is based on evaluation of research as opposed to qualitative facts derived from research. Qualitative based research lacks regular appraisal of clinical interventions, which is the very basis of
EBD. EBD has its roots in the discipline of clinical epidemiology, whereas qualitative methods have their foundations in the social sciences [16].

In contrast to traditional dental care which used knowledge and experience from books, adherence to accepted standards, and the opinion of experts and peers, Evidence based practice is based on using current evidence to solve clinical questions [17].

Glover et al. refined the hierarchy by characterizing literature as filtered information and unfiltered information. Filtered information is considered the higher level of evidence. It generates three categories of studies: Systematic reviews, critically appraised topics, and critically appraised individual articles [18].

Only the websites which have been certified over the years for their genuine content should be preferred. Following are the websites which can be assessed for literature review: [19]

- Websites related to EBD are as follows:
  - American Dental Association
  - A-Z systematic reviews.
  - www.ada.org/prof/resources/ebd/reviews/index.asp
    - Cochrane Collaboration. www.cochrane.org
    - Cochrane Oral Health Group. www.ohg.cochrane.org
    - EBD (Journal).
  - www.nature.com/ebd/index.html

The Cochrane Collaboration is a worldwide effort to establish an online resource of pre-appraised bio-medical evidence, which is continuously expanded and updated [20, 21]. Specifically, the collaboration is an international organization whose goal is to prepare, maintain, and provide systematic reviews of the effects of healthcare interventions. The overall aim is to produce periodically updated systematic reviews of randomized controlled trials in specific health areas. The main work of the collaboration is done by fifty Collaborative Review Groups, within which Cochrane Systematic Reviews are prepared and maintained. It has been called “an enterprise that rivals the Human Genome Project in its potential implications for modern medicine” [22] and has also been described as being one of the most significant clinical advances since the creation of the National Institutes of Health (NLM) in the US [23].

PubMed is a free medical database provided by the US National Library of Medicine and the NLM. Highly authoritative and up-to-date, PubMed gives us access to MEDLINE, NLM’s database of citations and abstracts in the fields of medicine, nursing, dentistry, veterinary medicine, health care systems, and preclinical sciences [23]. Articles can be searched by keywords, specific phrases, and Medical Subject Headings or MeSH terms, which are standardized headings used by the National Library of Medicine for cataloging articles in PubMed central [24].

Advantages of Evidence-Based Approach [25, 26]
1. Better use of research evidence in clinical practice
2. Uses resources more effectively
3. More attention on evidence rather than authority for clinical decision-making
4. Monitors and develops clinical performance

**Conclusion**

EBD is an approach which is logical, common sense, patient-oriented and is not different from the regular treatment except that it takes into consideration the uniqueness of each patient. EBD approach empowers clinicians to question and consider the use of current best evidence in decision-making on the management of individual patients. But the question regarding the authenticity of it remains unclear. Thus, well-trusted sites such as Cochrane Library or the PubMed should be trusted. This information is an adjunct, but not a substitute for our clinical judgment and patient preferences. For the clinician in everyday practice, EBD offers solutions to many greater faced in daily practice. Hence, efforts should be made to introduce more trusted websites and other sources which can help practitioners to inculcate evidence based approach in their practice.

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**Ethical Clearance:** Not required for review manuscript.
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5. http://www.cebm.utoronto/introduction to evidence based medicine


Bleaching Lights—A Review

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ABSTRACT

Vital bleaching is one of the most common cosmetic dental procedures done in dental office. This procedure consists of carbamide or hydrogen peroxide gel applications that can be applied in-office or by the patient (at-home/overnight bleaching system). In-office treatments utilise light to speed up the process. The objective of this article is to review the effect of light-activation sources on in-office tooth bleaching.

Keywords: In-office bleaching, Carbamide peroxide, Hydrogen peroxide, Whitening

Introduction

Tooth discolouration are of multifactorial etiology. They have been classified as extrinsic, intrinsic and internalised discoloration.1 The extrinsic discoloration is associated with the use of tea, coffee, tobacco.2 Intrinsic stains occurs due to various systemic diseases, medications (e.g., minocycline, tetracycline), childhood diseases, infection or trauma to a primary tooth while the underlying tooth is developing, natural aging changes and the accumulation of stain that has entered the teeth.3 There is an increase in patient awareness of the ability to improve the appearance of their discoloured teeth. Tooth bleaching is a conservative and non-invasive technique which has been well accepted to be safe and effective.3

Hydrogen peroxide releases oxygen that breaks down conjugated bonds in protein chains associated with stain into a single bond. This will result in more absorption of colour wavelengths and resulting in the reflection of little colour (i.e., a whitening effect).2 Various treatment modalities are available which include over-the-counter bleaching (self-administered), in-office bleaching (professionally administered) and dentist supervised take-home bleaching (professionally dispensed).7

Nonvital Tooth Bleaching: When the discolouration is from within the pulp chamber, from necrotic pulp tissue or from staining agents that are present in the pulp chamber, the bleaching treatment need to take place within the pulp chamber. The various techniques are thermolytic technique, walking bleaching and inside-outside bleaching. Recommendations are sodium perborate mixed with water or 10% carbamide peroxide.

Home Bleaching: Home bleaching is considered to be safe and effective treatment.8,9,10 This technique is performed with low concentration hydrogen peroxide (4%-8%) or carbamide peroxide (10%-22%) formulations, which are inserted into trays. These trays are placed in the mouth for 2-8 hours per day, over the course of 2-6 weeks.11

Over-the-counter Bleaching: The patient applies two strips per day for 30 minutes each. 6.5% hydrogen peroxide-coated strip is available. Clinical studies comparing the whitening efficacy of 10% carbamide peroxide with the efficacy of the hydrogen peroxide-coated strips have demonstrated that the polyethylene strips may be an acceptable alternative to the night guard method of at-home whitening.12
**In-office Bleaching:** Although in-office bleaching is performed using high concentration hydrogen peroxide (15%-40%) it is widely used because of these advantages: Minimally invasive, immediate visible results and no need of patient cooperation.\textsuperscript{13}

Since the introduction of in-office bleaching treatments, the use of curing lights (including halogen curing lights, plasma arches, LED, LED plus lasers, lasers) has been recommended to accelerate the action of the bleaching gel.\textsuperscript{14} It is believed that most light sources decompose peroxide faster (by increasing the temperature) to form free radicals which whiten teeth.\textsuperscript{15,16,17}

**The effect of light-activation sources on in-office tooth bleaching:** Strong controversy surrounds the success of light sources has been detected. Some researchers believe that it is effective in the bleaching process, while others believe only certain lights are effective and others reported no effect.

Luk et al., 2004\textsuperscript{18} reported that colour change were significantly affected by inter action of the bleaching and light variables, and the application of light significantly improved the whitening efficacy of same bleaching materials.

Hein et al., 2003\textsuperscript{19} reported no difference in the whitening effect of bleaching gels They concluded that the proprietary chemicals added to the bleaching gels acted as catalysts in the whitening process and were solely responsible for activation, where as the lights had no influence.

Lima et al., 2009\textsuperscript{20} summarised that non-activated whitening did not differ from activated whitening. Where, approximately 35% HP was used with different light sources (LED/diode laser, a halogen lamp, plasma arc lamp, argon laser).

Bernardon et al., 2010\textsuperscript{21} reported that similar results were observed when teeth bleached using the in-office technique and light irradiation were compared to teeth bleached without light irradiation.

Torres et al., 2011\textsuperscript{22} reported that bleaching is more effective with a hybrid light-emitting diode (LED) and a low-intensity infrared diode laser than the control group.

Kossatz et al., 2011\textsuperscript{23} reported a larger difference in bleaching with a LED/laser than without it on 35% HP gel after the first session of bleaching, but after two sessions, the use of LED/laser light activation did not improve bleaching speed.

Hahn et al., 2013\textsuperscript{24} could not find an improvement in tooth whitening as a result of LED or laser light treatments, when evaluating the colour stability of bleaching with Opalescence Xtra Boost (38% hydrogen peroxide) using four different methods: activation with halogen, LED, laser or chemical activation.

Liang et al., 2013\textsuperscript{25} concluded that halogen light and chemically activated in-office bleaching systems were both effective for tooth whitening; however, halogen light activation could improve the immediate tooth whitening.

Nuttera et al., 2013\textsuperscript{26} reported that there was no significant difference in shade change between in-office bleaching with light activated 25% hydrogen peroxide gel followed by 2 weeks at home, night-time bleaching with 10% carbamide peroxide gel in a customised bleaching tray and in-office bleaching with 25% hydrogen peroxide without light activation followed by 2 weeks at home, night time bleaching with 10% carbamide peroxide gel in a customised bleaching tray.

Henry et al., 2013\textsuperscript{27} reported that on a split-mouth design study, the use of a sodium arc bulb lamp with 25% hydrogen peroxide for in-office whitening produces better results on maxillary teeth up to 1 week after whitening is completed.

**Discussion**

This review summarises the effect of light-activation sources on in-office tooth bleaching. Bleaching has been accepted as the least aggressive method for treating discoloured teeth. The application of light significantly improved the whitening efficacy of bleaching materials. This may be attributed to tooth dehydration that presumably is greater with increased tooth heating on using light activation source. However, some researchers have stated that no acceleration or increase in efficacy occurs when using light sources. Light-activated whitening systems add cost, occupy operatory space, can cause burning of the soft tissue, and can increase operatory temperature. The use of a light for in-office whitening may not be justified due to the risks involved. The controversial results which are reported
with different tooth bleaching systems can be attributed to various factors such as: Base-line colour of the teeth of the chosen subjects, the type and concentration of the bleaching product, the time period for the in-chair treatment as well as the treatment period.

**Conclusion**

The use of light source in bleaching show improvement with the use of light activator sources accelerating the process of the bleaching gel and achieving better results.

**Source of Funding:** Nil

**Conflicting Interest:** Nil

**Ethical Clearance:** Not needed for a review article

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Veneers—Diagnostic and Clinical Considerations: A Review

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ABSTRACT

Comprehensive oral care that combines both art and science to optimally improve dental health, aesthetics and function is termed as cosmetic dentistry. The objective of Cosmetic Dentistry is to provide maximum improvements in aesthetics with the minimum trauma to the dentition. Veneer is a layer of tooth colored material that is applied to a tooth to restore localized or generalized defects and intrinsic discoloration. Veneer are made up of chairside composite, processed composite, porcelain and compressed ceramic materials. This evolution of material sciences, ceramics, and adhesive system permits improvements of the aesthetic smile design of patients. The current manuscript is a review that highlights the diagnostic considerations; repair and maintenance; and recent advances in veneers.

Keywords: Aesthetic dentistry, Smile design, Repair of veneers, Lumineers.

Introduction

All human desires are in some way related to beauty. The term “esthetics” is borrowed from the Greek word “aesthesia” meaning sensation or sensibility. It can be defined as belonging to the appreciation of the beautiful. Pilkington in 1936 defined dental esthetics as the science of copying or harmonizing our work with that of nature, making our art inconspicuous. “cosmetic” means “kosmos” or adornment in Greek. Veneer is a layer of tooth colored material that is applied to a tooth to restore localized or generalized defects and intrinsic discoloration. Veneers are made up of chairside composite, processed composite, porcelain and compressed ceramic materials. The process of applying a thin veneer of preformed porcelain, composite resin or plastic material to a tooth is called laminating. With the successful use of laminates smiles can be transformed painlessly, conservatively and quickly with long lasting results.¹

Recently people seek dental care mainly for esthetic reasons. The objective of Cosmetic Dentistry must be to provide maximum improvements in aesthetics with the minimum trauma to the dentition. One of the greatest assets of a person is a perfect smile that shows beautiful natural teeth. Rendering or restoration of the smile is one of the most appreciated treatment provided by the dentist. Correction of discoloured, malformed or crooked teeth can produce dramatic changes in appearance, which often results in improved confidence, personality and social life. Veneer is considered one of the most conservative operative treatment procedures because the tooth preparation involves the removal of less than half the thickness of the enamel, leaving the remaining portion intact before veneer placement (2). Number of clinical studies have concluded that bonded laminate veneer restorations delivered good results over a period of 10 years and more (3). The modern improvement of composite cements, adhesive systems and simplified cementation procedures enable the promotion of using veneers among the dentists (4,5).
Classification of Veneers

I. Based on method of fabrication:
   i. Direct technique
   ii. Indirect technique

II. Based on extent of coverage:
   i. Partial veneers - used for localized defects or areas of intrinsic discoloration that involve only a portion of the clinical crown.
   ii. Full veneers - when majority of the facial surface or whole crown of the tooth is discoloured or restoration of generalized defects.

III. Based on tooth preparation – full veneer:
   i. Full veneer with incisal lapping.
   ii. Full veneer with window preparation.

IV. Based upon the materials & techniques used:
   i. Directly fabricated composite resin veneers.
      a. Direct partial veneers
      b. Direct full veneers
   ii. Indirectly fabricated veneers
      a. Etched porcelain veneers
      b. Processed composite veneers
      c. Castable ceramic veneers
   iii. Veneers for metal restorations.

Indications

1. Teeth with intrinsic/extrinsic discoloration - single/multiple: Extrinsic – Plaque, chromogenic bacteria, chlorhexidine mouthrinse, beverages (tea, coffee, red wine), iron supplements.
   Intrinsic – tetracycline stains, fluorosis, haematological diseases, devitalization, smoking, caries and dental restorative materials.

2. Enamel defects - gross enamel hypoplasia of the anterior teeth, amelogenesis imperfecta.


4. Teeth with abnormal shape and form.

5. Improper surface texture.

6. Mal-aligned teeth - For developing the esthetic illusion of straight teeth where orthodontic treatment is not sought or indicated.

7. Malocclusion - The configuration of lingual surface of anterior teeth can be changed to develop incisal guidance or centric contacts in malocclusion or periodontally compromised teeth.

8. Multiple carious lesions and decalcifications.


10. Stained or defective restorations that appear unesthetic on labial surfaces of teeth.

11. Trauma/fracture of multiple anterior teeth.

12. Aging - For discoloured teeth or attrited teeth due to aging, improvement can be done by bleaching or bleaching with subsequent veneering.

13. Wear patterns - Porcelain laminates are useful in teeth with slow progressive wear patterns. If sufficient enamel remains and the desired increased in length is not excessive, porcelain veneers can be bonded to remaining tooth structure to change shape, color or function.


Contra-indications

- Teeth having insufficient enamel.
- Young permanent teeth.
- Teeth exhibiting severe occlusal wear patterns, due to para-functional habits.
- Severe periodontal involvement with severe crowding.
- Poor oral hygiene.
- Inability to etch the enamel in excessively fluoridated teeth.
- Patients with high caries rate.

Ideal requirements of a veneer

1. Biological compatibility, especially with gingival tissues and periodontium.

2. Chemical durability of both the veneer material and its bond to enamel.

3. To be wear resistant.

4. Good aesthetics, which depends on: Color of veneer, Translucency, Color of the luting agent, Resistance to both staining and discoloration.
5. Replicate tooth contour, with a minimum thickness (not thicker than 0.5mm)

6. Smooth surface and margins, capable of retaining high lustre.

7. To be able to mask all sorts of discoloration without the need of an excessive increase in thickness.

8. To be able to copy well, natural colours of tooth both at cervical and at its middle portion and incisal.

9. To be easy to prepare.

10. When in service, to resist fracture and be easily repaired or substituted when fracture occurs.

11. To be of a low cost.

Diagnostic considerations:

1. **Assessment of the Face:** It is important to assess the shape of the face, skin color, symmetry, maxillary and mandibular lip lines. Patients with a narrow face may desire veneers with long and narrow teeth to emphasize the facial shape or round and short teeth to soften the narrowness of the face. Veneers appear brighter and high in value – dark skin and appear yellow and low in value as the skin tone becomes lighter.

2. **Assessment of the Smile:** It is important to assess the shape, form, color of the teeth. The clinician should note the maxillary incisal edge position in relation to the lower lip, the amount of gingival display during smiling and speaking and the overall quality of the smile. In an ideal tooth arrangement, the smile line should coincide or follow the curvature of the lower lip while smiling.

   The space that includes the teeth and tissues (inferior border of the upper lip, superior border of the lower lip) that is revealed when smiling is called the smile zone. Smile zones can be classified into the following types namely - straight, curved, ellipse, bow, rectangular and inverted. This is helpful in assessment of the smile. (6)

3. **Photographs:** The pre-operative photographs documents the pre-operative condition and aids the technician for the veneer fabrication. This should include- a full face smile, retracted frontal view with the shade tab held beneath the incisal edges of the maxillary incisors, a close-up view of the teeth to be veneered and a post-preparation view with the shade tab.

4. **Computer Imaging and Diagnostic Mock Ups:** Computer imaging of the patient’s smile and making the desired changes on the screen – provides the patient and the dentist a realistic preview of the expected result. Preparation and waxing on the diagnostic cast is necessary when veneers are required to lengthen teeth, close spaces or correct mal-aligned teeth.

**Maintenance of veneers:**

- Devices such as ultrasonic cleaner and air- abrasive polisher must be avoided.
- Surface stains on porcelain veneers can be removed with Al₂O₃ or diamond polishing paste on a felt wheel or a rubber cup.
- Proximal stains can be removed with composite proximal polishing strips.
- When scaling is performed around veneers care must be taken not to chip off the margins.
- If topical fluoride application is required by the patient it should have neutral pH- stannous fluoride, acidulated phosphate fluoride should not be used.

**Instructions for the patient:**

1. Patient should be advised that foods & liquids with a high potential for staining such as tea and coffee, increase the potential for marginal staining.

2. Patient must also be aware of the potential of porcelain to fracture.

3. Activities like ice-chewing and finger nail biting should be avoided.

4. Patients with parafunctional habits or in cases when porcelain veneer oppose the natural teeth – a protective appliance or occlusal guard is fabricated and worn by the patient to protect both the veneers and the opposing teeth. (7)

5. Patient should be recalled after 6 months for clinical evaluation. Kihn & Barnes recall method, which was also modified from Ryge criteria are used to evaluate the restoration (9) given in Table 1.
Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Alfa</th>
<th>Bravo</th>
<th>Charlie</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Match</td>
<td>Matches shade tab in color/ shade</td>
<td>Mismatches shade tab in color/shade by less than one shade tab gradation</td>
<td>Mismatches shade tab in color/shade by one shade tab gradation or more</td>
<td>N/A</td>
</tr>
<tr>
<td>Marginal Adaptation</td>
<td>No visible evidence of a cervice along the margin that the explorer will penetrate</td>
<td>Visible evidence of a cervice that the explorer will penetrate</td>
<td>Discoloration has penetrated along the margin in a pulpal direction</td>
<td>N/A</td>
</tr>
<tr>
<td>Secondary Caries</td>
<td>No caries as evidenced by softness, opacity or etch at the margin of the restoration</td>
<td>Evidence of caries at margin of the restoration</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Postoperative Sensitivity</td>
<td>No postoperative sensitivity</td>
<td>Postoperative sensitivity</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Cavosurface marginal Discoloration</td>
<td>No discoloration</td>
<td>Discoloration present but not penetrated the margin in pulpal direction</td>
<td>Discoloration present and penetrated along the pulpal direction</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Repair of veneers:

1. Repair of direct/indirect composite veneers:
   Direct laminate veneer restorations have been developed for advanced esthetic problems of anterior teeth. Tooth discolorations, rotated teeth, coronal fractures, congenital or acquired malformations, diastemas, discolored restorations, palatally positioned teeth, absence of lateral incisors, abrasions and erosions are the main indications for direct laminate veneer restorations.

   Small chipped areas can be corrected by recontouring and polishing. When a sizable area is broken -the area is cleaned and shade selection is done. The operator roughens the damaged surface of the veneer with a coarse round ended diamond instrument to form a chamfered cavosurface margin. Roughening can also be done by sandblasting. For additional retention-undercuts or mechanical locks are placed in the remaining composite with a small ¼ round bur. A 45° bevel (2mm in width) is placed at the junction of the remaining composite and fractured portion. Acid etchant is applied and rinsed. Bonding agent is applied on the remaining composite and exposed tooth surface and cured. Composite is then added, cured, finished and polished.

2. Repair of porcelain veneers: PLVs have become the aesthetic alternative to ceramic crowns and the traditional porcelain fused-to metal. These restorations exhibit reduced plaque build-up and its easy removal due to their smoothly glazed surface. The union of etched enamel and porcelain, combined with the bonding composite resin-luting agent with a silane coupling agent provides a long lasting restoration. The patients acceptance of the porcelain laminate veneer technique now-a-days seems to be high. Goldstein and Lancaster in their study showed that patients would readily accept shorter restoration life expectancy (five to eight years) if enamel could be saved by not reducing the tooth for a full crown. Due to the delicate nature of porcelain veneers, a possible post-operative complication is cracking. If the veneer is been well bonded to the underlying enamel and is not an aesthetic concern, the patient should be informed and the veneer should be left in place. When the patient presented with a fracture of the mesio-incisal portion of porcelain veneer, isolation is done with an oral retractor. Initial shade selection is done. A quick mock-up of the repair with the selected resin composite can verify the shade selection. A 2mm wide bevel is placed on the porcelain surrounding the fracture. To protect the adjacent soft tissue and the restoration surface- EtchArrest – sodium bicarbonate gel is applied. 10% of hydrofluoric acid gel is applied for 1 min. To prevent the potentially harmful acid splatter and to neutralize the effect of HF acid-
Etch Arrest is again applied. Next the porcelain surface is rinsed and dried. The silane primer is applied and allowed to dry for 60 sec. This silane treatment of the exposed silica surface results in the formation of siloxane bond with the methacrylate groups of the composite. Bonding agent is applied and cured. The resin composite is applied to the fractured site, cured, finished and polished. Large fractures are treated by replacing the entire porcelain veneer.

Recent advances in veneers

1. Porcelain veneer with Inman aligner: The Inman aligner was invented by Dr. Don Inman in 2001 at the Inman Orthodontic Laboratory at Kent in U.K. Indicated in patients with severe anterior crowding, where extensive tooth preparation is required for porcelain veneers. The aligner worn for 4-12 weeks, prevents excessive tooth reduction by pre-alignment of teeth. Minimum tooth preparation is done and porcelain veneers are fabricated.

2. MAC Veneer: The MAC (Micro Advanced Cosmetic division) veneer was introduced by the Micro Dental laboratory at Dublin in 2005. They are made from pressed ceramic. When compared to porcelain veneers, they are stronger, thicker (0.8-1 mm), fit more tightly and securely over teeth. These custom-made veneers are long lasting, stain resistant and not easily dislodged.

3. Da Vinci Veneers: They were introduced by Dr. Joel D. Gould in 2008 at the Da Vinci laboratory at California. They are ultrathin shells of tooth coloured ceramic that are resistant to permanent staining. The thickness is 0.2 – 0.3 mm. This requires no anesthesia with minimum or no tooth preparation. The teeth are lightly buffed to removed 0.5 mm thickness of enamel, an impression is made and sent to the lab. No temporization is required. Depending on the colour of the luting cement the shade of the veneer can be adjusted.

4. Lumineers: They were introduced by Dr. Mat Carty in 1990 and manufactured by the Den Mat corporation. They are the most popular no preparation veneers. This exceptionally thin veneer (0.3 – 0.5 mm) can maintain its durability due to the high strength – Cerinate porcelain. Cerinate porcelain is a translucent leucite based feldspathic porcelain, available as stackable or pressable porcelain. A study conducted by Strassler et al. evaluated the colour stability, marginal integrity, discoloration and secondary caries for 10 years revealed that 94% out of 167 Cerinate Lumineers placed with ultrabond were successful.

5. E- max veneers: Introduced by Microstar Corporation to the U.S. market in September 1998. Available either as ingots for pressing or as blocks that can be milled by CAD/CAM milling machines. Made from IPS Empress 2 ceramic – lithium disilicate veneers. Mostly used for crowns and bridges. Indicated for veneers when combined with adjacent IPS e max bridges or crowns. They are very thin (0.3 mm), can be used to increase the vertical dimension of the concerned teeth. High bond strength, most popular for the last 15 years, cemented with dual cure resin cement variolink II.

Conclusion

A beautiful smile is like a green light at an intersection. The ultimate goal of veneers is to enhance the aesthetics with a beautiful smile. Veneers are a useful adjunct to the armamentarium of the dentist for management of aesthetic problems in both young and elderly patients. Care needs to be taken during tooth preparation and the luting phase to ensure maximum results. With the combined advancements in acid etch, resin bonding techniques and material properties, veneers have become a more conservative and a highly aesthetic alternative to full coverage restorations.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: Not required for review manuscript

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Diagnosis of Vertical Root Fracture: A Review

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ABSTRACT

Vertical root fracture in teeth can be a barrier in diagnosis. There are other clinical and radiographic findings which can be vigilant to the clinician to the existence of fracture. Knowledge of the diagnostic aspects and the correct correlation and interpretation of radiograph was enough to establish the diagnostic hypothesis of vertical root fracture.

Keywords: Endodontics, Diagnosis, Vertical Root Fracture, Three dimensional imaging.

Introduction

A vertical root fracture (VRF) is defined as a complete or incomplete, longitudinally oriented fracture of the root, which is usually directed in the buccolingual plane. This fracture usually initiates in the tooth root and may extend coronally (1). VRF are most commonly associated with endodontically treated teeth (2). Pain and swelling, the presence of an isolated deep periodontal pocket and a combination of periapical and lateral radiolucency associated with the root are considered pathognomic for VRFs (3). However, the clinical signs, symptoms and radiographic appearance of VRFs frequently resemble endodontic failure to distinguish VRFs from non-VRFs (4).

The fracture is usually diagnosed years after all endodontic and prosthetic procedures have been completed (5).

The final diagnosis of VRF is, at times, challenging because of either shortage of specific signs and symptoms and/or of conventional radiographic features. Therefore, the differential diagnosis from other pathologic existence can be a challenging task (6-9).

Several etiologic factors may be involved (5, 8, 10). The affected root or tooth has an unfavourable prognosis and extraction is usually the only treatment option (4, 11).

Clinical features: Clinical signs and symptoms as well as radiographic representations often resemble to those associated with non-healing root canal treatments and with certain phenomenon of periodontal disease. Although, a quick determination is mandatory to prevent undesirable bone loss, that can result in difficulty in reconstructing the area, in which the treatment of choice for replacement is dental implant. Yet, the diagnostic information may be insufficient or the patient may be reluctant to undergo a diagnostic surgical procedure, thus forcing postponement of a conclusive decision on the diagnosis.

Frequently occurring were bone loss, tolerable mild pain, sinus tract opening, and aggravation of a chronic lesion and pain during mastication.

One of the presenting signs of VRF is resorption along the fracture line (12, 21). In the apical region, this resorption may progress apically where it creates a V-shaped nick, or along the whole length of the fracture,
giving the appearance of an irregular long resorptive osseous defect running longitudinally along the gutta percha root canal filling. Defragmentation of root canal sealer, silver points and gutta percha in conjunction with considerable resorption of the root has been recorded as being a component of vertically root fractured teeth (21).

A definitive diagnosis of VRF is best attained by an exploratory flap (9,12,13). If dehiscence, fenestration, and/or a clear sign of fracture are not found during a surgical procedure, an apicoectomy may be attempted. Yet, the tooth may still have a questionable prognosis, as an undiagnosed incomplete fracture may be present at the lingual aspect of the tooth.

Radiographic features: A final diagnosis of VRF identified on radiographs can be made in two illustrates. First one is the appearance of a fracture as hair line radiolucency in the dentin body. The other sign of fracture is the radiographic appearance of root segment separation (7, 14), usually accompanied by large bone losses surrounding the tooth or root.

It may be difficult to detect the fracture line as root fractures almost generate in a bucco-lingual pathway, and only the bone facing the fracture resors at the early stage, which shows associated radiolucencies producing root superimposition. Anyhow, as the bone resorption extends laterally, it may be potential to detect. When a VRF is suspected in a specific tooth, two periapical radiographs taken from different horizontal angulations are mandatory. Other radiographic signs include diffused V-shaped bone loss radiolucent halo around the entire tooth surface (15). [Figure 1,2,3]

![Figure 1: Endodontic treated tooth with halo type radiolucency-suggestive of VRF in 36](image1)

![Figure 2: Diagnostic radiograph-mesial shift – VRF not appreciated in 36](image2)

![Figure 3: Diagnostic Radiograph–Distal shift – VRF seen in the coronal third of mesial root of 36](image3)

Discussion

VRFs are considered to have severe complication and differential diagnosis which unavoidably leads to tooth extraction. The differential diagnosis includes failed endodontic treatment and periodontal diseases. Clinical examination, history and various investigation rules out the differential diagnosis of VRF. Advanced imaging examinations like conventional computed tomography (16, 17) and coherence optical tomography(18). Till date, coherence optical tomography is not available for dental use; it is a diagnostic unit for arteriosclerotic plaques present in cardiac catheter laboratories and could be a important tool for the diagnosis of VRFs (18). Unfortunately, conventional computed tomography and cone-beam or digital volume computer assisted tomography are not feasible to most of the community since they are expensive. The conventional periapical radiograph is still the most implied method, in spite of its low sensitivity, and this is likely due to the credibility of low cost of X-ray machines. Furthermore, the diagnosis of a VRF is only conclusive when the affected tooth is surgically explored to visualize the fracture line (6, 19, 20)
Advanced imaging techniques are good alternate methods for enhancing the diagnosis of VRFs (16,17) because periapical radiographs are unable to detect the fracture line.

**Conclusion**

In conclusion, any lesions due to VRFs will not have a similar appearance on CBCT images in relation with those which appear due to non-VRFs. Hence, three-dimensional CBCT images can be used to differentiate the VRF with a high degree of accuracy. However, clinical and radiographic signs suggests that a root fracture is present, direct inspection of the fracture is the most assertive way to confirm the presence of VRF. Location of the fracture can be assisted by passing a sharp probe lightly over the tooth surface. A ‘clicking’ sound can be heard as the probe is passed over the fracture line (12). Where this is contra-indicated, elevation of a small flap is recommended in order to view the root and confirm the presence of a fracture. At the time of surgery, the appearance of the fracture may vary. When the fracture is stained, visualization is simple. A fibro-optic light is a useful diagnostic tool, particularly where the fracture is not stained, or where separation of fragments has not occurred.

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**Conflict of Interest:** Nil

**Ethical Clearance:** Not needed for a review article

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Handpieces and Speeds in Dentistry—A Review

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ABSTRACT

Handpieces are one of the most important instruments used in dentistry today. With the advancement in technology, handpieces are fast developing and playing a major role in many of the procedures in dentistry today. This review is about the handpieces used in dentistry, their recent advances and speed, which is an important factor which is closely associated with handpieces.

Keywords: handpieces, dentistry, speed, cutting, efficiency

Introduction

A handpiece is a device for holding rotating instruments, powering them, and for positioning them inside the oral cavity. Some of the requirements of a handpiece are (1) safe and effective, minimizes dental trauma, gross hard tissue removal, enables preparation refinement, offers sufficient power and torque, enables or enhances visualization, light weight, good grip and handle configuration, ergonomically designed, no noise or vibration, easy to sterilize.

History: In 1778, a near-mechanical drill was invented. It was powered by a simple hand-crank attached to a gear. Though it was hardly any technology, it was the first to remove bits of tooth structure. In 1864, the clockwork dental drill was invented by a British dentist named George Fellows Harrington. In 1868, the pneumatic dental drill was introduced by George Green. In 1914, electric drills of speeds 3000rpm were introduced. In 1949, John Patrick Walsh from New Zealand patented air turbine handpiece(2). In 1957, Bordon introduced aeroter air turbine handpiece(3) which was manufactured by Densply. And today we have handpieces of advanced technology with multiple ports for water spray(4) and also fibre-optic bundle for illumination.

Anatomy of a Handpiece: An air driven handpiece has two main components namely the body or the shell and the turbine. The body has two parts. They are the head that houses the turbine and an outer sheath. Air and water are delivered through the body to the handpiece head. This includes the main drive air, coolant water (balances the heat generated), and chip air (often used to atomize the water spray). After the drive air passes through the turbine, it is sent off through the hollow body of the handpiece and down the handpiece tubing.

Various materials are used for the body. Of them, brass and stainless steel have been the commonest. Stainless steel is heavier and stronger than brass and also costlier. The material being used recently is Titanium. It is newer, stronger and resistant to repeated cycles of sterilization.

Coming to the turbine, a high speed turbine contains two components; A chucking mechanism to hold the cutting instrument and a rotary system that turns the bur at speeds of approximately 6,000 times for every second when air pressure is supplied.
The rotary system is made of an impeller, or rotor, which “catches” drive air, mounted on a spindle. The spindle rotates clockwise at high speeds, supported by two precision bearings and two suspension O-rings. The miniature bearings are the heart of the turbine. The most critical element of these bearings is the retainer, or cage, that secures the ball bearings within the raceways. This becomes brittle as it is subjected to harsh sterilization environments; upon failure, the bearing cage disintegrates and the turbine will no longer rotate or generate power\(^5\). Some symptoms of bearing failure include the bur no longer spinning concentrically, unacceptable vibration when the handpiece is activated, or unusually loud sounds emanating from the turbine\(^6\).

**Recent Improvements**

**Air Driven Handpieces:** Air driven hand pieces are available in different head sizes. They are full-size, mid-size and miniature head. Small head size improves visibility and access. Large head sizes have higher power and therefore takes less time for the procedure. Coming to angulation, a typical handpiece is angled back at 22.5° so that the cutting instrument lies in line with operator’s line of sight, however this can sometimes restrict access to posterior teeth by causing the handpiece to come in contact with maxillary teeth. Newer designs are featured with a unique head angle to overcome this.

Newer handpieces are with lower noise levels of 58-71 decibels\(^4\). The ergonomic design of the handpiece is also improved with wider flared body shape towards the rear of the handpiece which reduces the pinching force required to grip the handpiece, thereby reducing hand and wrist fatigue\(^6\).

Innovations in turbine design include turbine impeller improvements which help handpieces to maintain a constant speed even under load and reduce stalling. Another new feature that addresses torque and stalling issues in the inclusion of sensors that tell the unit’s electronic ‘brain’ when additional power is required to maintain constant speed. Modern microsized components allow additions like high tech sensors to be integrated into the handpiece without increasing size or weight.

The newer antisuck technology is the integration of air compartments that store air, and then release it to counteract the Venturi effect making a difference.

**Electrical Handpieces:** Earlier small carbon brushes were used which wore against the rotors. Many of the new motors are brushless requiring lesser maintenance. Shorter and lighter weight motors maintain balance between motor and attachment. Newer electrical handpieces are with fewer attachments\(^7\). The fiber optics and multiport water spray are delivered through the attachments\(^8\).

**Maintainence and Sterilization:** Handpieces are semicritical instrumentation requiring sterilization. The current CDC guidelines recommend autoclaving of dental handpieces after use for a single patient\(^9\). The United States Air Force Dental Investigative Service concluded that the clinician can expect a handpiece to survive approximately 500 sterilization cycles without significantly reduced performance, if the handpiece is properly maintained\(^10\). Five hundred cycles for a handpiece used and sterilized twice a day, five days per week, would translate into approximately one year of clinical service\(^11\).

Autoclave sterilization is the most rapid methods of sterilization. Fibreoptics dim with repeated heat sterilization, apparently owing to oil residue and debris baked on the ends of the optical fibre. Cleaning with detergent solution and wiping ends of the optics with alcohol or other suitable organic solvents may prolong the use before factory servicing. The handpieces should be bagged, sheathed and autoclaved. Manufacturers directions have to be followed. Using chemicals that would damage the internal parts should be avoided.

Other methods of sterilization of handpieces are chemical vapour pressure sterilization or chemiclaving recommended for ceramic bearing handpieces. When autoclaving or chemiclaving, temperature should not exceed 275°F or 135°C. Another method is ETOX Gas. This is a gentlest method. The oil left can impair the sterilization. One must confirm with the manufacturer that the sterilizer has pre-marketed review and approval from FDA. Further research is needed on ETOX sterilization for handpieces.

**Speed:** According to Sturdevant, Speed is number of times a rotary instrument such as a bur, will make a full turn during a minute\(^12\). According to Marzouk, Speed is the surface feet per unit time of contact that the tool has with the work to be cut\(^13\). The rotational speed of an instrument is calculated as revolutions per minute (RPM).
Since the surface feet per minute is controlled mainly by RPM and the size of the revolving tool, it is important to consider the size of the working tool in relation to speed of operation. A rotary tool should be large in diameter when used with low speeds to approach the optimum surface feet per unit time. In the ultra high speed range, the diameter of a cutting tool should be reduced to approximate the limits of maximum cutting efficiency.

**Classification**

According to Sturdevant are:

1. Low or slow speeds (<12000 rpm)
2. Medium or intermediate speeds (12000-200,000 rpm)
3. High or ultrahigh speeds (>200,000 rpm)

According to Marzouk:

1. Ultra low speed (300-3000 rpm)
2. Low speed (3000-6000 rpm)
3. Medium high speed (20000-45000 rpm)
4. High speed (45000-100,000 rpm)
5. Ultra high speed (> 100,000 rpm)

According to Vimal Sikri:

1. Conventional or low speed (<6000 rpm)
2. Intermediate or high speed (6000-100,000 rpm)
3. Ultra or super speeds (>100,000 rpm)

The crucial factor is the surface speed of the instrument, the velocity at which the edges of the cutting instrument pass across the surface being cut. The speed is proportional to the rotary speed and the diameter of the instrument, with large instruments having higher surface speeds at any given rate of rotation.

**Slow Speed:** Although intact tooth surface can be removed by an instrument rotating at low speed, it has many disadvantages of being ineffective, time consuming, requiring heavy force application (results in heat and vibrations of low frequency and high amplitude which causes patient discomfort), burs having a tendency to roll out of the tooth preparation and mar the proximal margin or tooth surface and the brittle blades of the carbide bur are easily broken at slow speeds. The advantages of slow speed are better tactile sensation and less chance for overheating cut surfaces.

**High Speed:** At high speed, the surface speed needed for good cutting can be achieved by more smaller and versatile cutting instruments.

The advantages of high speed are removal of tooth structure faster with less pressure, vibration and heat generation, the number of rotary cutting instruments being reduced because smaller sizes are more versatile in application, having better control and greater ease of operation. The instruments last longer. Patients are less apprehensive and several teeth in the same arch can be treated at the same appointment.

The disadvantages are loss of control and tactile sensation, breakage of instruments proceeded by flute distortion and change in anatomical curvature of the canal.

The air driven high speed handpieces rotate at a speed of 2-8 lakh rpm. The actual speed and the rotational speed are two different aspects of high speed turbine/airrotor hand piece. The cutting speed is 30% less than the rotating speed. It is also called as free speed and active speed. Free speed is the true rotating speed while active speed is the cutting speed. Their is a safety mechanism in high speed hand piece i.e. the bur stalls when pressure is applied more than what is required for cutting. This is because as resistance builds during cutting the air pressure is insufficient to maintain the speed of the turbine’s rotation. So air-driven handpiece should not be selected based on top speed as it is not the actual speed during tooth preparation.

There is a basic difference in conventional micromotor bur rotation and high speed handpiece. With high speed instruments bur continues to rotate even after clinician removes his foot from the pedal controlling the air-water spray. This is called coast speed. Most of the high speed handpieces have two holes called Borden’s two hole handpieces. In 1950, Dr. John Borden invented air driven high speed handpiece. Eventually coast speed was substantially reduced and bur comes to a halt at the earliest. Today we have 4 and 6 hole handpieces.

The international standards specifications allow up to 0.03 mm of eccentricity commonly referred to as run out or bur wobble. However concentricity is defined as ability of a handpiece to produce a cutline consistent with the diameter of the bur.
**Speed in Electric Handpieces:** Electric handpieces have been found to be more efficient than air-driven high speed handpieces\(^{(18)}\). Electric systems alternatively offer smooth, constant torque that does not vary as the bur meets resistance. Because the speed and torque are constant, removing difficult crowns, bridges, and restorations become easier\(^{(19)}\). Electric motors give end users an advantage of setting precise speeds for procedures, rather than the conventional ‘feathering’ of the rheostat. When considering an electric hand piece you will need a 1:5 gear ratio for tooth preparation. Low-speed hand pieces are also available for other dental treatments procedures.

**Relation of Speed with Different Factors**

**Pressure\(^{(13)}\):** Pressure is force per surface area. Using same force, smaller tools apply more pressure to the point of contact than larger tools. To have both the tools cut at same pressure, force applied with smaller ones should be reduced. If so, then larger tools will remove more tooth structure since there is more surface contact. To make smaller tools remove more tooth structure it is necessary to increase the speed i.e. revolutions per minute. It has been observed clinically that low speed requires 2-5 pounds force, high speed requires 1 pound and ultra high speed requires still less force i.e. 1-4 ounces.

**Vibrations\(^{(13)}\):** A wave of vibration consists of frequency and amplitude. At low speed, large amplitude and small frequency vibrations are produced. At higher speeds, it is reverse. The greatest harm is caused by amplitude (patient apprehension, destructive reaction in tooth and dentist’s fatigue). By increasing operating speed, amplitude and its effects are decreased. It has been shown that rotation of approximately 6000RPM sets up a fundamental vibrational wave of approximately 100 cycles/sec. Higher speeds produce less amplitude and high frequency and hence perception will be lost in ultra high speed ranges of 100,000 RPM or more.

A study reported that average measurement of the frequency of sounds emitted by high-speed dental air turbines was 6860 Hz\(^{(20)}\). It indicated that under any working conditions, high-speed dental air turbines emit frequencies which can cause hearing loss.

**Cutting Efficiency\(^{(13)}\):** The rate of cutting increases with the rotational speed but this increase is not in direct proportion. It has been found that at very high speeds 150,000 and above, the time required for the removal of the same weight of tooth structure is very nearly the same as at still higher speeds. There is however a minimum rotation speed for a given load below which the tool will not cut. Greater the load, lower is this minimum speed. The correlation between the speed and the load depends upon whether enamel or dentin is being cut, design and composition of bur.

**Conclusion**

We cannot imagine dentistry without a handpiece. It is like going back in time by more than a hundred years. Today practitioners are extremely dependent on handpieces. The dental handpiece is a vital part of clinical procedures in every dental operatory. As the scope and need of procedures increases, advancements in handpiece technologies will continue to play a critical role in the practice of dentistry.

**Conflict of Interest:** Nil

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Management of Maxillary First Molar with Six Canals—A Case Report

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ABSTRACT

Generally permanent maxillary first molar has three roots and four canals. While there is usually a single canal in each of the distobuccal and palatal roots, the broad buccolingual dimension of the mesiobuccal root and associated concavities on its mesial and distal surface is consistent with the majority of the mesiobuccal roots having two canals. In the literature with respect to frequency of occurrence of the number of canals in each root, there is a wide range of variation with regards to the number of roots and incidence of fusion. The root canal morphology of teeth is often extremely complex and highly variable. Variations may result because of ethnic background, age and gender of the population studied. The following manuscript is a case report that describes the management of maxillary first molar with 6 canals.

Keywords: six canals, maxillary first molar, anatomical variations

Introduction

One of the essential prerequisite for successful endodontic diagnosis and treatment, is the recognition of variations in root canal anatomy. The complexities of internal anatomy are often masked by the external surfaces, which have a relatively simple and uniform anatomy.(1) Successful root canal therapy requires a thorough knowledge of root and root canal morphology. Generally permanent maxillary first molar has three roots and four canals.(2) While there is usually a single canal in each of the distobuccal and palatal roots, the broad buccolingual dimension of the mesiobuccal root and associated concavities on its mesial and distal surface is consistent with the majority of the mesiobuccal roots having two canals.(2,3) In the literature with respect to frequency of occurrence of the number of canals in each root, there is a wide range of variation with regards to the number of roots and incidence of fusion.

The root canal morphology of teeth is often extremely complex and highly variable. Variations may result because of ethnic background, age and gender of the population studied. In some studies, a separate canal is defined as a separate orifice found on the floor of the pulp chamber(10), two instruments placed into two MB canals simultaneously to a minimum depth of 16 mm from the cusp of an intact tooth (11), one that can be instrumented to a depth of 3 to 4 mm (12) or a treatable canal in retrospective clinical studies(8). Weine et al. in 1969 (5), gave the first clinical classification of more than one canal system in a single root, and used the mesiobuccal root of the maxillary first molar as the type specimen. A system was further developed for root canal anatomy classification for any tooth that has a broad buccolingual diameter(7,13).

Case Report: A 52 year old male patient came to Department of Conservative dentistry and Endodontics,
Sree Balaji Dental College and Hospital, with a chief complaint of pain in right upper back tooth region for past 1 month. Pain was aggravating during mastication and relieved under medication with an onset of lingering response to hot and cold stimulus for 1 month before the initiation of the treatment. Patient had no relevant medical history. On extra oral examination, there were No palpable lymph nodes. On intra oral examination no abnormality was detected in relation to soft tissue and a deep class II caries was present in relation to right maxillary first molar which was tender on percussion. Radiographic examination revealed radiolucency involving enamel, dentin and pulp and widening of periodontal space and loss of lamina dura in 16 with ill defined radiolucency in the periapical region (fig.1A). Based on clinical and radiographic examination, case was diagnosed to be symptomatic irreversible pulpitis with symptomatic apical periodontitis in relation to 16. The treatment plan opted was root canal treatment, followed by full coverage crown in 16.

Treatment was initiated with anesthetizing the tooth with 1.8 mL 2% lignocaine containing 1:80,000 epinephrine (Lignox 2% A, Indoco Remedies Ltd., Navi Mumbai, India) and relieving it from occlusion. The access cavity was prepared under rubber dam isolation (fig1c), and the chamber was irrigated with 3% sodium hypochlorite [NaOCl] (Neelkanth Health Care (P) Ltd.). MB1, MB2, MB3, DB1, and (palatal) P1,P2 canal orifices were located using DG 16 explorer and coronal flaring was done with gates-glidden drills size no. 2 and 3 to improve the straight-line access. The canals were negotiated for patency using K-flex files and working length was determined using RootZX Mini [JMoria] and initial hand filing till #20 K-file was done in all the canals. The working length (fig1B) was later confirmed by radiograph. Also CBCT image of the particular small field of vision in relation to 16 was taken. The canals MB1, MB2, MB3 and DB were instrumented with #25 4% NeoEndo instruments and #25 6% and #20 6% for palatal canal respectively. Master-cone radiograph was taken(fig1D). Final irrigation was done with EDTA (Endoprep-RC, Anabond Stedman Pharma research ltd.) and the canals were completely dried with paper points and obturated (fig1E) with gutta-percha (Dentsply Maillefer) and AH plus resin sealer (Maillefer, Dentsply, Konstanz, Germany). The patient was asymptomatic on follow-up (fig1G) and was posted for full coverage crown for the tooth.

![Fig. 1: A- Pre-Op radiograph, B- working length determination, C- intra oral photograph of the pulpal floor with orifices, D- mastercone radiograph, E- obturation, F- 1 month follow up, G- Intraoral picture of the pulp chamber after obturation, H- CBCT image](image-url)
Endodontic management of maxillary first molars is a constant challenge, due to the anatomical complexities of their roots and root canals. One of the major causes of root canal to fail is the inability to identify, locate, and manage the entire root canal system. Anatomical aberrations are commonly observed in maxillary first molar ranging from one to seven canals.\(^{(14)}\) It is generally accepted that maxillary first molar has three roots and three canals with a fourth canal (MB2) seen in 50.4–91% of cases.\(^{(14–16)}\) The occurrence of double root canal system in all roots of a maxillary molar simultaneously is an unusual finding.\(^{(8)}\) Diagnostic measures such as multiple preoperative radiographs, examination of the pulp floor with a sharp explorer, troughing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, visualising canal bleeding points and performing the hypochlorite champagne bubble test, are important aids in locating root orifices.\(^{(17)}\)

Different methods to decrease the occurrence of missed Canals include steps such as sufficient tooth structure removal to allow instruments to be placed easily into the orifice of each canal during root canal preparation without interfering with overhanging walls. Each canal orifice must be visible and easily accessible for placement of the instrument. If extra roots and/or canals are suspected at the diagnosis stage, modification of the access cavity outline form should be done.\(^{(18)}\) The anatomical laws of Krasner and Rankow\(^{(19)}\) highlight some useful general anatomical landmarks (independent of the crown anatomy). Degree of canal curvature, the position of the canal apex relative to its cusp tip, canal length, the degree of calcification, size and shape of the canals and the position of the tooth in the jaw are the parameters that determine the specific design of an access cavity.\(^{(18)}\)

Radiographic techniques to aid in locating the canals include \[a\] Conventional radiography: at least two periapical radiographies should be taken using the parallel technique with either a mesial or distal horizontal tube shift, for careful evaluation of the root canal morphology. Martinez-Lozano et al\(^{(20)}\) in their study revealed that by varying the horizontal angle, the number of root canals observed in maxillary premolars was similar with the actual number of canals present. Regarding the fact that the three-dimensional anatomy of the area being radiographed is compressed into a two-dimensional image, the amount of information gained from conventional radiographs and digitally captured periapical radiographs is limited.\(^{(21)}\) Newer diagnostic aids such as computerized axial tomography (CT) scanning greatly help access to the internal root canal morphology. CT images identified a greater number of morphologic variations than panoramic radiographs\(^{(21)}\).  [b] Cone-beam computed tomography: CBCT images always aided in the identification of a more number of root canals than digital radiographic images\(^{(22)}\). A dental operating microscope and CBCT scanning is of very important for locating and identifying root canals, and also CBCT scanning helps in initial identification of the internal morphology of maxillary first molars\(^{(15)}\). [c] Ultrasonic devices: Ultrasonic devices are particularly advantageous when attempting to locate the mesio-palatal canal in maxillary molars due to the cavitation effect of the same. The combined use of an operating microscope and ultrasonic devices help in the detection of mesio-palatal canals in maxillary first permanent molars\(^{(23)}\). [d] Microscopes: One of the major benefits of using a microscope is to increase the possibility of locating and accessing calcified and additional canals\(^{(24)}\).  [e] Transillumination: Transillumination can also aid in detecting calcified canals\(^{(25)}\). [f] Other methods: It is suggested that staining the Pulpal floor chamber with 1% methylene blue dye. It is a water-soluble dye that can be irrigated into a dry pulp chamber. The dye is absorbed into canal orifices and serves to visually map the hard-to-find canals. The sodium hypochlorite champagne bubble test is another aid to locate orifice. To identify the presence of two buccal roots if present, probing the buccal sulcus to feel the root eminences and furcation anatomy may also help. To identify the presence of two palatal roots in maxillary molars, Probing the palatal sulcus to feel the root eminences and furcation anatomy may also help. 17% EDTA and 95% ethanol to clean and dry the pulp chamber floor prior to visually inspecting the root canal system can be done\(^{(12)}\). The commonest variation is the presence of a second mesiobuccal canal in maxillary first molar. Here in this case the palatal root has Vertucci type II canal configuration and the mesiobuccal root presents a type II canal configuration as suggested by Gulabivala et al.\(^{(1)}\) The incidence of second mesiobuccal canal has been reported to be between 18% and 96.1%\(^{(16)}\). Other variations include One,\(^{(26)}\) Four,\(^{(9)}\) Five roots\(^{(27)}\). Case reports with six root canals\(^{(28)}\) or with a C-shaped canal configuration\(^{(29)}\) have also been reported earlier. Maxillary first molar of 3 root configuration with 6 canal has been reported by many others\(^{(30,31,32)}\).
Conclusion

Importance of root canal variations should not be underestimated, although their incidence is rare. Careful examination of preoperative and mid treatment radiographs and the internal anatomy of teeth are essential for the success of endodontic treatment. These discussions confirm the necessity for meticulous examination of the tooth pulpal floor at high magnification under proper illumination of the dental operating microscope and emphasize the importance of newer imaging techniques like CBCT in preoperative assessment. Knowledge of root canal configuration and its variations, the use of magnification (operating microscope) and the combined use with ultrasonics increased the detection of additional canals are all important aids that are needed for successful treatment. Endodontic science and technology are continually evolving to enable clinicians to identify, disinfect and seal root canal system predictably and efficiently.

Source of Funding: Nil

Conflict of Interest: Nil

Ethical Clearance: Written informed consent was obtained from patient. Ethical clearance not required for a case report.

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Re-attachment of Tooth Fragment—A Case Report

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ABSTRACT

This case report describes and analyses a tooth fragment reattachment technique used to resolve crown fractures of the anterior teeth. This treatment allows a conservative approach to traumatic coronal lesions offering a better possibility of maintaining aesthetics and function. The adhesive reattachment is a simple system to achieve good aesthetic and functional results. When tooth and fragment margins are intact, the reattachment technique without any tooth preparation is a simple and predictable procedure.

Keywords: Tooth fragment, re-attachment, trauma.

Introduction

Dental trauma often has a severe impact on social and psychological well being of a patient. The majority of dental injuries involve anterior teeth, especially the maxillary incisors, whereas the mandibular central incisors and maxillary lateral incisors are less frequently involved. Crown root fracture (CRF) is a type of dental trauma, usually resulting from a horizontal impact, which involves enamel, dentin and cementum, often occurring below the gingival margin and depending on whether pulp involvement is present or absent, which may be classified as complicated or uncomplicated. A fractured anterior tooth requires immediate clinical attention and if untreated, can cause damage to dentition and even have a psychological impact on the patient (1).

Factors influencing the management of coronal tooth fractures are:

- Extent of fracture (biological width violation, endodontic involvement, alveolar bone fracture),
- Pattern of fracture
- Restorability of fractured tooth
- Secondary trauma injuries
- Presence/absence of fractured tooth fragment and its condition-
- Occlusion
- Esthetics
- Cost and prognosis (2).

The choice of the esthetic restorative treatment of fractured anterior teeth include composite resin restoration, fragment re-attachment and ceramic restorations (full crowns, laminate veneers or ceramic fragments). When the tooth fragment is present and in good working condition, the best option for the treatment of a coronal fracture fragment is reattachment (3).

Case Report: A 35 year-old male patient presented to the Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Chennai, after sustaining a complicated crown root fracture to his maxillary left lateral incisor due to fall on the ground. The patient’s medical history was unremarkable. No mobility of the injured tooth was recorded and there was no apparent trauma to the soft tissues in the extraoral and intraoral examination. On hard tissue examination,
Ellis Class III fracture was seen in the coronal portion of tooth No. 22, which extended from cervical 3rd of crown on labial aspect to 2 mm sub-gingivally on the lingual aspect. The fractured fragment was loosely attached to the tooth [Figure 1 A].

Periapical radiograph showed that the root formation was complete with no extrusion [Figure 2A]. The patient expressed the desire to maintain the tooth and restore it due to the lower cost compared to an indirect restoration. A detailed explanation about the treatment plan was given to the patient, which included root canal treatment and reattachment with fiber post. The treatment plan was accepted by the patient and written statement of informed consent was obtained.

Local anesthetic was administered and the segment was removed with minimal force and recovered and stored in normal saline to prevent discoloration and dehydration [Figure 1B]. Following a detailed examination, the adaptation of the fragment was checked. The working length was determined with an electronic apex locator (Root ZX, J. Morita Corp., Japan) and confirmed with radiograph. Then the orifice was sealed with temporary restoration. Gingivectomy was done in 22 for making the palatal margin supra-gingivally [Figure 1C]. The patient was recalled the next day and the root canal was enlarged to size F5 with Protaper Gold rotary files till the working length. About 3% sodium hypochlorite was used as irrigant during the preparation. The root canal was dried with paper points (Spident, Hand Rolled, Korea) and obturated only at the apical third.

The root canal was prepared for the post placement from the coronal two third of the canal with peso reamers. The fiber post (FIBRAPOST PD, Switzerland) was tried in the canal and adjusted to the desired length. Space was also prepared in the pulp chamber of the fractured crown fragment for receiving the coronal portion of the post and the core. The alignment of the coronal fragment was verified with the post in place [Figure 1D]. The root canal was etched with 37% orthophosphoric acid, rinsed, blot dried with paper points and bonding agent (PRIME and BOND NT, DENTSPLY) was applied. The post was then luted in the canal using dual-cured resin luting cement (Rely X, 3M, USA). The inner portion of the coronal fragment was similarly etched and bonded to the tooth using flowable composite resin after proper shade matching [Figure 1E]. Finally, occlusion was checked and postoperative instructions were given to the patient. Clinical and radiographic examinations were carried out after 1 month and the tooth responded favorably [Figure 2B].

Figure 1: Intra oral Photographs 22 – A) Preoperative photograph with mobile fragment ; B) Fragment removal ; C) Gingivectomy ; D) Fragment reattachment with post ; E) Post Operative photograph after composite restoration.
Figure 2: Radiographs of 22 A) Pre Operative IOPA; B) Obturation with FRC post in 22

Discussion

Fractured anterior teeth can cause pain, fear and emotional concern to the patient about his or her appearance (4). An immediate restoration of esthetic appearance by preserving the natural tooth is usually the best option to offer these patients. The tooth fragment reattachment offers the following advantages like better esthetics i.e. shade matching and translucency, minimal invasive technique, incisal edge wear similar to adjacent teeth, functional rehabilitation, less time consuming than provisional restoration, positive, emotional and social response from the patient and it is used as a transitional restoration for a young patient (5,6).

Reattachment of the fractured fragment is indicated when fracture site has an easy access and the size of the fracture is significant. The remnant fragment has to be intact, kept hydrated and it has to fit accurately onto the tooth without compromising the occlusion. The use of a post depends on the size of the fracture and the pulpal involvement.

Important factors for tooth reattachment are degree of the fragment’s adaptation to the remaining structure, fragment retention, fracture location and pattern. The quality of fit between the segments is clinically important factor for the longevity of the reattached crown. According to the amount of the restoration, posts are used to support the fragment, which increases retention and distributes stress along the root (7). In addition, using fiber post along with self/light cured resin cement, as in the present case, gives a monobloc effect, protecting the bond from rotational and twisting forces (2,5).

Resin based restorative materials with tooth-colored fiber post are considered the best option because of several advantages such as a suitable elastic modulus, esthetics, good bonding between post and cement, lower chair time and minimal tissue removal. It is also reported that the use of a fiber post with fractured teeth, as it interlocks the two fragments, minimizes the stress on the reattached tooth fragment (8).

Early retrospective studies indicate that clinical performance of fiber posts is promising and the failure rate recorded is 2% over a period of 4 years (9). Cavalleri et al. reported a better long-term prognosis for the reattachment of crown fracture comparing to composite resin restorations (10).

The study conducted by Yucel et al. in 2008 evaluating the restored teeth using reattachment technique of fractured fragment to the remaining tooth, showed a successful result after a 24 months follow up. Additional preparation of the tooth is one of the most widely studied technical variations (11).

Some authors have found that tooth preparation (dentin grooves, over-contouring technique, chamfering, beveling, etc.), prior to reattachment, can provide higher fracture resistance compared with simple bonding (12,13,14).

However, in order to reduce the technical sensitivity of the procedure and the length of the clinical phase, several studies and case reports have attempted to simplify the procedure by eliminating any additional preparation in the traumatized tooth (15,16).

In addition to the preparation of post space, a vent was created in the coronal separated segment as a leeway for the excess cement to flow out without buildup of any hydrostatic pressure. A similar technique has been recommended by Tosun et al. reattachment using Ribbond material (17).

Conclusion

Reattachment of fractured fragment is an option that provides immediate esthetic, functional and biologic restoration. It could be the first choice for crown fractures of anterior teeth as it is conservative and less time consuming treatment. The presence of intact edges of the fractured fragment, easy access to the fracture line and adequate isolation during the procedure play an important role in successful re-attachment.
Source of Funding: Nil

Conflict of Interest: Nil

Ethical Clearance: Written informed consent was obtained from patient. Ethical clearance not required for a case report.

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Vertical Root Fracture—Diagnosis, Surgical Perspectives and Management—A Review

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ABSTRACT
Endodontically treated teeth are often associated with vertical root fracture (VRF) and it becomes difficult to differentiate a tooth with this condition from an endodontically failed one or one with concomitant periodontal involvement. The cause of VRF is mainly trauma and iatrogenic reasons. Both complete and incomplete VRF constitute an ongoing problem in dentistry because they are difficult to be diagnosed in the early stages. In majority of the cases, tooth extraction is the only reasonable treatment when the VRF is finally diagnosed. Treatment options included extraction of single rooted teeth, but with the advent of adhesive dentistry. There is a paradigm shift towards preservation of these teeth.

Keywords: Vertical Root Fracture, Multiple sinus, Pain

Introduction
Vertical root fracture (VRF) is defined as tooth fracture that run along the long axis of the tooth or deviate in a mesial or distal direction. They commonly occur in older patients in posterior teeth due to iatrogenic causes. (1) According to the American Association of Endodontists, “A vertical root fracture is a longitudinally oriented fracture of the root which originates from the apex and propagates to the coronal part.” (2) According to the literature, vertical root fracture is the third most common reason for extraction of an endodontically treated tooth. (3) VRF represents 2-5% of the crown/root fractures, with the greatest incidence occurring in endodontically treated teeth and in patients older than 40 years of age. (4) VRF is an important threat to the tooth’s prognosis during and after endodontic treatment. Teeth with VRF poses difficulties in diagnosis, treatment and usually associated with a poor prognosis.

Classification of VRF:
A. Based of separation of the fragments:
   i. Complete fracture
   ii. Incomplete fracture
B. Based of relative position of fracture
   i. Supraosseous fracture
   ii. Intraosseous fracture

Aetiology
I. Restorative treatment
   i. Excessive removal of tooth structure during cavity preparation, causing weakening of cusps.
   ii. Delayed expansion of amalgam
   iii. Excessive polymerization shrinkage of composite resins
   iv. Improper reproduction of occlusal anatomy causing deflection occlusal contacts.
   v. Extensively restored,
vi. forceful seating of crowns,
vii. intracoronal restorations (inlays),

II. Endodontic treatment
i. Access cavity preparation- mechanical weakening of tooth structure
ii. Cleaning and Shaping of root canals - increases tooth fracture. (6)
iii. Placement of a crown considerably increases the mechanical forces. (7)
iv. Narrow mesio-distal root like maxillary second premolar, mesio-buccal roots of maxillary molars and mesial roots of mandibular molars- root fracture increases (8)
v. Root canal obturation causes wedging effects (7)
vi. Stress from cementation of post, due to hydrostatic pressure - cause relative deformation of roots. (9)
vii. Repeated dislodgement of a post or a post crown (10)

III. Parafunctional habits: Non-endodontically treated and unrestored posterior teeth with no caries may occasionally fracture due to repetitive excessive occlusal forces, leading to ‘fatigue root fracture’. (11) This may be observed in individuals with heavy masticatory musculature, habits such as
i. Chewing ice
ii. Abrasive foodstuffs consumption
iii. Parafunctional habits. (5)

The compounding effects of all these increases the possibility and risk for vertical root fractures.

Clinical evidence

Pain and Swelling: In majority of cases of VRF mild pain is the only symptom. (12) Spontaneous dull pain on mastication or slight tooth mobility may be present in some cases. Local chronic inflammation due to infection leads to discomfort and soreness, mild to moderate pain, pain on biting, bad taste and swelling of soft tissues. Some swelling of soft tissues is usually present. The swelling is usually broadbased, and midroot in position compared to apical location in periapical abscess. Swelling and tenderness over the root is present during palpation.

Sinus tract: A sinus tract is commonly found in (1342%). In VRF, sinus tract is located close to the gingival margin as opposed to nonvital teeth where sinus tracts are located more apically (differential diagnosis from endodontic infections). Although single sinus tract is most frequently seen in many cases, intraoral swelling with multiple sinus tracts is not uncommon.

Pockets: Isolated pockets with probing characteristics of sinus tracts are pathognomonic. Probing along one position around the circumference of tooth in presence of otherwise normal attachment usually indicates that the tooth is fractured (as opposed with periodontal disease, where the pocketing is generalized around a large part of the tooth). Deep probing in two positions on opposite sides of the infection is almost pathognomonic for the presence of a fracture. These pockets extend from gingival sulcus part way or all of the way to the apex. Generally pockets are narrower with normal depth of sulcus on either side. Periodontal abscess is one of the clinical findings in cases of vertical root fracture, which result from chronic inflammation at the fracture line.

Fracture lines: A crack or incomplete fracture line in the crown may be the only clue for the detection of vertical root fracture in some cases. Methods to delineate fracture lines include trans-illumination using fibre optic light, staining with dyes and surgical exposure

Others: VRFs also detected during obturation of root canal. Sharp cracking or popping sound during root canal filling, a sharp stab of pain, bleeding in the canal or enlarged canal allowing large number of accessory cones - any one of these signs/symptoms or a combination, during root canal filling, should be suspected for VRF. It is extremely rare for all these findings to be present in a single case of vertical root fracture. All of these clinical findings should be carefully observed and correlated along with the radiographic findings to get conclusive evidence for VRF.

Radiographic features of VRF: Radiographic features of VRF vary widely as:

i. Diffuse widening of periodontal ligament,
ii. Dislodgement of retro-filling material, (14)
iii. Vertical bone loss, (15)
iv. Separation of root fragments (16)
v. Displacement of apical portions of root. (17)
vi. Presence of ‘radiographic halo’ or J shaped radiolucency.
vii. Double images or radioopaque images due to overlapping of fragments.

viii. Periodontal type lesions are also not uncommon.

ix. In an endodontically treated molar, bifurcation radioluency in conjunction with other areas is the first radiographic evidence of VRF.

x. Presence of dehiscence’s and fenestrations (18)

xi. V- shaped diffuse bone loss on roots of posterior teeth.

xii. Radiolucent areas adjacent to obturating material or spreader void type lucent areas.

xiii. In mandibular molars, furcation radioluency is also seen.

xiv. Hair like radiolucency

Histopathogenesis of vertical root fractures: VRF invites various irritating agents like bacteria and their metabolites, necrotic pulpal tissue, sealer components and food debris, which are forced into the fracture site during mastication. The source of bacteria in the fracture site may be due to communication from the gingival sulcus or from the canal itself (which are not removed completely from the root canal). This results in the periodontal breakdown and deep probing defects usually associated with the VRF. Although the “hollow tube theory” is disputed, the fracture represents a considerable area of exposure to the canal space for substances to enter, deteriorate and then exit as irritants. (19)

Diagnosis of vertical root fracture: Diagnosis of VRF poses a diagnostic challenge because fracture line may not be visible as long as it has not extended to the cervical region. Some of the diagnostic aids include:

i. Strong coaxial illumination along with good magnification

ii. Bite test - The clinician use rubber wheels, cottonwood sticks or tooth slooth fracture detector to replicate masticatory motion. This test can be performed tooth-by-tooth or cusp-by-cusp. When the patient responds with pain, the dentist should inquire if the pain is similar to his or her chief complaint.

iii. Transillumination test - a strong fiberoptic light passed through the tooth (provided there is no restoration to block light transmission) in a horizontal direction at the gingival sulcus may help the clinician to visualize a crack. When a crack is detected in the tooth, the light will be deflected, reducing its transmission through the tooth, and the fractured segment on the other side of the crack will appear darker.

iv. Periodontal probing test - Done by probing with a thin periodontal probe which reveals a narrow, isolated, periodontal defect in the gingival attachment. In the absence of any other associated periodontal disease, this narrow defect is consistent with an underlying bony dehiscence that is secondary to a VRF.

v. Visual illustration - Expose a radiograph with a Gutta Percha point placed in the defect helps to track the exit and the entry point of the fracture line into the periodontal ligament space.

vi. Vitality tests - Electrical, Thermal or Laser Doppler flowmetry is helpful in diagnosing a VRF, especially in sound teeth. When the patient complains of a sharp, sudden pain, especially while chewing, pulp testing provides valuable diagnostic information. Often, the fracture is incomplete but extends to the pulp, where it eventually causes necrosis.

vii. Disclosing dyes - Helps the clinician to visualize a suspected crack.

Treatment of Vertical Root Fracture: A variety of approaches have been attempted and used to treat the VRF

i. Cyanoacrylate: It is used to bond the fragments of anterior teeth. (20) While the treated teeth were comfortable at a 16-month follow-up, long-term prognosis was considered poor due to deep pocketing and resorption. An in vitro study (21) assessing the resistance to fracture of root segments bonded with glass ionomer cement, composite resin, and cyanoacrylate concluded that the bond strengths of composite resin and cyanoacrylate were superior to glass ionomer cement.

ii. GIC: It bonds around the fracture line, preventing propagation of the fracture. (22) Glass ionomer and amalgam condensed into the coronal half to two-thirds of the root canal in teeth with incomplete
vertical root fractures is reported to be successful at eight-month follow-ups (23) but long-term follow-ups have not been recorded in literature

iii. Calcium hydroxide: Promotes tissue repair and resolves osseous defects before the roots were restored. Teeth that are treated with calcium hydroxide, then ‘reinforced’ with glass ionomer cement, have shown healing at six-month follow-up appointments. (24) Studies using an expanded poly-tetrafluoroethylene Gore-Tex membrane to establish a new periodontal attachment after the fragments have been bonded with glass ionomer cement have reported differing results; six teeth failed in a twelve-month period. (25)

iv. Repositioning and Fixation with wire: Takatsu et al. (26) used orthodontic elastics to join the buccal and palatal segments of a vertically fractured maxillary second molar which were then sealed with a photoscured resin liner and then it was endodontically treated and restored with a cast crown. However, in most cases of VRF in anterior teeth, extraction is the only available treatment option. For posterior teeth, Luebke(5) has proposed four basic categories of treatment.

1. Treatment Plan 1A: In case of incomplete, supra-osseous fractures with viable pulp and no radiographic changes or periodontal defects restore the tooth with full coverage temporary crown and evaluate after 3 months. If the patient is asymptomatic, a permanent crown is cemented with polycarboxylate or glass ionomer cement. In case of pulp degeneration, additional treatment, as outlined in Plan 1B or Treatment Plan 2 is indicated.

2. Treatment Plan 1B: In case of incomplete supraosseous fractures with non-viable pulp but no radiographic changes or periodontal defects, restore the tooth with a full coverage stainless steel crown and initiate calcium hydroxide therapy. Recall must be done in a 3-month interval. After 9–12 months of calcium hydroxide therapy, if the bone level is unchanged, endodontic therapy is performed and a permanent crown is placed. If a pocket develops along the fracture line, switch to Treatment Plan 2.

3. Treatment Plan 2: In case of incomplete intraosseous fractures with non-viable pulp and a periodontal pocket along the fracture line exploratory surgery is indicated for the visualization of the fracture line and the osseous defect. When the fracture line stops short of the osseous defect, the required periodontal surgical procedure is carried out to restore the defect. Based on the status of the pulp, Treatment Plan 1A or 1B is initiated. If the fracture line extends beyond the osseous defect, Treatment Plan 3 is initiated.

4. Treatment Plan 3: In case of complete intraosseous fractures with non-viable pulp, bone loss and periodontal pocket for single-rooted teeth, extraction is indicated. In case of a multi-rooted tooth where fracture is confined to one root, or if it passes through a furcation, either root amputation, hemisection or extraction is indicated.

Conclusion

The constant ingress of bacteria from the oral cavity into the VRF provides an open pathway to the supporting alveolar tissues. Multiple treatment modalities have been suggested for the treatment of VRF but in vain. Unfortunately, by the time the diagnosis is made, severe bone loss has already occurred making the prognosis of the tooth poor, indicating a need for extraction. It has been reported from the literature that management of cases with VRF involves extensive procedures often with poor outcomes. Where successful outcomes have been claimed, the long-term prognosis is yet to be proven. The practitioner should be vigilant at all times and VRF should be ruled out.

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Efficacy and Safety of Oral Premedication on Pain after Nonsurgical Root Canal Treatment—A Review

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ABSTRACT

Postoperative pain is more likely to arise within a few hours following root canal treatment. Patients who have postoperative pain need analgesics that have fewer side effects for relieving the pain. Postoperative discomfort reduction by various preoperative means is a tried and tested method. Here, we predict symptoms that arise after treatment and try to deal with them before they begin. For those patients presenting with preoperative pain, it has been reported that up to 80% of this population will continue to report pain of different degrees even after endodontic treatment. A number of factors concerning the etiology of postoperative pain have been evaluated. The main contributing factors of pain during root canal treatment comprises of mechanical, chemical, and microbial injuries to the pulp or periradicular tissues which are induced or exacerbated during treatment. Pretreatment analgesia is providing analgesia to patients before initiation of endodontic treatment, which can decrease the establishment of central and peripheral sensitization and has the potential to reduce postoperative pain and postoperative analgesic intake. Administration of a nonsteroidal anti-inflammatory drug before root canal therapy will interfere with the inflammatory process before it begins; therefore, presumably decreasing postoperative pain.

Keywords: Post operative pain, premedication, analgesics, NSAIDS

Introduction

Postoperative pain after root canal therapy is a major concern for dentists and their patients, with pain having been reported to occur in 3%–58% of patients treated (1–4). Nagendrababu and Gutmann (5) identified various preoperative and procedural factors that were related to postendodontic pain and were associated with periradicular tissue injury as a result of mechanical instrumentation, chemical irrigants, intracanal medicaments, and microbial effects. To address these concerns, various procedures, such as occlusal reduction (4,6), the placement of intracanal medicaments (7), and the provision of postoperative medications (8) are used routinely to reduce postoperative pain after nonsurgical root canal procedures. Oral medications are preferred by patients over other parenteral routes because of ease and convenience of use, resulting in better compliance.

Many randomized controlled trials (RCTs) (9–12) support the use of oral premedication in reducing or eliminating postoperative pain after nonsurgical root canal treatment. Premedication can decrease central and peripheral sensitization, which has the potential to reduce postoperative pain (10). The effectiveness of various oral premedications, including ketorolac (10), prednisolone (10,11), indomethacin (9), ibuprofen (9,13–15), piroxicam (16), gabapentin (17), lornoxicam (17), tapentadol (18), etodolac (18), zintoma (Goldarou Pharmaceutical Co, DOI Number: 10.37506/v10/i12/2019/ijphrd/192322
Postoperative pain- Incidence and etiology:

Postoperative pain is more likely to arise within a few hours following root canal treatment. Patients who have postoperative pain need analgesics that have fewer side effects for relieving the pain. Postoperative discomfort reduction by various preoperative means is a tried and tested method. Here, we predict symptoms that arise after treatment and try to deal with them before they begin. For those patients presenting with preoperative pain, it has been reported that up to 80% of this population will continue to report pain of different degrees even after endodontic treatment (20,21). A number of factors concerning the etiology of postoperative pain have been evaluated. The main contributing factors of pain during root canal treatment comprise of mechanical, chemical, and microbial injuries to the pulp or periradicular tissues which are induced or exacerbated during treatment (22). For example, a clear indication of the relationship between microbial interactions and periapical tissues is that flare-ups are more likely to occur in necrotic cases (infected) than in vital cases (non-infected) (23,24). Mechanical irritation to the periradicular tissues include over-instrumentation and over-extension of filling materials, chemical irritation include apical extrusion of irrigants, intra-canal medicaments and filling materials (25,28). Many endogenous chemical mediators, particularly prostaglandins, have been associated with inflammation and its related pain.

Treatment of post-operative pain: For endodontic pain, nonsteroidal anti-inflammatory drugs (NSAIDs) are one of the most frequently taken analgesic medications (27,28). Administration of NSAIDs before root canal treatment can block the COX pathway, and thus the pain sensation can be blocked even before it begins. In contrary with these findings, Attar et al. declared that preoperative administration of NSAID treatment did not significantly reduce postoperative pain (24). NSAIDs inhibit inflammation and induce analgesia by inhibiting the activity of cyclooxygenase enzyme COX. Two forms of COX enzymes have been identified, COX-1 and COX-2. COX-1 enzymes are present in tissue at all times and responsible for synthesizing prostanoids that have a cytoprotective function. COX-1 enzymes regulate normal cell activities in the stomach, kidneys, and platelets. COX-2 enzymes normally are not present in tissue (other than in kidneys) and come into play when tissue injury and inflammation occur. Thus, NSAIDs exert their analgesic, antipyretic and anti-inflammatory action by central as well as peripheral mechanism. The main disadvantage of long-term therapy with NSAIDs is the risk of gastrointestinal disturbances which have often limited their clinical utilization. Pretreatment analgesia is providing analgesia to patients before initiation of endodontic treatment, which can decrease the establishment of central and peripheral sensitization and has the potential to reduce postoperative pain and postoperative analgesic intake (10,29). Administration of a nonsteroidal anti-inflammatory drug before root canal therapy will interfere with the inflammatory process before it begins; therefore, presumably decreasing postoperative pain.

Aceclofenac is a predominantly potent inhibitor of COX-2 which is used for pain management. It shares structural similarities with another NSAID, diclofenac. The therapeutic index of aceclofenac is reported to be four times more potent than diclofenac, a well-established NSAID in clinical use. It has also shown better gastric tolerance when compared to other NSAIDs. Its plasma half-life of approximately 4-6 hours is more than 99% bound to plasma proteins (20). Paracetamol has lower adverse drug effects like gastrointestinal disturbances and worldwide used analgesic and antipyretic. However, there is still debate about its exact mechanism of action. It primarily inhibits COX-2 and then COX-1. It may also affect additional inflammatory pathways by inhibiting other peroxidase enzymes such as myeloperoxidase. It has a comparatively weaker analgesic and anti-inflammatory activity. This explains its inability to significantly reduce postoperative pain at 6 hours and 12 hours due to the inflammatory response of the body due to extrusion of debris following cleaning and shaping (30).

In a study by Konagala et al. (31), the administration of piroxicam or dexamethasone or deflazacort reduced postoperative pain after 6, 12, and 24 h effectively compared to the placebo group. In addition, all the drugs
including placebo showed similar pain ratings at other time intervals (48 and 72 h). Mokhtari et al. stated that indomethacin and ibuprofen significantly reduced the postoperative pain 8 h after treatment with no significant difference at 12 and 24 h after treatment.\(^9\)

Glucocorticoids are believed to excite the production of anti-inflammatory cytokine tumor growth factor-β in target cells through pre- and post-transcriptional mechanisms. The bioequivalence of deflazacort and prednisolone has been investigated in various situations. In normal controls, 15-mg deflazacort inhibits T-cell reactivity to the same extent as 12.5 mg prednisolone, but for a longer period of time. Patients treated with long-term corticosteroids might be expected to have some complications during the endodontic treatment such as a rapid periapical bone destruction caused by the combined effect of a subclinical infection, suppressed immune response, reduced bone mineral content, and negative balance of the bone remodeling process in the jaws. However, single oral doses are safe over short-term usage, without side effects or contraindications.\(^{32–34}\)

Piroxicam is a long-acting NSAID with a potent anti-inflammatory activity similar to indomethacin and has good analgesic activity. They lower prostaglandin release at inflammatory site and decrease the production of IgM rheumatoid factor. Chemotaxis of leukocytes and ratio of T-helper to T-suppressor lymphocytes are also reduced. Thus, it can inhibit inflammation in diverse ways \(^{31,32,10}\). Piroxicam’s half-life of 50 h could favorably overcome the intense pain up to 48 h following the endodontic treatment and is suitable for short-term analgesic and long-term anti-inflammatory actions.

Smith et al. also reported that the combination of ibuprofen 600 mg and acetaminophen 1000 mg is more effective than placebo.\(^{29}\) Due to its diverse activity in the control of inflammatory process, dexamethasone group resulted in greater reduction of postoperative pain, similar to published literature \(^{32,33,36}\). Among two corticosteroid drugs, dexamethasone and deflazacort, deflazacort resulted in less pain reduction than dexamethasone during test periods \(^{35}\).

The adverse effects reported for tapentadol and etodolac were nausea, vomiting, headache, dizziness, and heartburn, whereas ketorolac studies reported headache and dizziness \(^{18}\). One study \(^{17}\) on lornoxicam reported gastrointestinal pain, whereas zintoma \(^{15}\), indomethacin \(^{9}\), prednisolone \(^{11}\) and ibuprofen \(^{9,15}\) had no reports of any side effect.

**Conclusion**

The oral route does bestows a convenient, economic and non-invasive route of administration to most patients and is preferred because of the clinically effective and convenient technique as compared to the use of intramuscular or intravenous injection which may lead to discomfort and fear and is not well accepted by some patients \(^{36,37}\).

**Conflict of Interest:** Nil

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**Ethical Clearance:** Not required for review manuscript

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Association between Systemic Diseases and Apical Periodontitis—A Review

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ABSTRACT

Many associated risk factors are shared by systemic diseases and oral infections that could confound a relationship between them. Periodontal disease has received considerable interest when these interrelationships were studied. Endodontic infections have received much less attention, despite the fact that many of microbial pathogens are common in those 2 diseases. Many of the systemic diseases were found to affect the outcome of endodontic treatment. A number of observational studies and a longitudinal cohort study have described, at least in part, a possible association between systemic involvement and endodontic periapical infection. To date, the role of systemic medical conditions as a modulating factor in the development of endodontic periapical infection has been a subject of controversy with authors who found a strong association and those who found weak to no association. Therefore, the purpose of this review was to discuss the pathogenesis and scientific evidence reporting any relationships between lesion of endodontic origin and risk of systemic diseases.

Keywords: Systemic disease, apical periodontitis, periapical infection, diabetes mellitus, CVD, Liver disease

Introduction

Many associated risk factors are shared by systemic diseases and oral infections that could confound a relationship between them (¹⁻³). Periodontal disease has received considerable interest when these interrelationships were studied. Endodontic infections have received much less attention, despite the fact that many of microbial pathogens are common in those two diseases. Many of the systemic diseases were found to affect the outcome of endodontic treatment. Diabetes mellitus was found to be associated with significantly reduced endodontic treatment outcome of teeth with preoperative infections, suggesting that diabetes may serve as a disease modifier (⁴⁻⁵). Also, both diabetes and hypertension were found to be associated with reduced survival of endodontically treated teeth (⁶). Therefore, at this time, systemic conditions and disorders can be considered modulating factors affecting oral infection progression rather than acting as the causative etiologic factor (¹⁻³,⁷⁻⁸). A number of observational studies (⁷⁻⁹⁻¹¹) and a longitudinal cohort study (¹²) have described, at least in part, a possible association between systemic involvement and endodontic periapical infection. To date, the role of systemic medical conditions as a modulating factor in the development of endodontic periapical infection has been a subject of controversy with authors who found a strong association (¹³⁻¹⁵) and those who found weak to no association (⁷,¹⁶,¹⁷). Therefore, the purpose of this review was to discuss the pathogenesis and scientific evidence reporting any relationships between lesion of endodontic origin and risk of systemic diseases.
Cardiovascular Disease (CVD): Many studies confirmed an association between endodontic pathosis and CVD. In a recent pair-matched, cross-sectional study An et al (18) reported a significant association between apical periodontitis and CVD. Gomes et al (12) explored the association between CVD and endodontic pathosis in a retrospective cohort study and reported that endodontic pathosis can act as an independent predictor of an incident of CVD. In a case-control study, Costa et al (19) explored the prevalence of endodontic pathosis in patients who were diagnosed with CVD. They reported that the prevalence of endodontic pathosis in a group of patients with CVD is twice that observed in the group without CVD. In a low-biased study by Caplan et al (10), they reported that there is an association between endodontic pathosis and CVD among those 40 years old. Also Pasqualini et al (20) reported that endodontic pathosis may be a risk factor for CVD. Also it should be mentioned that none of these studies can elucidate a cause-and-effect relationship between these two conditions. To date, Gomes et al (12) and Caplan et al (10) are the only well-designed longitudinal studies to report on the association of endodontic pathosis and CVD. The role of inflammatory mediators in the initiation and progression of CVD has been suggested that elevated levels of different inflammatory mediators were found to be possibly associated with risk of future CVD (21–23).

Diabetic Mellitus (DM): Elevated levels of circulating interleukin 6 and tumor necrosis factor-a after inflammatory reactions can increase insulin resistance by impairing glycemic control (24). Regarding the association of endodontic pathosis in patients with DM, the current evidence is inconclusive and insufficient to suggest an association. Britto et al (25) reported “no main effects of sex, diabetes diagnosis, or age (the covariate) on the 3 outcomes of interest—nonsurgical endodontic treatment with lesions, nonsurgical endodontic treatment without lesions, and no nonsurgical endodontic treatment with lesions.” However, all men with type 2 diabetes who had endodontic treatments were more likely to have residual lesions after treatment. Sanchez-Dominguez et al (26) reported the prevalence of endodontic pathosis was not significantly higher in poor or good control groups, although endodontic pathosis was reported to be highly correlated with hemoglobin A1c levels. These findings are in agreement with a recent review that reported inconclusive evidence about the association of diabetes with a higher prevalence of root canal treatment (27), Marotta et al (14) explored the association between endodontic pathosis and DM. They reported that teeth from individuals with DM were significantly more associated with endodontic pathosis. Lopez-Lopez et al (28) and Segura-Egea et al (29) also examined an endodontic pathosis–DM association. On the basis of these 2 case-control studies, patients with DM were more likely to be diagnosed with endodontic infection compared with healthy individuals. In a retrospective cohort study by Britto et al (25), association between endodontic pathosis and DM was denied. Well-designed longitudinal studies with accurate diagnostic methodology and matching criteria are needed to support any premise that endodontic treatment could improve serum hemoglobin A1c levels in patients with DM.

Chronic Liver Disease (CLD): Castellanos-Cosano et al (30) reported that teeth in patients with liver transplants were more associated with endodontic pathosis compared with the control group. Arvaniti et al (31) reported that CLD patients have 4 times increase of mortality after infection because their immunologic system has become compromised. These authors speculated that the reason could be due to increased levels of endotoxins, bile acids, nitric oxide, carbon monoxide, and cytokines such as tumor necrosis factor-a and interleukin 6.

Blood Disorders: Castellanos-Cosano et al (30) explored this association and reported that subjects with hemophilia had a higher likelihood of endodontic pathosis than the control group. However, these findings should be evaluated cautiously because of high chance of bias after lack of appropriate diagnostic tools and matching between study groups. Because the inflammatory process and healing outcome both involve the activation of vascular response, these mechanisms are physiologically closely involved (32). In hemophilic patients it has been hypothesized that angiogenesis during the healing phase is impaired (33).

Bone Mineral Density: The authors reported an association between the presence of endodontic pathosis and low bone mineral density (27). In patients with periodontitis, osteoporosis has been reported as a risk indicator to progression of periodontal disease (34).

The review addressed pathogenesis, but there is also a need to address endodontic outcomes as they relate to systemic diseases. One of the current clinical healthcare challenges is to lower costs by controlling factors that
may lead to systemic disease. If a definite cause-effect relation is confirmed between endodontic pathosis and systemic diseases such as CVD, DM, and CLD, oral healthcare providers might be able to contribute to lowering the cost of treating such disease by prevention of chronic oral infections.

In the CVD group, there were few studies with low level of bias\(^{19,18,20}\) and in the DM, CLD, blood disorders, and bone mineral density groups, there was no well-designed study with a low level of bias, which necessitates the need for longitudinal cohort studies to assess the association between endodontic pathosis and systemic diseases. Another limitation is that most of the included studies used panoramic radiography for detecting apical periodontitis, which can affect the accuracy of the results. Also none of the studies had confirmed the presence of apical periodontitis by using pulp vitality tests, which can increase the chance of detection bias. If a periapical radiographic lesion is not associated with a tooth with a necrotic pulp, that periapical radiographic lesion may be non-odontogenic. Another potential risk of bias that might lower the quality of available evidence is the lack of appropriate matching between study and control groups. Therefore, well-designed longitudinal studies with appropriate diagnostic tools such as cone-beam computed tomography are required to confirm the potential association between systemic disease and endodontic pathosis.

**Conclusion**

The present review assessed the association between endodontic pathosis and different systemic conditions including CVD, DM, CLD, blood disorders, and bone mineral density. On the basis of the available evidence, there might be an association between some systemic diseases and endodontic pathosis.

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Ultrasonic Tips in Surgical and Non Surgical Root Canal Therapy: A Review of Literature

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ABSTRACT

Dentistry has been revolutionized by the development of ultrasonic tips. It gives a minimally invasive approach, and with optimum magnification it can favor a successful conservative treatment. Ultrasonics are ideal for endodontic use and offers many applications and advantages like improved techniques and use of materials, and helps enrich the way endodontics is being practiced beginning from access preparation to re-treatment and also surgical treatment. They offer numerous advantages over conventional methods and a viable option employed by the dentists. Most frequent applications of ultrasonics in endodontics are access refinement, finding calcified canals, and removal of attached pulp stones and intracanal obstructions, increased action of irrigating solutions, condensation of gutta-percha, placement of mineral trioxide aggregate, in surgical endodontics and root canal preparation. Due to its efficiency there is an increased focus on the use and possible consequences of ultrasonics. This review article describes the various uses of ultrasonics in surgical and non surgical root canal treatment in a clinical perspective.

Keywords: ultrasonics, retro-tips, RCT, root-end cavity, post

Introduction

The sound energy with a frequency above the range of human hearing, which is 20 kHz is known as ultrasound. The frequencies employed range between 25 and 40 kHz1. There are two basic methods of producing ultrasound namely Magnetostriction and Piezoelectric principle. Piezoelectric units are preferred over magnetostrictive units as they have higher frequency (40kHz vs 24 kHz) and work in a linear, back-and-forth, “piston-like” motion2. It is ideal for endodontics and offers many applications and advantages like improved visualization and a more conservative approach to selectively remove tooth structure. It offers opportunities that are not possible with conventional treatment, leading to improved techniques and use of materials, and helps enrich the way endodontics is being practiced.

The concept of using ultrasound in endodontics was first introduced by Richman in 19573. Martin and Cunningham in 1985 coined term endosonics and defined it as the ultrasonic and synergistic system of root canal instrumentation and disinfection4,5. After Gary Carr introduced first ultrasonic tips, there was increased focus on the use and possible consequences of ultrasonic root-end preparations during apicoectomy. Most frequent applications of Ultrasonics in endodontics are access refinement, finding calcified canals, and removal of attached pulp stones and intracanal obstructions, increased action of irrigating solutions, condensation of gutta-percha, placement of mineral trioxide aggregate, in surgical endodontics and root canal preparation6,7. The ultrasonic tips are classified based on use as surgical tips.
and non-surgical tips which further include vibratory tip, access refinement tip, bulk removal tip, troughing tips. Based on design they are classified as active and non-active tip, smooth or milled, diamond coated and non-diamond coated tips. Based on metallurgy they are either stainless steel and nickel titanium and based on the attachment type they are S-threaded and e-threaded6.

**Use in Surgical Endodontics:** The root-end therapy has been revolutionized by the development of ultrasonic and sonic retrotips. It provides increased access to root ends with smaller osteotomy because of the various angulations of the retrotips and their small size7. These conservative cavities follow the original path of the root canal leading to a centered root-end preparation reducing the risk of perforation8. The retrotip design does not require a beveled root-end resection access thus exposure of dentinal tubules is reduced and apical leakage is minimized3. It is a timesaving technique that has a lower failure rate and produces less smear layer in a retro-end cavity compared to a slow-speed handpiece9. A medium power setting is recommended for use. The cavity walls should be parallel and follow the anatomic outline of the root canal. Root-end cavities should be initiated with a diamond-coated retrotip, using its better cutting ability to prepare the main cavity. This aids in the removal of root canal obturation materials and should be followed by a smooth retrotip to smooth and clean cavity walls5. A better quality surface is produced by the prototype diamond-coated retrotips, in less time than the SS retrotips, which in turn caused fewer cracks. DC retrotips removed more dentine than SS retrotips and should therefore be used with care to avoid over-preparation or perforation10.

An ultrasonically activated condenser tip can be used for retrograde filling. The ultrasonic vibration is said to improve the flow, setting and condensation of the materials to dentinal walls increasing the seal11. It was demonstrated that, with the adjunct of US, a significantly better seal with MTA was achieved. It was observed that ultrasonically condensed MTA is radiographically denser and lesser voids were seen. But excessive ultrasonication adversely affected MTA properties. It was recommended to use 2 seconds of ultrasonication per increment12. On a contrary, Aminoshariae et al., observed that Hand condensation resulted in better adaptation to the walls and less voids than the ultrasonic method and hand condensation should be considered the preferred method for placement of MTA13. Polishing root end material and apical surfaces can be done using ultrasonics. It may be beneficial in the elimination of extra-radicular bacteria14.

**Use in pulp chamber:** The advantage of ultrasonic tips is that they do not rotate, thus enhancing safety and control, while maintaining a high cutting efficiency. This can be applied when the risk of perforation is high. Ultrasonics works well when breaking through the calcification that covers the canal orifice. E.g: CPR 2D, BUC 2. A troughing tip is a good choice for this task E.g: BUC1, Bigger tips with a limited diamond coated extension should be used during the initial phase of removing interferences, as they offer maximum cutting efficiency and enhance control while working in the pulp chamber. The diamond-coated pear tip, creates a smooth, clean flat troughing groove that facilitates canal location. The diamond-coated, ball tip provides fine cutting control when preparing a troughing groove and is less aggressive than the pear tip, yet it has the same clinical indications2. For locating orifices thinner and longer tips facilitate working in deeper areas, while maintaining clear vision16. Ultrasonic cutting seems to be significantly influenced by the power setting as larger fragments of dentin are removed at higher power, and by the ultrasonic unit type used. Therefore, care should be taken while searching for canal orifices, as aggressive cutting may cause an undesired modification of the anatomy of the pulp chamber2.

**Use in Root Canal:** Ultrasonics failed to demonstrate superiority as a primary instrumentation technique, as no improved debridement was accomplished compared with hand instrumentation7. The relative inefficiency of ultrasonic debridement has been attributed to file constraint within the unflared root canal space. A modification of the technique in which ultrasound is activated for a few minutes after hand preparation has instead resulted in greater canal and isthmus cleanliness compared with hand preparation alone15. Despite the multitude of studies conducted on ultrasonic root canal preparation with ultrasonically activated files, the current consensus is that this is not a viable clinical technique.

**Use in disinfection of root canal:** Cleaning webs and fins is only possible through movement of the irrigation solution by ultrasonics, as they cannot be mechanically cleaned16. Ultrasonics creates Cavitation which is minimal and is restricted to the tip and Acoustic streaming effect which is significant and has been shown
to produce sufficient shear forces to dislodge debris in instrumented canals\textsuperscript{20}. A higher velocity and volume of irrigant flow is created in the canal during ultrasonic irrigation. It can also improve disinfection of root canals, probably because organic tissues enters the streaming field that is generated are disrupted\textsuperscript{2}. When sonic or ultrasonic files are used in small, curved canals, they may bind, thus restricting their vibratory motion and cleaning efficiency. To prevent a dampening effect, sonic or ultrasonic files should not contact the canal walls; therefore, the use of smooth files is recommended\textsuperscript{21}.

**Use in obturation:** Ultrasonically activated spreaders have been used to thermo plasticized gutta-percha in a warm lateral condensation technique. Ultrasonic spreaders vibrate and produce heat, thermoplasticizing the gutta-percha. It achieved fewer voids, homogeneous three-dimensional obturation. Of the various methods of ultrasonic softening, the more accepted way is ultrasonic activation after placing accessory cone\textsuperscript{22}. The activation times of 10 and 15 s and power setting 5 produced root canal fillings with fewer voids than cold lateral condensation without sealer\textsuperscript{23}. It has been demonstrated that placement of sealers with an ultrasonically energized file promoted a better covering of canal walls with better filled accessory canals than placement of sealers with hand instruments\textsuperscript{2}.

**Use in re-treatment:** Ultrasonics can be used for removal of silver points, fractured instruments, and cemented posts and the use is not restricted by the position of the fragment in the root canal or the tooth involved. It facilitates post removal with minimal loss of tooth structure and root damage. For silver post removal, Ultrasonic tip (Eg: VT, CPR 1, Osada Enac ST9) is placed for few seconds followed by air drying to loosen the silver point\textsuperscript{24}. A fiber-reinforced composite post with a significantly lower modulus of elasticity than stainless steel or titanium, conducts vibration less efficiently. To increase the action, ultrasonics without water spray is applied to posts cemented with resin cements, because of the increase in heat it dislodges early. Different bur kits have been proposed to remove fiber posts\textsuperscript{25}. An improved performance might be obtained if fiber posts are removed with kits followed by subsequent ultrasonic instrumentation\textsuperscript{26}.

**Conclusion**

The concept of minimally invasive dentistry and the desire for preparations with small dimensions has stimulated new approaches in cavity design and tooth-cutting concepts. And ultrasonics are playing an important role in achieving this in endodontics beginning from access preparation to re-treatment and surgical treatment. They offer numerous advantages over conventional methods and a viable option be employed by dentists.

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Occupational Hazards in Dentistry—A Review

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ABSTRACT

Occupational health hazards are not uncommon. Continuous education on potential risk, precautions and protocols should be rapidly instituted to greatly reduce or even eliminate the occupational hazard. This review article is regarding the occupational hazards in the field of Dentistry, various classification and its management has been discussed

Keywords: biohazard, radiation, aerosols, dental materials

Introduction

Occupational health hazards are present in every profession, which is an unavoidable circumstance for the dentist and his team. Precaution has to be taken while practicing to prevent these hazards. A study by Brooks SL et al [1] reported that dentists, more frequently have worse health problems than other high risk medical professionals.

Definition:

- Occupational hazard is the risk to a person usually arising out of employment.
- It can also refer to a work, material, substance, process, or situation that predisposes, or itself causes accidents or disease, at work place. [1,2,3]

Classification:

These hazards are grouped into:

1. Physical
2. Chemical
3. Biological
4. Mechanical
5. Social aspects

Handbook of Occupational Hazards and Controls for Dental Workers by government of Alberta in year 2011 classified as follows:

- Biological
- Chemical
- Physical
- Psychological

Babaji P et al stated that dentists during clinical practice are exposed to variety of work related hazards which are classified into five types: [4,5,6]

1. Physical
2. Chemical
3. Biological
4. Psychological
5. Musculoskeletal disorders

Physical Hazard: The dentists are at risk of physical injuries during dental procedures that includes:
Poor illumination: Causes- eye pain, eye strain, headache and eye fatigue

Excessive brightness:

Causes- discomfort and visual fatigue: The study done in Norway reported that public health dentists complained 13% of eye problems. An investigation done on Flemish dentists in Belgium revealed that 52% had vision problems and eye injuries. [4,6,7]

Prevention

- Sufficient and suitable lighting
- Natural or artificial is advised

Radiation [8-11]: Dental radiology gives rise to a significant dose of radiation to the bone marrow in the skull and cervical spine, the oral mucosa, the thyroid and the eye. Dental personnel are exposed to both ionizing and non-ionizing type of radiations

Non- ionising radiation injury - Exposure to Dental Curing Light and Lasers

Causes- conjunctivitis and keratitis: Non-ionising radiation has become an important concern with the use of blue light and to cure various dental materials (for example composites and other resins) (Gambhir, 2011).

Lasers: The main occupational hazards associated with them are:

- Eye damage
- Skin damage
- Fire
- Smoke inhalation (cellular and viral debris)

Prevention

- Good workplace design

Ionising radiation injury-Exposure to radiation: Causes- acute erythema, dermatitis, chronic skin cancer, bone marrow suppression, damaged to eye including cornea. Radiation effects are cumulative and this damage is totally painless yet life threatening. Ionising radiation is a well established risk factor for cancer. The study conducted among Canadian dentists reported that occupational doses of ionizing radiation among dentists and dental workers have decreased markedly since 1950s. [5]

Prevention

Following are the recommendations for safety of the practitioner [5, 11-5]

- Buying standard radiographic equipment, which rigidly follows the National Council on Radiation Protection and Measurements (NCRP) and ISI recommendations.

Curing Lights: Curing lights have become an integral part of daily practice in restorative dentistry. In this regard, visible light-cured resin-based composites are the predominant restorative materials for both anterior and posterior restorations (Singh, 2011). Halogen and LED units are by far the most frequently used in daily practice. From an occupational safety perspective, the blue light used to cure composite is not well tolerated by the human eye (i.e. solar retinitis).
● Well-collimated and filtered beam of at least 1.5 mm of aluminium filtration, should be available.

● Special conch shell designs are recommended for the X-ray departments. During construction use special barium plaster, which absorbs the scattered radiation.

● Dental surgeons must use a film badge provided by the Baba Atomic Research Centre (BARC), Mumbai for personnel monitoring.

● Operator should leave the room or take a position behind a suitable barrier or wall during exposure of the film.

● Walls must be of sufficient density or thickness.

● The operator should stand at least 6 feet from patient, at an angle of 90° to 135° to the central ray of X-ray beam.

● Lead aprons routinely used for all patients and children special thyroid shield should be used.

● Use of fast films

● Films should never be held in place by the operator (use film holding instruments).

● The radiographic tube should never be stabilized by the operator or patient during the exposure.

● To ensure the above, advice to use film badges. These badges contain a piece of sensitive film or radiosensitive crystal by which the quantity of radiation exposure or dose can be determined. The instrument used to measure radiation dose is known as dosimeter.

Pressure System [16-18]: Typical pressure equipment used in dentistry includes:

● Autoclaves

● Compressed air systems (fixed and portable).

The failure of pressure equipment can result in serious injuries to staff/patients and cause major damage to structure/property. The control measures to prevent such failures relate to the mechanical integrity of the equipment involved.

Autoclaves: The most serious risks associated with autoclaves are the uncontrolled release of stored energy include:

● Scalding

● Explosion of sealed glass containers containing liquids.

Control measures to mitigate such risks include:

● Determine the type of equipment and control system (manual or automated)

● Assess the risk of door opening violently, underpressure;

● Verifying “nil” pressure before opening door;

● Operator training and instruction;

● Thorough examination of pressure equipment as per schedule 12 part b of the safety, health and welfare at work (general application) regulations 2007 to 2016,

Compressed air systems: The most serious risks associated with air receivers come from the uncontrolled release of stored energy. i.e., catastrophic failure of vessel whilst under pressure.

Control measures:

● Thorough examination of air receivers (every 26months as per Schedule 12 Part B of the Safety, Health and Welfare at Work (General Application) Regulations 2007 to 2016

● Maintenance and inspection (as per manufacturer’s recommendations and undertaken by competent person).

Injury due to sharps [7,8]: Exposure-prone procedures (EPPs) include situations where the worker’s hands (whether gloved or not) may be in contact with sharp instruments, needle tips or sharp tissues (spicules of bone or teeth) inside a patient’s wound or confined anatomical space where the hands or finger tips may not be completely visible at all times. There is an increased risk of transmitting blood-borne viruses between Dental health professionals and patients during these procedures.

Prevention

● The use of personal protective equipment (disposable gloves)

● Vaccination of employees

● Prevention of re-capping needles

● Reporting of incidents, response and follow up.
**Aerosol:** It is defined as particles less than 50 µm in diameter. These are produced from operating site and suspended in the air and are airborne infection in dentistry. Therefore, are contaminated with bacteria and blood. [14-20]

Procedures Shown To Produce Airborne Bacterial Contamination:
- Ultrasonic and sonic scalers - Shown to be the greatest source of airborne contamination.
- Air polishing - Bacterial counts show that airborne contamination is nearly equal to ultrasonic scalers.
- Air-water syringe - Bacterial counts indicate that airborne contamination is slightly less than ultrasonic scalers.
- Tooth preparation with an air turbine hand piece - Minimal airborne contamination if a rubber dam is used.

**Prevention:** High volume evacuator will reduce airborne bacteria by nearly 99%.

**Chemical Hazards** [21-25]: Dentists are exposed to many various types of chemicals that are hazardous while providing care. These include beryllium, silica, powdered natural rubber latex (NRL), formaldehyde and mercury.

- **Silica:** Inhalation of dust containing free silica or silicon dioxide in ceramic laboratories leads to silicosis.
- **Beryllium:** Some of the dental alloys contain beryllium and if it inhaled while working on items such as dental crowns, bridges, and partial denture framework, they can cause chronic beryllium disease (CBD). As per Occupational Safety and Health Administration (OSHA) specification, employees cannot be exposed to more than two microparticles of beryllium per cubic meter of air for an 8 hour time weighted average.
- **Formaldehyde:** is one of the chemical agents routinely used in the clinical set up mainly for disinfection of operatory area. Liquid and vapour forms of formaldehyde causes severe abdominal pain, nausea, vomiting and eye irritation.
- **Natural Rubber Latex (NRL):** Latex gloves (dusted with cornstarch powder) form an efficient barrier against most pathogens. Unfortunately most of the professionals are allergic to latex content of gloves. The powder in latex gloves itself is not the allergen. It only provides binding sites for latex protein and aids in carrying the protein into the skin. It has also been reported that airborne powder particles causes asthmatic allergic reactions or even anaphylaxis. Dental personnel should note that latex is present in other personnel protective equipments like masks, eyewear, rubber dam and clinical gowns.

**Clinical symptoms of latex allergies include:** urticaria, conjunctivitis accompanied by lacrimation and swelling of eyelids, mucous rhinitis, bronchial asthma and anaphylactic reaction.

**Dental Materials:** Many products used in dentistry may act as allergen to a part of population. The free monomers may cause a wide range of adverse health effects such as irritation to skin, eyes or mucous membranes, allergic dermatitis, asthma and parasthesia in the fingers.

**Nitrous oxide** [21-24]: The National Institute for Occupational Safety and Health (NIOSH) in 1994 issued a warning to hundreds of thousands of medical, dental professionals who work with nitrous oxide (N₂O). If used in high concentrations during anesthetic administration, it causes increased absorption and thereby liver and kidney damage with neuralgic disease and congenital abnormalities.

**Mercury:** Waste dental amalgam is considered to be hazardous waste. Mercury causes the formation of „neurofibrillar tangles,“ which are one of the two diagnostic markers for Alzheimer’s disease. In February, 1998, it was announced that mercury from amalgam fillings can permanently damage the brain, kidneys, and immune system of children.

**Prevention:** Amalgam capsules, waste amalgam, amalgam sludge and used amalgam filters on suction units as well as extracted teeth with amalgam fillings must be segregated from other waste, stored in special UN-approved, labelled containers with vapour suppressant.

**Biological Hazard** are constituted by infectious agents of human origin and include viruses, bacteria and fungi. Therefore it is greatest concern to the dental professional. They are HIV, HBV, HCV and Mycobacterium tuberculosis. A dentist can become infected either directly or indirectly.

Possible sources of exposure to biological agents for dental healthcare professionals include:
Contact with contaminated sharps
- Respiratory infectious disease through splatters from bodily fluids and/or projectiles while using high-speed rotary handpieces.
- Environmental biological contaminants from water/ventilation systems (for example, legionella).

Musculoskeletal disorder \(23,28\): It has been reported that young and less experienced dentists experience more musculoskeletal disorders compared to older and experienced one. Common problems are, low back pain, shoulder pain, headache, hand and wrist pain. Low back pain is more prevalent than other types. The cause of musculoskeletal problem is due to, repeated unidirectional twisting of the trunks, working in one position, prolonged static periods and operators flexibility.

Prevention of Neck, Shoulder and Back Disorders
- Change Posture
- Use Support
- Safe reaching [within a distance of about 20 inches (50 cm)]
- Normal arm posture
- Use Comfortable Equipment
- Manage Time

Legal Hazards: To help assure a safe work environment in dental treatment, the hazard awareness and prevention of legal risks should be made known to all clinical workers of the dental hospital.

Psychological Hazards: Dentists encounter numerous sources of professional stress, anxiety, and depression, beginning in dental clinic.

Some of the main types of mental health promotion interventions are:
- At organisational level – ensuring adequate staffing levels and skill mix, organising shift patterns.
- At organisation/individual interface level – improving relationships, establishing support groups, improving person-environment fit.
- At individual level- stress management, counselling

Dental Unit Water Lines (DUWLs): Dental Unit Water Lines (DUWLs) are prone to microbial contamination, build-up of biofilm and are a potential source of legionellosis. The manufacturer’s instructions should be followed for the periodic disinfection of water lines. Regular disinfecting with a chemical agent is the most effective approach.

Summary

Dentist has to upgrade their existing knowledge by participating in continuing dental education, regular workshops and seminars on occupational hazards. Dental clinic design has to be made with, sufficient lighting, ventilation, engineering control measure and equipped with appropriate personal protective. More effort should be made by management officials to educate the staff about the importance of vaccination.

Conclusion

Occupational hazard is an unavoidable circumstance for the dentist and his team. The aim of infection control is to control iatrogenic, nosocomial infections among patients, and potential occupational exposure of care providers to disease causing microbes during provision of care. Disease transfer to the dentist and dental staff during dental care is considered an “occupational exposure” to a given pathogen while disease transfer from one patient to another in the dental clinics is considered “cross-infection”. Therefore, the dental health care provider must be knowledgeable about the diseases commonly encountered in the dental operatory and must follow high standards of infection control for the safety of the patients and the dental health care workers.

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Role of Photodynamic Therapy in Endodontics—A Review

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ABSTRACT

The irrigants used commonly do not always eradicate the entire microbial flora in infected root canals. Thus in quest other strategies, such as photodynamic therapy (PDT) have been developed. The word photodynamic means the applications of the dynamics of photons of light on the biological molecules. German physician Friedreich Mayer performed the first study, which was first called as photo-radiation therapy with porphyrins (1913) in humans. Photoactivated disinfection is based primarily on the interaction of a photosensitive antibacterial agent and a light source which uses a nontoxic dye named photosensitizer (PS) and lowintensity visible light. In the presence of oxygen, these combine to produce some cytotoxic species. The PS molecules attach to the bacteria membrane. Irradiation with a specific wavelength of the light may result in the production of singlet oxygen, resulting in rupture of the microbial cell wall. There are several applications for PDT in dentistry.. Photodynamic therapy has also been used to disinfect caries dentin before the restoration, disinfecting oral tissues before or during surgical procedures, treating denture stomatitis, and treating oral candidiasis in immunocompromised patients. Photodynamic therapy can also be used in combination with mechanical instrumentation and chemical antimicrobial agents, such as sodium hypochlorite.

Keywords: photodynamic, biofilm, endotoxin, irrigants.

Introduction

The effect of microorganisms on the evolution of pulpoperiapical lesions has been demonstrated in numerous studies. Due to the complex anatomy of the root canal system, eradication of microorganisms from infected root canal systems is a complicated task.(1-3) Chemical irrigation in endodontic treatment conceives a suitable bactericidal effect; however, commonly used irrigation solutions, such as chlorhexidine and sodium hypochlorite (NaOCl) and intracanal medicaments, such as calcium hydroxide cannot completely eradicate the entire microorganisms in infected root canals.(6) To increase the disinfection level of the root canal system, several other strategies, such as photodynamic therapy (PDT) have been developed.

Principle: It is based on the principle that if the photosensitiser is excited by light source of suitable wavelength, it will be activated from the ground level to the triplet state and produce free radicals, which have a site-specific toxic effect to the cells. Longer the life time of the triplet state, cell constituents enables the excited PS to interact more with the surrounding molecules which leads to the formation cytotoxic products. The resultant products usually cannot migrate more than > 0.02 mm after its formation and thus it is ideal for local application, since and hence it avoids damage to the distant molecules, cells and organelles. (7) Several studies
have shown that PDT is lethal to most of the bacteria except for some gram-negative bacteria because they have a special cell wall due to which PDT is effective. [8]

**Photosensitizer:** The various photosensitizing agents available and which are commonly used are

1. Tolonium chloride - peak absorption, 633nm
2. Methylene blue - peak absorption, 670 nm
3. Rose Bengal - peak absorption, 550 nm
4. Aluminium disulphonated pthalocyanine - peak absorption, 675 nm
5. Porphyrin conjugates, polysine conjugates and chlorine conjugates with different peak absorption

**Light Source:** PDT require light source for activation of the PS agent at a specific wavelength and the light source available for PDT belongs to three major groups

1. Broad spectrum lamps
2. Light emitting diode lamps
3. Lasers

**Effect on Bond Strength:** An in vitro study evaluated the effect of the PAD system on the bond strength of AH Plus, Sealapex, and MTA Fillapex root canal sealers using the push-out test design. Findings concluded that AH Plus and MTA Fillapex sealers had greater bond strength when compared with Sealapex root canal sealers. It was also revealed that the PAD system adversely affected the bond strength of the MTA Fillapex root canal sealer to dentin[9].

**Biological Response to Photodynamic Therapy:** The biological response to PDT is influenced by the dye concentration, preirradiation period, environmental pH, light source, presence of exudates, and the energy dose. One minute is considered to be effective to achieve cellular uptake of toluidine blue O, and 5 minutes to achieve that of methylene blue[10,11]. Bhatti et al[12] demonstrated a dose-dependent relationship between concentration of toluidine blue O and its associated lethal effect. Some other studies also found that increase in concentration of methylene blue may cause a decrease in number of colonies recovered after the irradiation[13,14].

**Effect on Endotoxin:** Endotoxin is a part of the cell wall of the Gram-negative bacteria, which is composed of lipids, polysaccharides, and proteins and referred to as Lipo polysaccharides(LPS) [15]. When free to act, endotoxins cause no cell pathosis, but they can however stimulate competent cells to release some chemical mediators[16]. Macrophages have been regarded as the main target [16,17]. Endotoxins can act on neutrophils, macrophages, and fibroblasts, thus leading to release of a large number of inflammatory mediators, such as tumor necrosis factor, alpha-interferon, interleukin (IL)-1, IL-5, IL-8, and prostaglandins[16]. Shrestha et al [18] showed that the antibacterial PDT with chitosan-conjugated rose Bengal nanoparticles can result in inactivation of LPS and consequent reduction of all inflammatory marker.

**Effect on Endodontic Microbiota:** Photodynamic therapy can be used in combination with mechanical instrumentation and chemical agents, such as NaOCl and hydrogen peroxide. Garcez et al[19] showed that endodontic treatment alone reduced 90% of bacteria, whereas PDT alone reduced it by 95%. However, the combination of these two treatment methods, reduced bacteria significantly by 98%. In another study, Garcez et al showed that the endodontic treatment alone may produce a significant decrease in microbial count, whereas using the combination of endodontic treatment with PDT all teeth were bacteria-free [20]. Garcez et al have also demonstrated that usage of PDT added to endodontic treatment of infected canals with the optical fibre may be better than when the laser is used directed at the cavity [21]. Meire et al[22] compared the antimicrobial efficacy of neodymium-doped yttrium aluminium garnet (YAG), erbium-doped YAG (Er:YAG), two commercial antimicrobial PDT (aPDT) systems, and revealed that NaOCl is the most effective, while Er:YAG laser also resulted in high reductions of bacteria. Both aPDT systems resulted in a weak reduction of bacteria. George and Kishen[23,24] showed that the PDT destroyed the integrity of cell wall, deoxyribonucleic acid (DNA), and membrane proteins of bacteria. Damage degree was influenced by PS solvent employed during PDT. Soukos et al[25] used methylene blue as PS and concluded that there was complete elimination of all bacteria except Enterococcus faecalis. Pourhajibagher et al[26] investigated the effect of PAD on reduction of microbial diversity and count, related with primary endodontic infections and concluded that TBO (toludine blue O)-mediated PAD is an effective method in exhibiting efficient antimicrobial activity due to the substantial reduction of the microbial diversity and count in the primary endodontic infections.
Conclusion

Several strategies, such as usage of intracanal medicaments, e.g., calcium hydroxide, irrigating solutions, e.g., NaOCl and chlorhexidine, and PDT have been advocated to increase the disinfection level of the root canal system. It is used effectively to kill gram negative or gram positive bacteria, fungi, viruses and various bacteria that are present in complex biofilm.

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ABSTRACT

Objective: To evaluate the effect of modifying the liquid component of conventional GIC with 10 v/v % and 50 v/v % Chitosan on fluoride release and flexural strength in comparison to conventional GIC.

Method: The liquid component Conventional GIC was modified by adding 10 v/v % and 50 v/v % Chitosan. To evaluate fluoride release, 90 discs of 10*2mm were prepared, stored in 50ml distilled water for 1hr, 24hrs and 1 week and measured in DR-2000 spectrophotometer. To measure flexural strength, 30 samples of 10*2.5*2.5mm were prepared, loaded until fracture in Universal testing machine.

Statistical Analysis: One-way analysis of variance and student Newman Keul test were used to analyze the data.

Results: The accumulated fluoride release at various time intervals were greater for 50 v/v% Chitosan modified GIC than the other groups. Mean Flexural strength of 10 v/v% Chitosan modified GIC was found to be statistically significant than the other groups.

Conclusion: Chitosan enhances the Fluoride release and flexural strength properties of conventional GIC.

Keywords: Chitosan, flexural strength, fluoride release, glass ionomer cement, spectrophotometer.

Introduction

Glass ionomer cement [GIC] has been used as a dental restorative material for more than four decades and its unique properties include direct adhesion to tooth and base metals [¹], anticariogenic properties [²], thermal compatibility with tooth, minimized microleakage at the tooth–enamel interface and biocompatibility. Its disadvantages such as brittleness, low tensile and flexural strengths has limited its use to low stress-bearing sites such as Class III and Class V cavities [³]. To overcome these disadvantages, incorporation of materials were tried out including bioglass, CPP-ACP, nanoclay, Chitosan and so on.

Chitosan is a hydrolyzed (deacetylated) derivative of chitin and found to be the principal component of the protective cuticles of crustaceans [⁴]. The medical properties of Chitosan include antifungal and antibacterial activity [⁵], non-toxicity, biocompatibility, biodegradability and muco-adhesion [⁶]. Chitosan has been widely use in dentistry including augmentation of edentulous ridge [⁷], for osteogenesis [⁸], for increasing salivary secretion [⁹], as a guided bone regeneration tool [¹⁰] and to improve wound healing [¹¹].

Fluoride release is one of the major advantages of GIC and this advantage should not be compromised by adding additives. There are only few studies in literature that evaluates the fluoride release and flexural strength...
properties of Chitosan modified GIC. So the aim of this study is to evaluate fluoride release and flexural strength of Chitosan-modified GIC (10 v/v % and 50 v/v %) in comparison to conventional GIC. The null hypothesis is that the addition of chitosan does not influence the properties of conventional glass ionomer cement.

Materials and Method

Preparation of Chitosan modified GIC: In a 100 ml standard flask, 20 mg and 100 mg of Chitosan powder (Sigma Alrich, Manopolise, USA) was dissolved in 0.3 N acetic acid and made up to 100 ml by adding acetic acid in order to get 0.2mg/ml and 1mg/ml Chitosan Solution respectively. [21] 10 v/v% and 50 v/v% Chitosan modified glass ionomer solution was prepared by adding 0.1ml of 0.2mg/ml of Chitosan solution to 0.9ml of GIC liquid and 0.5 ml of 1mg/ml Chitosan solution to 0.5ml of GIC liquid respectively.[12,21] Fuji II GIC (GC dental Industrial Corporation, Tokyo, Japan) was used in this study.

Group I: Conventional GIC
Group II: 10 v/v % Chitosan modified GIC
Group III: 50 v/v % Chitosan modified GIC

Fluoride Release: Powder liquid ratio (2.7g/1g) as recommended by manufacturer of Conventional type II GIC was used to prepare the samples of groups I, II, III (n=90) by packing the material into a circular PTFE mould of 10mm internal diameter and 2mm height and pressed between glass microscopic slides. The cement was allowed to set and incubated at 37 ºC and 100% humidity for 24 hours. They were then transferred into individual glass flasks containing 50ml of distilled water. 30 samples of each group was sub grouped into subgroup a (1 hour), b (24hours) and c (1 week). Fluoride release from the samples were determined by SPADNS’ spectrophotometric method of fluoride determination, which is based on the principle that the presence of fluoride affects the rate of absorption of light leading to change in optical density and from the optical density the fluoride content (mg/L) is measured with HACH DR-2000 spectrophotometer at 580nm.

Flexural Strength: Ten samples of each group was prepared by placing the material into a PTFE mould of 25*2.5*2.5 mm and pressed between glass microscopic slides. After one hour, specimens were removed and ground to 25*2*2mm cross sectional dimension (600 grit silicon carbide paper), rinsed with tap water, cleaned and stored in distilled water at 37º C for 24hours. The specimens were then transferred to universal testing machine and loaded at a cross head speed of 1mm/min until the specimen fractures. The flexural strength was calculated based on the formula

$$FS = \frac{3Fl}{2bh^2},$$

where F is the maximum load at fracture in MPa, l is the distance between the supports (20 mm), b is the width of the specimen (in mm) and h is the height of the specimen (in mm).

Statistical Analysis: Results of fluoride release and flexural strength test were statistically analyzed using statistical package of social sciences (SPSS) version 10.0 and the data were analysed using one way analysis of variance (ANOVA) and the multiple comparisons between the experimental groups were done with post hoc- STUDENT NEUMAN KEUL test. Statistical significance was taken as p < 0.001.

Results

The mean value of fluoride release and flexural strengths of all the three groups [I, II, III] were tabulated [Table I].

<table>
<thead>
<tr>
<th>Groups</th>
<th>Fluoride Release</th>
<th>Flexural strength [MPa]</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subgroups</td>
<td>Mean (mg/L)</td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>I a (1hr)</td>
<td>0.428</td>
<td>9.5 a</td>
</tr>
<tr>
<td></td>
<td>I b (24hrs)</td>
<td>1.414</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I c (1 week)</td>
<td>1.564</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>II a (1hr)</td>
<td>0.257</td>
<td>14.3 b</td>
</tr>
<tr>
<td></td>
<td>II b (24hrs)</td>
<td>1.516</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>II c (1week)</td>
<td>1.894</td>
<td></td>
</tr>
<tr>
<td>Group III</td>
<td>III a (1hr)</td>
<td>0.566</td>
<td>11.7 c</td>
</tr>
<tr>
<td></td>
<td>III b (24hrs)</td>
<td>1.667</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III c (1 week)</td>
<td>2.057</td>
<td></td>
</tr>
</tbody>
</table>

Note: Different alphabets denotes significance at 1% interval. * denotes significance at 5% interval
Results showed that Group III had the highest mean fluoride released at various time intervals compared to the group I and group II. Statistical comparison of fluoride release at 1hr, 24 hrs (1 day), 1 week between the Groups and among the subgroups a, b, c showed they were statistically significant (p < 0.001) [Table II].

Table II: Statistical analysis- post hoc test- Student Newman Keul’s test, comparison of fluoride release between the groups and among the subgroups

<table>
<thead>
<tr>
<th>Comparison</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I a vs Group I b</td>
<td>58.831</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I a vs Group I c</td>
<td>67.850</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I a vs Group II a</td>
<td>10.273</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I a vs Group III a</td>
<td>8.183</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I b vs Group I c</td>
<td>9.019</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I b vs Group II b</td>
<td>6.092</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I c vs Group III b</td>
<td>15.111</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group I c vs Group III b</td>
<td>19.650</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group II a vs Group II c</td>
<td>75.197</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group II a vs Group III a</td>
<td>97.773</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group II b vs Group II c</td>
<td>22.577</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group II b vs Group III b</td>
<td>9.019</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group II c vs Group III c</td>
<td>9.736</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group III a vs Group III b</td>
<td>65.760</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group III a vs Group III c</td>
<td>89.053</td>
<td>P &lt; 0.001*</td>
</tr>
<tr>
<td>Group III b vs Group III c</td>
<td>23.294</td>
<td>P &lt; 0.001*</td>
</tr>
</tbody>
</table>

Note: If t value is greater than 3.086 then p value is less than 0.05

* denotes significance at 5% interval

The mean flexural strength of group II was highest when compared to the groups I and III and it was found to be 50.3% more than Group I. Although Group III had the highest mean fluoride release, its mean flexural values were lower than group II but higher than group I [Table I]. Statistical comparison between the Groups showed they were statistically significant (p < 0.001).

Discussion

Glass ionomer cements are the most preferred restorative material for management of cervical lesion because of its reliable bond to dentin [13]. The main disadvantage of GIC is its lack of wear resistance and fracture toughness [14]. Therefore efforts were taken to reinforce GIC which resulted in different kinds of self cured GIC, water hardening versions, amino-acid residue modified GIC and so on. In accordance with the previous study of Petri DFS et al, in our study the liquid component of conventional GIC was modified by adding different concentration of Chitosan. [15] Chitosan is positively charged because of its free amino group which reacts with surfaces/polymers with negative charge forming covalent and ionic bonds, thereby allowing improvement of properties.

In the present study, fluoride release was measured by spectrophotometry, in which SPADNS’ utilizes the reaction of the zirconium-dye lake with that of the Fluoride. The stronger the concentration of fluoride, the lighter the color of the solution will be, which is measured in HACH DR-2000 spectrophotometer at 580nm [16]. This makes it a simple and accurate method of determining fluoride content in a solution.

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The result of the present study revealed significantly greater amount of fluoride was released by Group III samples than groups I and II at the end of 1 hour, 24 hours and 1 week.

In the previous study 10 v/v% Chitosan modified GIC released the maximum amount of fluoride when compared to 25 v/v% Chitosan modified GIC [15] but to the contrary, in our study, 50v/v % Chitosan modified GIC had the greatest fluoride release followed by 10v/v% Chitosan modified GIC and conventional GIC.

The fluoride release increases as a function of time. The accumulated fluoride release values of the present study were significantly lower than the other studies [17,18]. This might be due to differences in manipulation and slight variations in setting time. Intra and inter group variability of the GIC specimens were found in the present and other studies [19].

Three point bending test remains the choice for evaluating the glass ionomer’s flexural strength as it has a lower standard deviation, lower co-efficient of variation and the less complex crack distribution produced by it when compared to other test designs[20].
Results of this study showed that group II had the highest flexural strength followed by group III and group I which is in accordance with the previous study [15]. Chitosan increases the flexural strength of the material. The probable reason might be that the hydroxyl and acetamide groups of chitosan bind to hydroxyl group of powder particles and carboxylic groups of polyacrylic acid by hydrogen bonding. During this reaction the interfacial tension among GIC components was reduced which resulted in improved mechanical properties.

Previous study done by the same authors revealed that 10 v/v% Chitosan had greater microshear bond strength than conventional GIC and 50 v/v% Chitosan [21]. Another study revealed 10 v/v% chitosan had no deleterious effect on microleakage of GIC [22].

In one study, it was found that Chitosan modified glass ionomer cement could be used as a root filling material that could allow adhesion and growth of gingival tissues.[23] Another study highlights the improvement of antibacterial property and adhesion of GIC to enamel when 10 v/v% of Chitosan was added to conventional GIC. [24] A study by Senthil Kumar et al concludes that Chitosan modified GIC inhibits the bacteria associated with dental caries along with improved physical properties. [25]

Another study compares chitosan and chlorhexidine-cetrimide-modified glass ionomer cements and found that CH modified GIC had better antibacterial effect along with improved physical properties when compared with chlorhexidine-cetrimide modified GIC and conventional GIC. [26]

Further tests should be done to evaluate other properties like setting and working time, shelf life of Chitosan modified GIC to know more about the material characteristics.

Though there are different classes of fluoride releasing materials, their properties need to be improved significantly before considering them as universal restorative materials. Although a single material would be desirable, compromises may be necessary when selecting materials. The results of our study showed that Chitosan modified GIC might prove to be a promising restorative material but it can be indicated for clinical use only after clinical trials are done, as the clinical performance of a material might not be the same as in invitro conditions.

Conclusion

Within the limitations of the present study, it can be concluded that Chitosan enhances the anticariogenic [fluoride release] and flexural strength of the conventional glass ionomer cement.

Ethical Clearance: Not required for in vitro study.

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Third Molar along the Line of Fracture in Mandible—A Systematic Review

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Sree Balaji Dental College and Hospital, Pallikaranai-100

ABSTRACT

The aim of this systematic study is to know whether the third molar is to be removed or not when in line of fracture. The angle fracture of mandible is one of the most common site because of the presence of thin cortical bone and the presence of third molar. The presence of third molar increases the incidence for the angle fracture and decreases the risk for condyle fracture. The search terms were the “third molar AND angle fracture” were used to search in the pubmed. Of the total 128 article, 22 relevant article was reviewed. The search criteria was for the last 5 publication year 2013-2018 the resultant articles were 50. In which the duplicates and irrelevant article were removed (28 articles).

Keywords: angle fracture, treatment, complications, third molar, teeth in line.

Introduction

The aim of this systematic review is to analyze surgical removal of teeth intraoperatively during angle fracture is a better option or not. Treatment of mandibular angle fracture is challenging because it seems to be associated with the highest rate of complications such as infection, malunion, malocclusion, and facial nerve damage recorded to range from 0% to 32%. Presence of third molar always influences the angle fracture depending on its root, angulation and position. The presence of third molar can influence the percentage of angle fracture and decreases the incidence of condyle fracture. The angle region is prone to fracture because of the presence of thin cortical bone and presence of third molar. The removal of teeth remain a controversies during open reduction. Retaining the teeth within the fracture line can result in decreased bone contact and blood supply.

Material and Method

This systematic review was done to evaluate the weather removal of third molar is the better option for the treatment of angle fracture. The search was done in PubMed using keywords “third molar AND angle fracture”.

Discussion

Rafael Ferreira e Costa et al (1), he reviewed the complications of mandibular angle fracture post operatively, in most patients the dental element was removed intraoperatively (52.64%). In 26.31% of the patients, the third molar was present in the fracture line; and in 21.05% of the patients, this dental element was absent. Regarding the patients with complication observed, no complications occurred in patients where the third molar was absent, 3 complications occurred when the third molar was in the fracture line (33.33%), and 6 complications occurred when the third molar was removed intraoperatively. Matteo Brucoli et al (2018), conducted a European based study on 489 patients. Sixty complications were observed with a complication rate of 12.3 %. Complications were associated with the absence of third molars (p < .05).

Sahand Samieirad et al (2018), the study sample consisted of 117 patients (63.2% with condylar fractures,
30.8% with angle fractures and 6% with concomitant fractures of condyle and angle). 88.9% of subjects with angle fracture had impacted M3s; however, the impacted M3 was absent in 59.5% of condylar fracture cases. The presence of impacted M3s increased the risk of angle fractures and simultaneously decreased the risk of condylar fractures. Fractures of the angle region are more commonly seen in individuals with superficially impacted (compared to deeply impacted) third molars. Oikrinen, Malmstrom and Halazonetis et al(13), stated that angle fractures were twice as likely to occur in dentate patients compared with edentulous persons. The difference in survival of third molar was statistically significant between right and left side, the left side had a relatively better chance 92.85%. This was probably due to the fact, that the operating surgeon being right handed, had more comfortable and easier access for the left side rather than the right side. Maaita and Alwrikat(4) showed the relevance of various angulations of mandibular third molar to the risk of an angle fracture. They showed a higher risk of angle fractures in the vertical and distoangular positions of mandibular third molar. However, Maaita and Alwrikat showed a higher fracture risk from deeply impacted mandibular third molar both in the ramus and occlusally. This study coincides with the result to Iida et al he also stated that the root of mandibular third molar in these two groups is directed towards the angle of the mandible, the third molar may act as a wedge splitting the mandibular angle, by which the injury force is redirected toward the mandibular ramus and angle.

Samson et al(2, 5), considered that the tooth in the line of any mandibular fracture can cause complications. Consequent to trauma, pulp necrosis may result that disturbs vascularization and resultantly predisposed to invasion of bacteria from the fracture line in to the tooth pulp. Additionally, marginal bone resorption and the creation of bone pockets may occur post-surgically, when the reduction of fracture fragments is inadequate affecting the relation of the gingiva, teeth and supporting tissues. Presently, several authors favor that tooth in mandibular fracture line can cause complications, but whenever possible, they recommend retaining the tooth in fracture line. This was based on the observation that large number of teeth with a negative response to sensitivity testing, but without clinical and radiological signs of devitalization. They found that the conservative endodontic treatment of teeth in the fracture line does not interfere with healing of the fracture. Macan D et al (10, 13), in 1985 had described the importance of the tooth in the mandibular fracture line, should be retained if its help to stabilize the bone fragments exceeds the ability of such tooth to cause inflammatory complications. In attempting to achieve stability by retaining these teeth. Their retention carried the attendant risks of delayed union and infection of the fracture; it therefore seemed advisable to remove vertically impacted lower third molars. Extraction of a tooth in the line of fracture rendered it less stable and therefore any likelihood of further displacement had to be counteracted. This was achieved by internal fixation usually by means of a single upper border wire.

Malanchuk VO, Kopechak AV (2007)(6, 7) their study reported that when a decision is taken to leave the tooth in the fracture line, it has been suggested to closely check for its vitality after fracture consolidation to perform endodontic treatment whenever loss of vitality is noted. Bobrowski et al (19), in a recent systematic review considered prognosis of 1542 third molars along mandibular angle fractures. In this 1542 cases, in 788 (51.1%) cases the tooth was removed. Of these 788 cases, during the follow-up infection occurred in 84 cases (10.66%). Of the 754 third molar retained 84 (11.14%) cases had infection. This difference had no statistical significance. This study showed that removal of the third molar along the line of fracture did not confer any exemption from infection. Balaji et al., in their study, during fracture reduction, of the 116 cases enrolled for the study, 61 cases had their third molar extracted and another 8 extractions in the 3 months followed. Further 21 molars were needed to be extracted in the 3–6th month follow-up. The cause for removal included development of severe periodontal problem including mobility and periapical lesions. As these could impede the healing, the teeth were extracted. In total, at the end of the study, only 22.4% of the teeth remained. During the healing period, of the 55 teeth that were left behind with the strong notion that they would not impede healing, three cases of infection that required surgical intervention were observed. Additionally of the 55 cases, only 26 (47.27%) cases survived at the end of 6 months.

Ellis E., in 2002 explained that in the pre-antibiotic(12, 14) times, it had been a norm to remove the entire tooth in lines of fracture. This was carried under the school of thought that such tooth would be an area of weakness through which microbes would trespass to cause infections. Extractions were performed prophylactically to avoid infections. With the introduction of antibiotics and antimicrobials, the efforts were directed to save the tooth while the drugs took care of the microbes. However,
the inherent defects of a tooth in the line of fractures could not be underestimated. As per reviews in the subject, Muller as early as in 1964, had recommended that multi-rooted tooth in the line of fracture be always removed. Later, James et al., proposed that tooth with extreme mobility, those with the fracture of root, apical pathology and those not necessary for stability of fracture be removed. In their sample, they removed only 39% of the teeth. Kahnberg and Ridell\(^{(14)}\) found that 59% of teeth left along the line of fracture obtained satisfactory healing. Meechan advocated that the mandibular angle may fracture under the influence of both direct and indirect trauma. He stated that if third molar is present and impacted, after direct trauma, it could affect the occurrence of angle fracture. In such a situation, prophylactic removal may prove beneficial.

Lee et al\(^{(17)}\), in 2003 explained that in partial displacement of the tooth axially from the socket; partial avulsion where the periodontal ligament usually is torn, treatment is to reposition and stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neuro-vascular supply while maintaining esthetic and functional integrity. Gassner et al\(^{(16)}\), in 1999 in his study of 6000 patients with dental trauma concludes that tooth with crown/root fracture with a mobile coronal fragment attached to the gingiva with or without a pulp exposure, can maintain pulp vitality and restore normal vitality.

Olsburg et al\(^{(18, 19)}\) in 2002 showed successive restoration by definitive treatment alternatives: removal of the coronal fragment followed by a supragingival restoration. He also concludes that most fractured permanent teeth can be saved but fractures extending significantly below the gingival margin may not be restorable. Andreasen and Andreasen\(^{(20)}\), in their works showed that Root fracture i.e., dentin and cementum fracture involving the pulp with a mobile coronal fragment are treated by repositioning and stabilizing the coronal fragment.

<table>
<thead>
<tr>
<th>Authors</th>
<th>In Favor of Removal of Third Molar in Angle Fracture</th>
<th>Not in Favor of Removal of Third Molar in Angle Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rafael Ferreirae Costa et al</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Matteo Brucoli et al</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Oikrinen, Malmstrom and Halazonetis et al</td>
<td>Yes</td>
<td></td>
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<td>Samson et al</td>
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<td></td>
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<td>Macan D et al</td>
<td>Yes</td>
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<td>Kahnberg and Ridell</td>
<td>Yes</td>
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<td>Lee et al</td>
<td>Yes</td>
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<td>Malanchuk VO, Kopchak</td>
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</tr>
<tr>
<td>Bobrowski et al</td>
<td>Not statistically significant</td>
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<td>Olsburg et al</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Andreasen and Andreasen et al</td>
<td>Yes</td>
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</tr>
</tbody>
</table>

**Conclusions**

The removal of teeth in line of fracture has been a controversy to many author. The Champy technique with semi rigid fixation always seems to prove the best fixation method so far. This systematic review concludes by stating that on removal of third molar when the teeth is in line of fracture with the presence of apical infection, dental caries, tooth mobility, root fracture. While on removal at the same time can result in osseous defect which can latter on result in infection on latter part, presence of bone defect and delay in reduction of fracture site.

**Result**
In the 22 article, the controversies on removal or to retain the teeth was discussed and the maximum number of authors concluded that the teeth is to be retained when in line of fracture carried less complication than removing.

**Ethical Clearance:** Not required since it is a review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCE**


11. Duan DH, Zhang Y. Does the presence of mandibular third


Management of Dry Socket—A Review

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ABSTRACT

Dry socket is one of the common complications which may befall following the extraction. It is characterized by intense painful episodes, loss of taste sensation and halitosis. However, the pathogenesis is unbeknown but occurs more likely due to blood clot disintegration which has multiplex etiological factors. There are many methods emphasized for the prevention and management of this condition that is empirical and not the standard one. This review article aims to lists possible methods for management of dry socket

Keywords: Osteitis, Alveolitis, Lymphadenopathy

Introduction

Dry socket is also termed alveolar osteitis, which occurs two to three days after the extraction. The first clinical appearance of dry socket was observed in 1896 and was described by Crawford [1]. Birn named this complication as “fibrinolytic alveolitis” [2-4]. Also been denoted by other terms like Alveolar osteitis, Localized osteitis, Post-operative alveolitis, Alveolalgia, Alveolitis Sicca Dolorosa, Septic socket, Necrotic socket, Localized osteomyelitis, Fibrinolytic alveolitis[5,6]. It is characterized by fever, pain with varying intensity and halitosis, with an empty socket, consist of a disintegrated blood clot. On Clinical examination, the gingiva is inflamed with ipsilateral regional lymphadenopathy. The empty socket consists of a denuded bone surface with greyish-yellow slough and necrotic tissue [7]. The pain may be localized, but most often radiates to temporal regions, for the mandible. In the maxilla, pain can radiate to the ocular or frontal region [4]. Dry socket is more common in mandibular third molars has an incidence of 38%; 0.5%-5% for other routine extraction; 1%-45% for mandibular molar extraction [8, 9]. Thus the incidence of dry socket is elated in mandibular molars than maxillary molars.

Etiopathogenesis: Many etiological factors have been proposed, but the exact specific cause for the occurrence of dry socket is unknown. The etiological factors include traumatic extraction causing injury to bone[10]; oral flora which includes bacteria like Treponema denticola, a gram-negative, obligate anaerobic produces plasmin like substance begins the fibrinolytic activity[11]; circulatory factor; poor post-operative care, saliva production; stress; enzyme factors[12]; post-operative irrigation of socket; usage of mouth rinses[13]; clotting factor disorder; nutritional factors mainly vitamins[14]. The pathogenesis is characterized by fibrinolysis by conversion of plasminogen to plasmin that is achieved directly or indirectly. Direct activators are released from bone cells following the trauma. Indirect activators include bacteria and other predisposing factors.

Predisposing Factors: Some Predisposing factors which can provoke the occurrence of dry socket are:

a. Age of the patient – commonly occurs between 20-50 years old people due to an eruption of third molars and are uncommon in younger age due to increased bone elasticity and increased blood circulation with better healing capacity[9,15];

b. Sex of the patient- women is more affected than a male with a ratio of 5:1. Due to alterations in the level of hormones mainly the estrogen during
menstruation, there is an increased chance of occurrence of dry socket in the female. Estrogen can induce fibrinolytic activity indirectly, thus resulting in dissolved blood clot. Estrogen can induce fibrinolytic activity indirectly, thus resulting in dissolved blood clot. 

Oral contraceptive- increased incidence of dry socket is seen in the patient under medication of oral contraceptives. It indirectly activates plasminogen, induces lysis of blood clot.

Smoking- Smoking has shown to have an increased occurrence of dry socket. It is characterized by the inhibition of neutrophil chemotaxis and production of immunoglobulin. Also, nicotine in the cigarette causes vasoconstriction.

Area of extraction and no. of teeth

Insufficient blood supply to the alveolus

Systemic diseases like diabetes

Clinical Management: The royal college of surgeons in England laid National clinical guideline in 1977 for management of dry socket which was further reviewed in 2004. They suggest when a patient approaches a clinic with characteristics of dry socket,

- He/she should be examined and radiograph should be taken to rule out the presence of any retained root or bone fragment to rule out the cause of pain
- The necrotic tissue or food debris present in the socket must be removed by irrigating with 0.12% chlorhexidine digluconate
- Then the socket has to be packed with Obtundent dressing to prevent food debris accumulation and local irritation from the bone. Obtundent should have antibacterial and antifungal property

Commonly used obtundents are zinc oxide eugenol, Alvogyl

The patient can be prescribed with NSAIDS/steroids for reducing the pain sensation if there is no medical complication

The patient should be reviewed every two days to change the dressing and it should be done until the pain gets reduced. They will be instructed to rinse the socket with 0.2% chlorhexidine digluconate with a syringe at home.

The treatments for a dry socket include placement of a self-eliminating dressing such as Alvogyl; placement of an obtundent dressing such as zinc oxide, eugenol, and lidocaine gel; a combination of these therapies and, where appropriate, the prescription of systemic antibiotics.

Various Methods of Management:

- **Zinc oxide eugenol**: Applied in the Gauze or as an ointment. Eugenol contains antiseptic and anesthetic properties thus depress sensory receptors involved in pain perception. But causes local irritation and delayed wound healing.

- **Alvogyl**: Most commonly used and commercially available, consists of eugenol acts as an analgesic, iodoform which acts as antimicrobial agent and butamen which acts as an anesthetic agent, which has to be replaced after every 2 days.

- **Steroids**: Though the topical application of corticosteroids has been reported to prevent the occurrence of dry socket, it only decreased the post-operative pain and not its occurrence. However, the topical application of hydrocortisone and oxytetracycline mixture reduced the incidence of dry socket in impacted third molars.

- **Topical anesthetic gel Oraqix**: Contains 2.5% prilocaine, 2.5% lidocaine, thermosetting agents, hydrochloric acid and purified water. It has antiseptic and anesthetic properties.

- **G.E.C.B Pastilles**: Contains 3% eugenol, 3% guaiacol and 1.6% chlorobutanol as effective ingredients, and Balsam Peru as a base. Haghighat et al 2012, studied the efficacy of GECB pastilles and ZOE, reported that GECB shows more result in reducing the post-extraction complications.

- **SaliCept Patch**: Contains Acemannan hydrogel, the clear inner gel of Aloe Vera, promotes wound healing, augments reticuloendothelial function, regulates the immune response and acts as an anti-inflammatory and antibacterial agent.

- **Vitamin C**: Available as tablet form. It helps in wound healing and promotes antioxidant action thus reduces the infection and inflammatory action. Maria et al concluded that 4000 mg vitamin C dose along with curettage and irrigation shows 100% pain remission in 4 days.

- **Plasma Rich in Growth Factors (PRGF)**: Consist of platelets and fibrinogen which are
obtained from blood that helps in wound healing and osteogenesis[30]. Platelet-derived growth factor (PDGF) and Tissue Growth Factor (TFG) are some of the Growth Factors in this plasma. PRGF, when used along with gelatin sponge, promotes earlier healing of wound when compared to zinc oxide eugenol [31,32]

i. Low-level laser therapy (LLLT): Uses continuous mode gallium aluminium diode laser of 808 nm, 100-mW for 60sec - 7.64J/cm2. Showed improved healing of the wound and enhanced antimicrobial action[24,33]

Of all these methods given that promotes healing of alveolar bone, it has been concluded that early and effective healing of the socket is seen in LLLT therapy and PRGH[23, 24, 34]

Conclusion

Dry socket is the most common condition encountered after the extraction of the impacted third molar. The management of the dry socket is done until the patient relieves from pain and the healing of the socket occurs. Healing of the exposed socket also depends on patient cooperativeness by following post-operative instructions and maintaining proper oral hygiene. The treatment method includes the use of PRGH, LLLT Therapy, Alogyl along with the irrigation of the socket. However, the exact etiology and pathogenesis for the occurrence of dry socket are unknown. In the future, further investigation is required to conclude about exact cause and mechanism so that the proper method of management can be performed.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Role of Oxidative Stress in Development of Nephropathy in Diabetic Patients

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ABSTRACT

Diabetes Nephropathy is a major microvascular complication of Diabetes Mellitus and the most common cause of End Stage Renal Disease (ESRD) worldwide. Hyperglycemia, a well recognized pathogenic factor of long term complications of Diabetes Mellitus, generates ROS. This attenuates antioxidative mechanisms through glycation of the scavenging enzymes. Excess amount of ROS modulate activation of protein kinaseC, mitogen activated protein kinases and various cytokines and transcription factors which eventually cause increased expression of extracellular matrix (ECM) genes with progression of fibrosis and end stage renal disease. Therefore, this study was carried out to investigate oxidant and antioxidant status in Diabetic patients for manifesting the progression to diabetic nephropathy.

Keywords: Diabetic Nephropathy, Hyperglycemia, Reactive Oxygen Species, Extracellular Matrix, Oxidative Stress.

Introduction

Diabetes is a metabolic disorder characterized by hyperglycemia and often leads to numerous microvascular complications, including nephropathy. The increased oxidative stress was noted in the poor glycemic control patients with chronic diabetes mellitus. High intracellular glucose concentration in chronic diabetes mellitus causes activation of polyol pathway, hexosamine biosynthetic pathway and PKC are major sources of reactive oxygen species (ROS) (Forbes et al 2008), which are collectively involved in the pathogenesis of diabetic nephropathy(Agarwal R et al, 2005). ROS are believed to play a key role in the pathogenesis of diabetic complications because of their reactive chemical property to directly oxidize and damage DNA, protein, lipid, and carbohydrate. ROS activates signal transduction cascades and transcription factors leading to transcriptional activation of profibrotic genes(Julius et al). Further, PKC, transforming growth factor-α1 (TGF-α1) and angiotensin II (Ang II) stimulated by hyperglycemia-induced ROS, in turn, generate and signal through ROS and thus involve in glomerular mesangial expansion and tubulointerstitial fibrosis. It is now clear that the overproduction of ROS plays an important pathogenic role in the development of diabetic nephropathy (Kashiharan et al 2010) explore major therapeutic interventions.¹,²,³

Reactive oxygen species (ROS): ROS are continuously generated in physiological condition and are effectively eliminated by several antioxidative systems. ROS includes mainly superoxide or hydroxyl radicals and other are alkoxyl, peroxy, plus non-radical derivatives of oxygen, specifically hydrogen peroxyde and ozone, which plays a major part in cell signaling, ageing and degenerative disease The amount of ROS produced is finely balanced with the antioxidant activity and when it exceeds cellular defence power or diminishes the production of antioxidants can lead to increased oxidant-derived tissue injury or oxidative stress(Julius et al)⁴,⁵
Sources of ROS in diabetes mellitus: The high glucose concentration in chronic diabetes mellitus induces oxidative stress by generating ROS through an activation of number of enzymatic and nonenzymatic sources in the body. The major sources of ROS in diabetes include polyol pathway, advanced glycation and uncoupling of NADPH oxidases (Kiteda et al 2011).6

Oxidative stress and kidney damage: “SIES” introduced the term oxidative stress, which occurs as a consequence of imbalance between the formation of oxygen free radicals and inactivation of these species by antioxidant defense system. Oxidative stress is recognized as one of the major components in the pathogenesis of diabetic microvascular complication (Kelly D.J et al). Sustained hyperglycemia increases oxidative stress which in turn affects kidney by following mechanisms.

a. Increased advanced glycation end products (AGEs) are produced by the prolonged exposure of amino acids to increased glucose levels. The AGEs cause cellular damage by altering cell protein actions and cell membrane functions;

b. Hypertension and hyperfiltration in the glomerulus (which is the filtering unit of the kidney—there are about one million in each kidney) increases pressure in the glomerulus is decreased by blocking the actions of angiotensin II

c. Increased transforming growth factor (TGF) leads to activation of a number of inflammatory compounds leading to fibrosis in the kidney8,9

Materials and Method

The people were grouped into 2 categories:

Group 1: Controls includes both male and female. Age criteria were not taken into the consideration because they were not showing any symptoms of Diabetes Mellitus.

Group 2: Diabetic patients which includes both male and female. 5ml of blood was collected by vein puncture from the antecubital vein in both Group 1 and Group 2 (N =20) Heparinized sample for estimation of Hydrogen peroxide radical, Superoxide radical, Citrated sample for estimation of plasma Malondialdehyde(MDA), Catalase, Vitamin E Glutathione peroxidase(GP) serum for estimation of Superoxide Dismutase(SOD) Lipid profiles, EDTA sample for stimation of Glycosylated hemoglobin.

Estimation of Glycosylated Haemoglobin: Venous blood mixed with lysing reagent for the preparation of hemolysate. Elimination of the labile Schiff's base is achieved during hemolysis. The hemolysate is then mixed with a weakly binding cation exchange resin. The non – glycosylated hemoglobin binds with resin leaving glycosylated hemoglobin free in the supernatant. The percentage is determined by measuring the absorbance of the glycosylated hemoglobin fraction and the total hemoglobin at 415 nm.

Oxidants and Antioxidants Systems

Estimation of Oxidant Systems

Estimation of Superoxide Radical: Superoxides were estimated by the method of Nishikimi et al., (1972) in erythrocytes using Nitroblue tetrazolium (NBT). Superoxide levels in erythrocyte are expressed in terms of mmoles of NBT reduced/ml/10 min

Estimation of Hydroxyl Radicals: Hydroxyl radicals were estimated by the method of Gutteridge(1987) by their reaction (Hydrogen abstraction) from deoxyribose, resulting in the formation of thiobarbituric acid reactive species. Amount of hydroxyl radicals present in the erythrocyte are expressed in terms of MDA/ml/hr.

Estimation of Hydrogen Peroxide Radical: Estimation of Hydrogen peroxide by the method of Wolff(1994), using FOX reagent containing 2mM xelenol orange, 5mM ammonium ferrous sulphate, 200mM sorbital and 500mM Sulphuric acid. The erythrocyte hydrogen peroxide levels are expressed as µmoles/ml

Assay of Enzymatic and Non-Enzymatic Systems

Enzymatic Systems

Assay of Superoxide Dismutase [SOD]: The Superoxide dismutase activity was determined by the method of Marklund and Marklund [1974] and is based on the inhibition of pyrogallol autoxidation by the enzyme. The values are expressed as the amount of protein required to give 50% inhibition of pyrogallol autoxidation.

Assay of Catalase: The activity of Catalase was assayed by the method of sinha [1972]. The activity of the catalase was arrived at from the amount of hydrogen peroxide consumed and was expressed as µmoles of hydrogen peroxide consumed per minute per mg protein.
**Assay of Glutathione Peroxide:** Glutathione peroxidase was assayed according to the method of Rotruck et al. [1973] with some modification using DTNB. The activity was expressed in terms of µg of glutathione utilized/min/mg protein.

**Estimation of Non-Enzymatic Antioxidants**

**Estimation of Plasma Vitamin E [Vit E]:** Estimation of Vitamin E was done by the method of Barker and Frank [1968] using Dipyridyl reagent. Values are expressed as mg/dl.

**Estimation of GSH:** Estimation of GSH was done by the method of Moron et al. [1979]. Disodium hydrogen phosphate [DSHP] 0.3M. The amount of GSH was expressed as mg of GSH utilized/min/mg protein.

**Oxidative Markers of Biological Macromolecules:** LPO was estimated by the method of Devasagayam and Tarachand [1987]. The malondialdehyde content of the samples were expressed as nmoles of MDA formed/mg protein.

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**Table 1: Oxidant, Antioxidant and Lipid peroxide status among the control and diabetic patients**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Control</th>
<th>Diabetic patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HbA1c (%)</td>
<td>6.2 ± 1.0</td>
<td>10.2 ± 0.8***</td>
</tr>
<tr>
<td>2.</td>
<td>Erythrocyte Superoxide radicals mmoles NBT reduced/10¹² cells/min</td>
<td>42.3 ± 3.02</td>
<td>81.8 ± 8.01***</td>
</tr>
<tr>
<td>3.</td>
<td>Hydroxyl radical mnoles MDA/10¹² cells/min</td>
<td>17.3 ± 1.11</td>
<td>27.6 ± 1.72***</td>
</tr>
<tr>
<td>4.</td>
<td>Hydrogen peroxide mmoles/10¹² cells/min</td>
<td>63.4 ± 3.36</td>
<td>101.2 ± 3.44***</td>
</tr>
<tr>
<td>5.</td>
<td>Superoxide dismutase (SOD), U/ml of haemolysate</td>
<td>3.05 ± 0.41</td>
<td>1.10 ± 0.42***</td>
</tr>
<tr>
<td>6.</td>
<td>Membrane Catalase (nmoles H₂O₂ Consumed/min/10¹² cells)</td>
<td>4.36 ± 0.32</td>
<td>2.03 ± 0.25***</td>
</tr>
<tr>
<td>7.</td>
<td>Membrane Glutathione peroxidase (GPₓ), µg/mg Hb</td>
<td>4.78 ± 0.97</td>
<td>2.06 ± 0.75***</td>
</tr>
<tr>
<td>8.</td>
<td>Plasma Vitamin E mg/ml</td>
<td>1.01 ± 0.20</td>
<td>0.44 ± 0.019***</td>
</tr>
<tr>
<td>9.</td>
<td>Plasma Lipid peroxide (nmoles MDA/ml of plasma)</td>
<td>1.84 ± 0.36</td>
<td>3.1 ± 0.78***</td>
</tr>
<tr>
<td>10.</td>
<td>Lipid peroxide (nM MDA released/10¹² cells)</td>
<td>241.13 ± 27.85</td>
<td>689.72 ± 70.12***</td>
</tr>
</tbody>
</table>

Comparisons made between control and diabetic patients.

Values are statistically significant when *p<0.05, **p<0.01, ***p<0.001 Values mean ± SD for 10 experiments.

**Discussion**

The results on various parameters are useful to diagnose oxidative stress and to assess the relation with diabetes patients which progress to nephropathy.

Table 1 shows the levels of, HbA1c, Oxidance, and anti-oxidance of control on diabetic patients. There was significant difference (p<0.001) in HbA1c between control and diabetic patients.

HbA1c levels are higher in diabetic patients who develop micro and macroalbumin evidence both in type 1 and type 2 diabetes, that poor blood glucose control contributes to the development of albuminuria. Some of the mechanisms that link hyperglycemia to the functional/structural abnormalities of diabetic kidney disease have been elucidated. Extracellularly glucose reacts non-enzymatically with primary amines of proteins, forming glycated compounds. Glucose transported into cells by glucose transporters, is partly metabolized to sorbitol via the polyol pathway and to hexosamines. All these biochemical pathways have been implicated in hyperglycemia induced kidney damage. Furthermore, excess glucose can directly exert toxic effects by activating intracellular signaling pathway and inducing a number of cytokines injurious to the kidney (Gareth et al).

Table 1 also shows the level of oxidants and anti-oxidants level in the control and diabetic patients. It shows that the level of oxidants such as erythrocyte superoxide radical, hydrogen peroxide and lipid peroxide were significantly (p<0.001) increased in diabetic patients when compare to control.

Similar results were seen in the level of anti-oxidants like SOD, Catalase, GPₓ, VIT E which shows...
a decrease in diabetic patients than control group. Insulin deficiency promotes beta-oxidation of fatty acids with resulting increase in Hydrogen peroxide formation.

Studies have shown that glucose catalyzes LPO reactions Elevated glucose has also been shown to increase the activity and expression of the Lipid peroxide enzymes. Also there is an association between free radicals and advanced glycation end products. The Schiff base and amadori products are sources of superoxide radical (Pitt et al 1999). Carboxy methyllysine and pentosidine, which are sugar-derived auto oxidation products known as glycozidation products may initiate and propagate free radical reactions.

Another means by which AGE formation plays a role in Diabetes Mellitus related oxidative stress is through glycation and resultant inactivation of antioxidant enzymes, such as (CU-2N) SOD.

Thus the combined effect of increased free radical production and decreased antioxidant status leads to oxidative stress in the diabetic patients conforms the susceptibility of kidney in development of nephropathy.11-16

Conclusion

Diabetic nephropathy is the most common cause of progressive renal damage and end stage renal failure in patients with diabetes mellitus. Oxidative stress coupled with chronic hyperglycemia has an important role in the pathogenesis of glomerular and tubular functional and structural abnormalities. There has been an increase in the knowledge of the role of oxidative stress in diabetic nephropathy which has directed to the investigation of a number of therapeutic strategies, the success of which has been so far limited. However, timely and judicious use of recent therapies to maintain good glycemic control, lipid levels adequate and blood pressure, along with life style measures such as regular exercise, optimization of diet and smoking cessation, may help to reduce oxidative stress and endothelial cell dysfunction and slow the progression of diabetic nephropathy until more effective therapies become available.

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Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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Uromodulin a Screening Marker of Nephrolithiasis in Essential Hypertension

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ABSTRACT

Tamm Horsfall Protein or Uromodulin is the most abundant urinary glycoprotein that has a protective function in the bladder mucosal layer. THP is also the primary constituent of renal tubular casts and THP aggregation has been implicated as a factor in the pathogenesis of acute renal failure by causing tubular obstruction. Using ELISA, the autoantibody level of Tamm Horsfall Protein in serum was determined in Hypertensive Patients and control subjects. A significant percentage of hypertensive subjects have a greater risk of renal stone formation, with high autoantibodies level to Tamm Horsfall Protein in serum when compared to control subjects. Hence THP acts as a potential biomarker for nephrolithiasis in Hypertensive patients.

Keywords: Tamm Horsfall Protein Hypertension ELISA Autoantibody Nephrolithiasis.

Introduction

Essential Hypertension: Essential, primary, or idiopathic hypertension is defined as high BP in which secondary causes such as renovascular disease, renal failure, pheochromocytoma, aldosteronism, or other causes of secondary hypertension or mendelian forms (monogenic) are not present. Essential hypertension accounts for 95% of all cases of hypertension (WHO1996). Essential hypertension is a heterogeneous disorder, with different patients having different causal factors that lead to high BP. It has been called “silent killer” because patients with hypertension generally have symptoms whatsoever, often 15-20 years. Hypertension is a major contributor to the development of renal failure, cardiovascular disease, and stroke. These pathologies are associated with vascular functional and structural changes including endothelial dysfunction, altered contractility, and vascular remodeling (A Julius et al, 2014).

Association between Hypertension and Kidney Stone Disease: The prevalence of nephrolithiasis has been reported to be 30% to 79% (Cappuccio et al., 1990) in hypertensive than normotensive subjects. Alterations in calcium metabolism may play an important role in the pathogenesis of both hypertension and nephrolithiasis and have been suggested as plausible mechanism linking this to disorder (Strazullo and Macini 1994). A higher prevalence of hypercalciuria has been reported in patients with essential hypertension (Strazullo, 1991) and alterations of calcium metabolism such as primary hyperparathyroidism that lead to hypercalciuria have been associated with a increased prevalence of hypertension. Several other mechanisms that may link hypertension and nephrolithiasis have been suggested, which include high dietary intake of sodium, low intake of potassium and renal damage.

Tamm Horsfall Glycoprotein: Tamm and Horsfall discovered a glycoprotein in urine that was named the Tamm Horsfall Glycoprotein (THP). THP is the most abundant protein present in the urine of healthy subjects. It is secreted by the thick ascending limb of the loop of Henle (Pennica D. et al1987.)
luminal cell surface by a glycosyl-phosphatidylinositol (GPI)-anchor and then excreted in urine at a rate of 50 - 100 mg/day. It is a monomeric glycoprotein of ~ 85 kDa with ~30% carbohydrate moiety that is heavily glycosylated by polyantennarysialated N-linked glycans. Sialic acid plays an important role in maintaining THP function during kidney stone formation. THP has a strong tendency to forming macroaggregates of several million Daltons.

**Structure of THP**

THP excretion decreases in stone formers and therefore it was proposed as a potential biomarker for kidney stone disease(Glauser A et al, 2000) described THP as the major inhibitor to calcium oxalate crystal aggregation in the urine of healthy individuals(Knörle R et al, 1994). However, other reports showed that stone formers excreted defective urinary THP that devoid of sialic acid with a diminished effect on inhibiting stone formation.THP has been considered as a hidden antigen that is exposed to the immune system only after pathophysiological alteration (Hoyer JR et al, 1990) which then results in formation of antibodies to THP. Anti-THP antibodies have been determined in various kidney diseases.6,7,8

The scope of this study is to investigate the autoantibody levels of Tamm Horsfall protein among the control and hypertensive subjects for early diagnosis of nephrolithiasis.

Hypertensive patients were those from the OPD of hypertensive clinic, department of general medicine, Royapetah Medical College, Chennai.

Patients who exhibited a systolic pressure of >=160mmHg and/or a diastolic pressure of >=95mmHg were included in the present study and the hypertensive patients selected for the study were receiving regular drug treatment for high blood pressure. These patients were established to be essential hypertensives.9,10

5ml of blood samples were collected by vein puncture from the antecubital vein from normal and hypertensive person and immediately transferred to stoppered tube containing 0.1 ml heparin as anticoagulant and transported to lab using a cool container.

**Isolation and Purification of Human Urinary Tamm Horsfall Glycoprotein:** Isolation of Huma Urinary Tamm Horsfall Glycoprotein was carried out by the methods of Gokhale et al. [1997].

**Procedure:** To total volume of 24hrs urine collected with toluene as preservative from normal subjects 0.58 M NaCl was added and left for overnight precipitation the following day the sample was subjected to centrifugation at 20,000xg for 20 mins the pellet was collected and suspended in 50ml of pH 9.0 water and left overnight [THP tends to form a gel into the pH9.0 water]. The following day the sample was centrifuged and the supernatant was saved for further isolation and the pellet [containing the cell debris] was discarded. THP was then precipitated from the water soluble phase by bringing the solutions concentration of NaCl to 0.58M and left overnight at 4oC and on the following day the centrifugation process was repeated and the final pellet was dissolved in 1ml distilled water containing 0.1mM Phenylmethlysulfonylfluoride[PMSF].

**Determination of Autoantibody by Elisa:** Auto Antibody level of the sera was checked using ELISA by the method of Gokhale et al.[1997].

1. Capture material used for coating was WGA, a type of lectin from *Triticum vulgaris* (Sigma) and was purified by affinity chromatography
2. Carbonate buffer [50mM], pH 9.6
3. 15mM phosphate buffered saline pH 7.4[PBS] [15mM NaH$_2$PO$_4$, 15mM Na$_2$HPO$_4$,138mM NaCl, 2.7mM KCl]
4. PBS – 2% BSA 2% BSA to the required amount of PBS buffer.
5. PBS-Tween 20[0.05%]0.05% Tween to the above buffer [PBS-T]
6. Anti-rabbit IgG-HRP diluation[1:10000]
7. Substrate: TMB/H$_2$O$_2$ 20x concentrate ready use to kit from GeneiPvt Ltd which was diluted 1 to 20 just before use
8. 2N Sulfuric Acid
Procedure

Each well on the 96-wells microtiter plate (Maxisorp™, Nunc) was coated with 100 μL of 10 μg/mL lectin WGA in coating buffer [5.0 mM Na2CO3, 34.9 mM NaHCO3, 0.02% (v/v) NaN3, pH 9.6]. Then plates were coated with purified THP [10 microlitre] in carbonate buffer. The plates were washed five times with freshly prepared washing buffer (0.1% Tween 20 in 10 mM phosphate buffer saline (PBS) pH 7.2 for 5 min each. The unoccupied sites on the microtiter plates were blocked with 200 μL blocking buffer (3% BSA in 10 mM PBS, pH 7.2) and incubated at room temperature for 2 hours with a slow rotation (50 rpm) on the orbital shaker. The plate was washed five times with washing buffer for 5 min each wash and dried in an oven at 37°C for 3 hours or until thoroughly dried. Finally, the plates were cooled to room temperature and sealed with an adhesive plate seal, wrapped in aluminum foil and stored at 4°C. TEA buffer was used as blank. After 1 hour incubation at 37°C, the plates were washed five times (rotation, 50 rpm) with 300 μL freshly prepared wash buffer (0.1% Tween 20 in 10 mM PBS, pH 7.2). The plates were placed top down on absorbent paper to remove residual buffer. Hundred microliter of the serum from the control and hypertensive subjects was dispensed in each well and the plates were incubated at 37°C for 1 hour. The plates were washed five times (rotation, 50 rpm) with 300 μL of freshly prepared wash buffer and the residual buffer was removed on absorbent paper. The plates were incubated at 37°C for 1 hour after adding the same volume of anti-rabbit IgG (HRP) horseradish peroxidase conjugate diluted 1:1000 in antibody diluent. The plates were washed five times (rotation, 50 rpm) with 300 μL of freshly prepared wash buffer and residual buffer was removed on absorbent paper.

Colour was developed by adding 100 μL of TMB substrate solution to each well. The plates were incubated on orbital shaker (100 rpm) for 15 min at room temperature in the dark. The reaction was stopped by adding 100 μL of 4 M H₂SO₄ to each well. OD₄₅₀ and OD₆₂₀ (Thermo LabsystemsMultikan Ascent, Finland) were read immediately.

Results and Discussion

Hypertensive patients excrete increased quantities of abnormal THP, with a change in the chemical composition in urine and the extravasations of THP into the renal interstitium may lead to immunization of the host with this antigen and produces high circulating autoantibodies to THP in blood stream. Hence evaluation of increased levels of autoantibodies to THP in hypertensive patients acts as a prognosing tool for nephrolithiasis.12,13,14,15

Conclusion

Uromodulin is considered as a hidden antigen that is exposed to the immune system only after pathophysiological alterations that results in the formation of autoantibodies circulating in the blood stream. Increased circulating autoantibodies and altered Uromodulin excretion in urine acts as a marker for nephrolithiasis in hypertensive patients. Finally, the association of uromodulin with nephrolithiasis and hypertension will need further investigation to clarify the biological effect of the identified risk variants and to assess for the presence of additional linked variants that may have a causal role.

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Validity and Reliability of Assessment of Cervical Vertebrae on Lateral Cephalograms—A Review

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ABSTRACT

Knowledge of timing and duration of the adolescent growth spurt is essential to treat skeletal jaw discrepancies in the growing child. The purpose of this review of literature was to evaluate the validity and reliability of the maturational stages of the cervical vertebrae C2, C3 & C4 as seen on lateral cephalograms in the prediction of peak pubertal growth spurt. Literature review purported that cervical vertebral maturity indicators were effective in assessing the circumpubertal growth spurt. The drawbacks of this method of assessment was that it evaluated the skeletal maturity at one point of time and that it failed to pinpoint the peak in mandibular growth. It also did not specify the intensity and amount of residual growth left, factors deemed important for implementing orthopedic therapy.

Keywords: lateral cephalograms; cervical vertebrae; adolescent growth spurt; mandibular growth; dentofacial orthopedics

Introduction

A sound knowledge of the optimal timing of pubertal growth spurt in the growth period is vital for treatment with orthopedic therapy. Information gleaned from chronologic age, statural height from growth charts, dental age, menarche and observation of secondary sexual characteristics too could help in predicting the pubertal growth spurt which occurs one to two years earlier in girls than in boys. However, they lack precise predictive assessment due to various reasons attributed to socioeconomic conditions, environmental influences, climate and nutrition. Many radiologic markers like hand-wrist radiographs and assessment of Middle Phalanx of the third finger (MP3) have been used to predict the onset of pubertal growth spurt in both the genders. However, the lateral cephalogram is currently and widely preferred now in preference to the other radiographic methods as it is routinely taken for orthodontic diagnosis and treatment planning negating the need for the patient to be subjected to an additional radiograph and attendant radiation exposure. The objective of this review of literature was to evaluate the validity and reliability of assessment of cervical vertebrae on lateral cephalograms and its ability to predict the circumpubertal period of growth to help facilitate correction of skeletal jaw discrepancies.

Method

Internationally peer reviewed and valid indexed reference articles pertaining to cervical vertebral maturational indicators as assessed on lateral cephalograms was segregated and perused with the views of the different authors succinctly highlighted.

Discussion

Assessment of the maturational stages of the cervical vertebrae from C2 to C4 to predict the skeletal age of an individual has been in orthodontic practice for over 5 decades. This narration of the literature helps glean valid
information pertaining to its use as an indispensable radiologic biomarker.

Lamparski DG (1975) conducted a study to determine whether maturational changes of the cervical vertebrae as recorded on routine lateral cephalometric radiographs could be used to assess the skeletal age of an individual. He concluded that there was no significant statistical differences between cervical vertebral and handwrist assessments and that the use of cervical vertebrae as a skeletal maturity indicator was valid.

Tanner JM (1981) stated that though adolescent growth spurt varies in intensity and duration from one child to another it is a constant phenomenon and occurs in all children. The peak velocity of growth in height averages about 10cm a year in boys and slightly less in girls. In boys the spurt takes place on average between 12.6 and 15.6 years of age and in girls some two years earlier.

O’Reilly MT et al (1988) investigated the relationship of the cervical vertebral maturation and mandibular growth changes in annual lateral cephalograms of thirteen Caucasian females aged 9 to 15 years of age. The results showed that significant increase in mandibular length occurred in cervical stages 1&2, 2 &3, and 3& 4. Ramal height increased between stages 1 and 2 & Corpus length increased between stages 1-2 and 2 – 3.Stages 1 through 3 occurred prior to peak velocity with 2 and 3 in the year immediately preceding peak growth velocity.

Hassel B & Farman AG (1995) investigated a sample of 11 groups of 10 males and 10 females (220 subjects) aged 8-18 years, from Bolton-Brush Growth Center at Case Western Reserve University. Lateral cephalograms and left hand wrist radiographs were evaluated. The hand wrist radiographs were reviewed using Fishman’s method. It was concluded that by using the lateral profiles of 2nd, 3rd and 4th cervical vertebrae, the orthodontist could evaluate the skeletal maturity of the patient at that one point in time to assess how much growth could be factored into anticipated treatment.

Fernandez GP et al (1998) conducted a study on 113 patients (50 males & 63 females) aged 9-18 years taken from patient files of Orthodontic Graduate Program, Universidad Autonoma de Nuevo Len Mexico. Hand wrist radiograph was evaluated by Fishman method and cervical vertebrae evaluation with Hassel and Farman modification of Lamparski’s method. They concluded that skeletal maturity could be accurately appraised using the cervical vertebrae evaluation from the cephalograms without the need of an additional radiograph.

Franchi L et al (2000) analyzed the validity of 6 stages of cervical vertebral maturation as a biological indicator for skeletal maturity in 24 subjects (15 females, 9 males) and concluded that cervical vertebral maturation appeared to be an appropriate method for the appraisal of mandibular skeletal maturity in individual patients.

Baccetti T et al (2000) evaluated skeletal and dentoalveolar changes induced by the Twin-block appliance in 2 groups of subjects, early treated group of 21 subjects (11 females & 10 males) & late treated group of 15 subjects (6 females & 9 males) with Class II malocclusion treated at different skeletal maturation stages in order to define the optimal timing for this type of therapy. Skeletal maturity in individual patients was assessed on the basis of the stages of cervical vertebrae maturation.

Baccetti T et al (2002) conducted another study on 706 subjects whose lateral cephalogram files from the University of Michigan Elementary and Secondary School Growth Study was used to detect the peak in mandibular growth as measured from Gonion to Gnathion, based on the analysis of cervical vertebrae 2, 3 & 4 with the Cervical Vertebral Maturation (CVM) method of the 5 maturational stages. The peak in mandibular growth was seen to occur between CVMS II and CVMS III.

Mito T et al (2002) conducted a study to establish cervical vertebral bone age as a new index for objectively evaluating skeletal maturation on 176 lateral cephalograms of girls aged 7.0-14.9 years. They measured the cervical vertebral bodies and determined a regression formula to determine cervical vertebral bone age. They also used lateral cephalometric & handwrist radiographs of another 66 girls aged 8-13.9 years. The correlation between cervical vertebral bone age & bone age using Tanner-White (TW) method was determined. The results suggested that cervical vertebral bone age on lateral cephalograms was as reliable at estimating bone age as was the TW method on hand-wrist radiograph.
Roman SP et al\textsuperscript{10} (2002) conducted a study to determine the validity of cervical vertebrae radiographic assessment to predict skeletal maturation. Left hand wrist and lateral cephalometric radiographs of 958 Spanish children from 5-18 years of age were measured. The hand wrist radiographs were assessed according to Grave and Brown method. Cervical vertebrae were evaluated using stages developed by Lamparski & Hassel and Farman. The results suggested that this new method to determine the skeletal maturation was reliable.

Baccetti T et al\textsuperscript{11} (2005) introduced a further modified version of the Cervical Vertebral Maturation (CVM) method for the detection of the peak in mandibular growth based on the analysis of the second through fourth cervical vertebrae in a single lateral cephalogram. The morphology of the bodies of the second (C2), third (C3), and fourth (C4) cervical vertebrae were analyzed in 6 consecutive cephalometric observations (T1 through T6) of 30 orthodontically untreated subjects. The current clinically improved CVM method comprised of six maturational stages (CS1 through CS6). CS1 and CS2 were pre-peak stages & the peak in mandibular growth occurred between CS3 and CS4. CS6 was recorded at least 2 years after the peak pubertal growth.

Damian MF et al\textsuperscript{12} (2007) evaluated 45 patients of both genders, aged 9-15 years, with two lateral cephalograms each taken at a 12-month interval. Establishment of the maturation stages of cervical vertebrae was performed by the method proposed by Hassel and Farman. Based on this evaluation, the patients were assigned to 3 groups. Patients in the initiation (1) or acceleration (2) stages comprised Group I; patients changing from the initiation (1) or acceleration (2) stages to the transition (3) stage comprised Group II; and patients in the transition (3) stage on both radiographs, namely during the growth peak, constituted Group III. For each individual in Groups I, II and III, S-N and Co-Gn cephalometric measurements were assessed on both radiographs and the growth increment in this period was evaluated. The results showed larger growth for Group III, followed by Group I and smaller for Group II. The authors concluded that the CVMI stages were valid for the analysis of cranial growth and especially of mandibular growth at the initial stages of pubertal growth spurt.

Gu Y & McNamara Jr JA\textsuperscript{13} (2007) evaluated the mandibular growth changes of 20 subjects from cephalometric superimpositions on tantalum implants placed into the craniofacial complex during childhood. Lateral cephalograms were available at each of the 6 consecutive stages of CVM. Interval increases in posterior facial height was greater than simultaneous increases in lower facial height. The authors concluded that the peak increase in mandibular length was observed during the interval CS3–CS4.

Gabriel DB et al\textsuperscript{14} (2009) evaluated the reproducibility of CVM stage determination by using a stringent methodology. Ten practicing orthodontists, trained in the CVM method, evaluated the morphology of cervical vertebrae C2 through C4 from 30 cephalometric radiographs using question based CVM method. Intra-observer agreement was only slightly better and clinicians agreed with their own staging only 62% of the time. The authors concluded that CVM method could not be recommended as a strict clinical guideline for the timing of orthodontic treatment.

Wong RW et al\textsuperscript{15} (2009) evaluated the validity of the cervical vertebral maturation (CVM) method as an indicator of skeletal age in the circumpubertal period by correlating it to the hand-wrist method (HWM) in 400 Chinese subjects aged 10-15 years for girls and 12-17 years for boys. The CVM was evaluated by using the method developed by Baccetti et al. The hand-wrist assessment was evaluated according to the method of Hagg and Taranger. The authors concluded that CVS3 in CVM was around the peak of the growth spurt when growth modification treatment by dentofacial orthopedic appliances could be commenced.

Gerenoso R et al\textsuperscript{16} (2010) compared mandibular size in subjects of both genders with Class I and Class II skeletal patterns as defined by the cervical vertebrae maturation. The results indicated that boys with Class I pattern had greater mandibular lengths than girls at cervical stages CS2, CS4 and CS5, whereas in the Class II pattern, the boys had greater mandibular lengths than girls at stages CS2, CS3 and CS4.

Nestman TS et al\textsuperscript{17} (2011) did a study to determine which of the individual CVM vertebral patterns could be classified reliably and which could not. Ten practicing orthodontists trained in the CVM method evaluated the morphology of cervical vertebrae C2 through C4 from 30 cephalometric radiographs using questions based on the
CVM method. The Kendall coefficient of concordance was used to assess the level of inter-observer agreement when determining a “derived CVM stage” for each subject. The authors concluded that weakness of the CVM method results in part from difficulty in classifying the vertebral bodies of C3 and C4 as trapezoidal, rectangular horizontal, square or rectangular vertical.

Ball G et al 18 (2011) tried to establish a pattern of mandibular growth and related this pattern to the stages of cervical vertebral maturation. Lateral cephalograms taken annually from ages 9 to 18 years were evaluated for 90 boys from the Burlington Growth Center, Toronto, Ontario, Canada. Mandibular lengths were measured from articulare to gnathion and incremental growth was determined. CVM stages was assessed by using a 6-stage method. Advanced, average and delayed maturation groups were established. The authors concluded that progression from cervical stages 1 through 6 does not occur annually; time spent in each stage varies depending on the stage and the maturation group.

Mellion ZJ et al 19(2013) did a study to assess the maturation and prediction of the timing of the adolescent growth spurt using the sequential stages in the development of the hand wrist and cervical vertebrae. They concluded that the common assumption that onset and peak occur at ages 12 and 14 years in boys and 10 and 12 years in girls seemed correct for boys but was 6 months to 1 year late for girls.

Vijayashree et al20 (2014) did a study to investigate the relationship between mandibular second molar calcification stages and cervical vertebrae maturity indicators and concluded that. Stage F of Demirjian index, with the root length equal to or greater than the crown height corresponding to stage 3 of CVMI indicated the start of peak in mandibular growth, an appropriate time to plan for functional appliances.

Mc Namara Jr JA, Franchi L21(2018) devised a user’s guide for the cervical vertebral maturation method. They suggested that CVM staging should be used in concert with a thorough evaluation of the hard and soft tissue during the treatment planning process. They also opined that as with any subjective clinical evaluation the reliability of the CVM method improves with experience.

**Conclusion**

- Cervical vertebral maturity (CVM) staging is liable for subjective errors with intra and inter-observer disagreements.
- Onset of the peak mandibular growth cannot be accurately defined by the CVM staging.
- Lack ability to determine intensity and end of growth spurt and that the final stage of development does not necessarily determine growth completion.
- Incorrect positioning of the neck during taking of radiograph could inadvertently change the shape of the cervical vertebra and thus lead to erroneous assessment of its shape.
- A reliable alternative to handwrist radiograph.
- Accurate assessment and reliability of cervical vertebral maturation stages improves with experience of the observer.

**Ethical Clearance**: Not required since it is a review article

**Source of Funding**: Nil

**Conflict of Interest**: Nil

**REFERENCES**


Position of Hyoid Bone Between Snorers with Obstructive Sleep Apnea and Snorers without Obstructive Sleep Apnea—A Cephalometric Study

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ABSTRACT

Obstructive sleep apnea is brought about by intermittent upper aviation route deterrent during sleep and it presents as loud snoring, blood vessel oxygen desaturation, sleep fragmentation, and over the top daytime sleepiness. The lateral cephalogram is a routine diagnostic aid in orthodontics. It has been used extensively in the fields of orthodontics and anthropology to record craniofacial form. Recently, it has also suggested that cephalometry could be an adjunctive procedure for assessing craniofacial patterns associated with obstructive sleep apnea. This study was attempted to look at the craniofacial structures of Obstructive sleep apnea patients with those of basic snorers utilizing parallel cephalometric radiographs and to decide the hazard factors for Obstructive sleep apnea in a Dravidian population.

Keywords: Obstructive sleep apnea, hyoid bone, lateral cephalogram

Introduction

Obstructive sleep apnea is brought about by intermittent upper aviation route deterrent during sleep and it presents as loud snoring, blood vessel oxygen desaturation, sleep fragmentation, and over the top daytime sleepiness. OSAS affects 2% to 4% of the general adult population and might be considerably increasingly present in explicit subgroups, for example, hypertensive or cardiovascular breakdown patients.

A few reasons for OSAS have been recommended. It may be a result from a variable mix of anatomical and pathophysiological factors, some of which might be under hereditary control. Relaxation of the upper airway route musculature has been considered in connection to OSAS. Anatomic narrowing of the upper airway route because of modifications in the craniofacial morphology or delicate tissue broadening, the Bernoulli impact, rest act, age, male sexual orientation, nasal check, and fat tissue in the pharynx have been proposed as aetiologies of OSAS.

There are a few hazard factors for OSAS, with the most basic being weight and age. The commonness of OSAS increments with age, with a twofold to triple higher pervasiveness in people greater than 65 years contrasted and those in middle age. There is a connection between a Body massIndex (BMI) of >26 kg/m² and OSAS. Previous research proposed that there might be contrasts in how much stoutness and craniofacial life structures fill in as hazard factors among Asians and Caucasians and that the etiology of OSAS in obese patients may contrast from those in nonobese patients. It is as yet indistinct whether there are anatomical contrasts in cephalometric estimations between extreme OSAS patients and patients experiencing wheezing among nonobese young Asians.

This study was attempted to look at the craniofacial structures of Obstructive sleep apnea patients with those of basic snorers utilizing parallel cephalometric radiographs and to decide the hazard factors for Obstructive sleep apnea in a Dravidian population.
Materials and Method

Sample Size: 25 subjects.

13 subjects were snorers with obstructive sleep apnea

12 subjects were snorers without obstructive sleep apnea

Subject Selection Criteria: This study was conducted in the patients who visited the Outpatient department, Department of Orthodontics, SreeBalaji Dental College and Hospital, Chennai, India. Subjects of both the sexes between 12 to 35 years of age were included in this study. 416 patients were clinically examined and Epworth sleepiness scale questionnaire was given. Out of which 54 patients with the history of snoring were revealed by the patients based on questionnaire (Epworth sleepiness scale) that were included in the study. Of which 11 Individuals could not give a written consent, 2 patients found risky to radiation exposure, 3 patients undergoing orthodontic treatment, 1 patient had undergone orthodontic treatment, 6 patients had gross facial asymmetry, 6 patients had undergone removal of nasal polyp. On exclusion, only 25 snoring subjects were taken for the study.

These 25 snoring subjects were monitored by overnight sleep study using Alice PDx portable monitoring device. Apnea was defined as cessation of breathing for at least 10 seconds. Hypopnea is a decreased effort to breathe of at least 50% less than the baseline and with at least a 4% decrease in oxygen saturation. The respiratory disturbance index (RDI) was calculated as the sum of the total events (apnea and hypopnea) per hour (apnea + hypopnea/sleep time). A diagnosis of obstructive sleep apnea was based on the respiratory disturbance index (RDI). Patients who snored but had an RDI of < 5 were grouped into the simple snoring group, while patients whose RDI > 5 were grouped in moderate obstructive sleep apnea group.

Inclusion Criteria:
- Age: 12-35
- Both males and females
- Patients who were identified as snorers

Exclusion Criteria:
- Patients without the history of snoring.
- Patients who had undergone removal of nasal polyp.
- Patients who had undergone Nasal septal deviation correction.
- Patients who had undergone uvulopalatopharyngoplasty.
- Patients who had undergone somnoplasty.
- Patients who had undergone orthodontic treatment
- Patients currently under orthodontic treatment
- Patients found risky to radiation exposure
- Patients with gross facial asymmetry

Result

Observed frequency statistics are mentioned in Table 1. Expected frequency statistics are mentioned in Table 2. The acquired data were assessed for normality using Chi square test. The statistics results suggest that it accept the Null hypothesis i.e., there is no association or dependency between these two variables.

Table 1: Observed Frequency

<table>
<thead>
<tr>
<th>Bone Position</th>
<th>Group I</th>
<th>Group II</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>At C3 Level</td>
<td>6</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Below C3</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Above C3</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Below C5</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Sum</td>
<td>13</td>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 2: Expected Frequency

<table>
<thead>
<tr>
<th>Bone Position</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>At C3 Level</td>
<td>0.0833</td>
<td>0.0925</td>
</tr>
<tr>
<td>Below C3</td>
<td>0.2482</td>
<td>0.2688</td>
</tr>
<tr>
<td>Above C3</td>
<td>0.1384</td>
<td>0.15</td>
</tr>
<tr>
<td>Below C5</td>
<td>0.443</td>
<td>0.48</td>
</tr>
</tbody>
</table>
The probability that $X^2$ statistics having 3 degree of freedom is more extreme than 1.9042 ($p=0.5$)

No statistically significant difference was observed in hyoid bone position between snorers with obstructive sleep apnea group and snorers without obstructive sleep apnea group.

**Discussion**

The lateral cephalogram is a routine diagnostic aid in orthodontics. It is a two-dimensional representation of sagittal aspect of head and neck region. It has been used extensively in the fields of orthodontics and anthropology to record craniofacial form. Recently, it has also suggested that cephalometry could be an adjunctive procedure for assessing craniofacial patterns associated with obstructive sleep apnea17.

Maltaiset al18 have opined that use of cephalometric radiographs to assess the upper airway anatomy is helpful because it is simpler than other methods for measuring airway patency. Parkinenet al19 further confirm in their study that the lateral cephalogram is a valid method for measuring dimensions of the nasopharyngeal and retropalatal region. Tsai et al16 also confirmed in their study that soft tissue variables have much greater influence in obstructive sleep apnea patients.

Tsai et al16 found that the position of hyoid bone in simple snorers was below but near the straight line from C3 TO Me, whereas that position of hyoid bone in severe obstructive sleep apnea patients was far below this line, but in contrary our study shows no significant difference in the position of hyoid bone in both the groups.

**Conclusion**

The position of hyoid bone relative to a line from third vertebra to menton remains at same position in both simple snorers and obstructive sleep apnoea patients.

**Acknowledgement**

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**REFERENCES**


Lingual Orthodontics—A Review

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ABSTRACT

The lingual orthodontic furnishings are in a manifest pretence the only invisible machinery rules available. This appliance system consists of arrangement tariff planned lingual brackets onto the palatal/lingual surface of the teeth. The biggest issue is that lingual braces can be difficult to get used to and wear. The common problems encountered are Difficulties with speech, Tongue soreness Eating, Cleaning your teeth. This review comprises of history, different mechanics that are incorporated in lingual orthodontics and various systems that is used in lingual orthodontics etc.

Keywords: Lingual orthodontics, Esthetic, Adult orthodontics

Introduction

Long durations of unaesthetic appearance due to malocclusion treatment led to the exploration of accordingly self-styled invisible orthodontics which comprises of underling coloured brackets and archwires, ostensible aligner therapy and lingual orthodontics. In any way, these brackets and archwires are obscure from a certain distance unexcelled. Apart from, the clear aligners are quite a distance scarcely vague as it is an authoritative integument closely adapted to the teeth. The lingual orthodontic furnishings are in a manifest pretence the only invisible machinery rules available. This appliance system consists of arrangement tariff planned lingual brackets onto the palatal/lingual surface of the teeth.

History

In 1889, John Farrar printed a “Lingual removable Arch.” The dental literature extolled the benefits of moving teeth with lingual appliances. These early lingual appliances were removable and designed to expand the dental arches.

In 1918, Dr John Mershon published a paper entitled “The removable lingual arch as an appliance for the treatment of malocclusion of the teeth.” In 1922, Mershon’s presentation onlabial and lingual arches with finger springs was reported as being a highlight of the meeting. The idea of development of Current lingual treatment began at identical time (the middle 1970’s) in 2 completely different countries, when it became apparent that bonding of bracket was a viable procedure, and that esthetic plastic brackets were a compromise.

Dr. Craven Kurz began experimenting with lingually bonded brackets in 1973, achieving reasonably good results in simple cases. He became convinced that a lingual warranted edgewise system was possible and would create a major contribution to adult dentistry. His main motivation was to find a way to provide treatment for patients in a less noticeable way. He created his own lingual appliances by modifying labial appliances, using hand modified labial brackets. He restricted his treatment to the jaw teeth for concern that the forces of occlusion would dislodge the brackets placed on the lingual surfaces of the jaw in anterior teeth. At identical time in Japan, Professor Kinya Fujita conducted a research for the purpose of developing an orthodontic technique which would be both hygienic and aesthetically pleasing. A primary motivation for his efforts was to be able to give

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care in an exceedingly approach that helped to shield the lips and cheeks of patients taking part in martial arts.

**Advantages**

- The chief advantage of getting lingual treatment lies within the undeniable fact that your braces are non-visible.
- If you are feeling that carrying typical braces would merely be too embarrassing, this is one of the “invisible” orthodontic methods that you might consider.

**Disadvantages**

- The biggest issue is that lingual braces can be difficult to get used to and wear.
- And, in general, every periodic workplace appointment you have got throughout your treatment method takes longer than it might with typical braces.

**The Incognito Lingual Appliance**: Lingual orthodontics has advanced to a highly sophisticated level where CAD/CAM (computer-aided design/computer-aided manufacture) technology is employed to manufacture both the brackets and arch wires for each patient individually in the incognito appliance system. It was launched in 2004 as the first fully customized lingual bracket system in the world. The Incognito appliance is manufactured using state-of-the-art CAD/CAM technology. The first step in the fabrication process is taking accurate polyvinyl siloxane impressions and bite registration using polyvinyl siloxane, and then creating a model in plaster and a diagnostic waxup thereafter (according to my direct instructions). The final model is then sent to dentist, digitally for feedback. The final model is then scanned with a 3-D scanner and the brackets are designed on the computer. This appliance has an advantage over other “invisible” orthodontic appliances for several reasons. Due to its core brackets and wires, all movements can be accomplished. It is a lingual appliance; thus, it does not suffer from any visible issues that are imposed by conventional ceramic brackets, coated or even translucent wires, and aligner attachments.

**Digitally Customized Self-ligating Lingual System**:

Harmony is the lingual system that combines

- Interactive Self Ligating Brackets
- Customized Bonding Pads
- Anterior Positioning Jigs
- Robotically Formed Arch Wires
- Digitally-Assisted Treatment

Using proprietary digital scanning and CAD/CAM technologies, a highly accurate bonding pad is created for the lingual surface of each tooth. The custom-made pad integrates seamlessly with its corresponding interactive self-ligating bracket. The slot of every bracket is positioned ideally on each tooth employing a digitally custom-made adapter that works in conjunction with robotically shaped arch wires to deliver doctor-driven, patient-specific treatment goals. Kafle D et al. reported five cases of midline diastema which was successfully treated with lingual orthodontic appliances. Chaudhari PK et al. reported a case of 19-year-old female patient with Class I malocclusion associated with 80% overbite (closed bite) treated by lingual appliance. As the patient was adult and faculty going, and more aesthetic aware, she chooses lingual orthodontic appliance for the treatment of her malocclusion. Another reason for selecting lingual appliance was the bite plane impact of the lingual appliance which might be useful in bite gap. The patient was highly satisfied aesthetically as well as functionally after the treatment was completed. Khaled M. Abouseada also reported a case of non-extraction treatment of a Class II case with a missing mandibular central incisor treated successfully using a CAD/CAM lingual orthodontic system and concluded that the key to success in lingual orthodontics in terms of both professional and patient satisfaction is practice and training. The Incognito system can be used for all types of malocclusions with the same precision as labial braces.

**Problems or Difficulties Faced with the Appliance**: As a general rule, it’s more difficult to get used to wearing lingual braces than with the conventional ones and time duration is too long. The common problems encountered are:

- Difficulties with speech
- Tongue soreness
- Eating
- Cleaning your teeth
Comparative Biomechanics between Lingual and Labial Techniques

i. Force actions: As the force of application is on the lingual side, the mechanics of tooth movement for lingual orthodontics has different characteristics from the labial one\textsuperscript{13}. Scuzzo and Takemoto\textsuperscript{14} summarized the effects of different forces imposed on teeth by the lingual and labial techniques in the three planes of spaces.

Sagittal plane: From a mesial read, when the same amount of force is applied to anterior teeth in both systems so that the intrusion force equals the retraction force, the net force vector points directly towards the middle of resistance with the labial system and lingual to the center of resistance with the lingual system, producing a lingual tipping force and vertical bowing effect. Therefore, during en-masse retraction in lingual orthodontics, the retraction force should be minimized and more intrusion and palatal root torque is needed.

Vertical plane: The result of intrusive forces on the lingual and labial sides of the higher incisors differs between cases of traditional, labial or lingual inclination. In unremarkably inclined incisors, vertical force applied on both the labial and lingual side lies mesial to the center of resistance (CR) in the horizontal plane, thereby producing a counterclockwise moment. The moment force is applied on the labial facet thanks to greater distance from the chromium as compared thereto once the force is applied on the lingual side. In proclined incisors, both the labial and lingual intrusive forces turn out counterclockwise moments however the magnitudes area unit bigger than that of traditional tooth inclination thanks to increased distances of the points of application of the forces from the CR. In upright incisors (as in a very category II division a pair of malocclusions), labial intrusive force will produce a counterclockwise moment but the same amount of vertical force on the lingual side can turn out a dextrorotary moment and this will increase the lingual inclination of the crowns. This is due to the point of application of the force lies distal to the axis passing through the chromium of incisors. In such cases, it is advised to advance the crowns first and then to perform the intrusion\textsuperscript{15,16}. As way because the higher molars area unit involved, the axis passing to through the CR is closer to the lingual surface. This implies that whenever associate degree intrusive force is applied to the lingual brackets, the crowns of the teeth will rotate in a lingual direction; the opposite will occur whenever intrusive force is applied to the labial brackets: crown rotation can manifest itself in adorning an associate degree exceedingly in a very labial direction. Within the lower arch with traditional tooth inclination, the lingual bracket slot is nearer to the axis passing through the chromium when put next therewith on the labial facet. For this reason, lingual application of force allows easier intrusion coupled with less proclination of the crown, as compared with labial force application. This will additionally generate a lot of distal inclination of the lower molar crowns and a lot of lingual tipping of the lower incisors throughout levelling.

Horizontal plane: In the horizontal plane, the interbracket distance in lingual orthodontics is shorter than that in the labial one. Also, the purpose of application of force is nearer to the tooth axis in lingual orthodontia. Therefore, the rotation moment is a smaller amount than on the labial aspect and it’s more difficult to possess an economical coupling of forces throughout move movement. The short interbracket distance means that the arch wire stiffness is also increased\textsuperscript{17}. A more flexible arch wire is needed, especially in crowded cases. All these factors build correction of rotations tougher with the lingual appliance.

ii. Choice of extractions: With its unique biomechanics, extraction choices in lingual orthodontics often differ from those in labial orthodontics\textsuperscript{18,19,20}. In lingual orthodontia the robust molar anchorage, especially in the lower arch, makes mesial movement of the lower molars difficult.

Also, the lower molars tip distally because the arch is levelled in lingual orthodontia and this change the molar relationship from category I to category II. Therefore, in school I cases, the extraction of the upper first premolars and lower second premolars may be necessary rather than the extraction of the four first premolars. In Class II cases, it’s fascinating to avoid extraction within
the lower arch the maximum amount as attainable and rather to advance and/or slice anterior teeth if the quantity of state of affairs is least. If crowding in the lower arch is severe, extraction of one or more lower incisors may be considered. In Class III cases, bicuspid extraction facilitates the lingual tipping of lower anterior teeth. The distal tipping of lower molars throughout leveling additionally improves the category III molar relationship. All these facilitate the correction of a Class III malocclusion.

iii. Anchorage considerations: It is generally said that a lingual approach gives a greater amount of anchorage than a labial approach. In lingual orthodontia, distally tipping forces square measure perpetually applied to posterior teeth through the archwire, that makes posterior teeth additional immune to anchorage loss than in labial orthodontia. As brackets square measure placed on the lingual surfaces, it is easier to control the vertical height of the lingual cusps through the constant application of buccal root torque, which tips molars lingually. This is particularly helpful in controlling the lingual cusps of the higher second molars, that square measure presumably to be extruded and cause interference. The management of molar extrusion additionally prevents the rotation of the jawbone and also the resultant adverse effects like anterior open bite and deterioration of a Class II relationship. Removal of tongue pressure with a lingual appliance further reinforces molar anchorage, especially in a lower dental arch with narrow bone.

Segmented Mechanics in Lingual orthodontics: Fontenelles pointed out that only segmentation could solve the contradiction of conflicting requirement in lingual orthodontics: low load-deflection rate, constant moment-to-force ratios, and keeping strict control. The appliance was divided into 3 parts, namely, the passive appliance, the active appliance and the guiding component. The passive appliance provided a high load-deflection rate, ensuring maximum stiffness to control the relationships between the teeth included. Because passive systems were meant to supply enough stiffness to tie the teeth into a unit, any sufficiently stiff device could be used, for example, 018.025-inch SS archwire, bonded cast chrome-cobalt splint and bridgework. The active appliance ought to have a coffee load-deflection rate giving a high degree of force constancy, and will turn out the moment-to-force quantitative relation necessary for the tooth movement meant and maintain it as constant as possible. The guiding component was to guide the tooth in its progress along the dental arch, form its initial position to its final location. Anchorage could be provided by varying the line of action of the force. Case reports of different segmental techniques have been published.

Lingual Straight-Wire Technique: With conventional lingual brackets, mushroom-shaped archwires are required with insets between the canine and the premolar and between the premolar and the molar. Vertical steps between the canine and the premolar are often needed. In a study within which the crowns on a plaster model were cut to the animal tissue margins, parallel to the occlusal plane, a few in-out differences on the lingual side were revealed. This study has led to the development of a lingual straight–wire (LSW) technique based on the cervical lingual arch form. The LSW-brackets are given varied degrees of torsion, angulation and bracket thickness for individual tooth. The bracket slots are positioned in order that the direction of archwire insertion is opposite to the Kurz 7th generation appliance. The bracket stem of the LSW-appliance is positioned more gingivally relative to the bonding base and is longer labio-lingually and the bracket is shorter vertically. With the employment of straight wires, wire-bending is minimized and chair-time is reduced. With no inset between the canine and the premolar, there is no variation in the amount of inset associated with archwire changes and also the lateral occlusion remains stable once established. Preformed archwires may be used and slippery mechanics may be simplified. Vertical control of the teeth is possible from an early stage of treatment because vertical steps are not needed.}

Lingual Light-Wire Techniques: In 1982, Paige described a lingual light-wire technique using Unipoint combination brackets with slots oriented in the occlusal-incisal direction and with vertical slots for use of auxiliaries and horizontal slots in unravelling of crowding incisors. There is an animal tissue ‘wing’ to position elastic modules on continuous elastic chains. The problem of short interbracket distance was partially overcome. Using this technique, the lingual tooth contours are much less a variable factor because torque control can be achieved by properly shaped torqueing
auxiliaries and placement of brackets is sensitive only to the incisal-gingival placement. Therefore, indirect bonding is not required. Jenner and McLean also showed that the Begg Appliance, based on the use of ribbon arch brackets and round archwires, provides a relatively simple conversion from labial to lingual mechanics. During bracket placement, the bracket is turned upside down for lingual mechanics. Unlike the edgewise techniques, bracket placement is simplified because torque is not built into the bracket. This removes the necessity to involve the services of business laboratories to position pre-angled bracketson the model prior to indirect bonding. There was conjointly less issue with sequent rebonding of individual brackets if they were dislodged. It is possible to use standard labial bracket bases on the lingual. Archwires for lingually placed brackets required modifications to accommodate the lingual anatomy of the incisors, canines, bicuspids and molars. However, the original three stages of Begg treatment sequences were retained.

Retention in Lingual Orthodontics: Patients who have chosen to have lingual braces are often esthetically demanding and do not like visible retainers. Due to social restrictions, they have limited time to wear retainers. Clear retainers made from 0.4-0.5mm thick thermoplastic material are easy to fabricate and can be delivered on the same day of appliance removal. They are conjointly comfy to wear and cause very little speech interference. However, they break and deform simply in order that they don’t seem to be appropriate for future use. A modified Begg retainer with the anterior part made of transparent retainer wire is esthetically pleasing but the baseplate may cause some discomfort and speech difficulty. The retainer also has to be fabricated in the laboratory. It has been suggested that clear retainers ought to be used throughout the day and a Begg or Hawley retainer for future night wear. For lower incisors with reduced periodontal support, a fixed lingual retainer is used to stabilize the teeth. Scuzzo and Takemoto prefer the .012-inch Australian wire because the finer wire causes little discomfort and the resilience of the wire allows individual movement of the incisors and encourages periodontal fibre rearrangement. This passive retainer may be reworked into associate degree ‘active’ retainer to correct minor tooth malalignment or for finishing a case.

Conclusion

Lingual Orthodontics is the nicest highbrow medicament modality, and is the bludgeon cure alternative for full-grown patients, as the lingual brackets gain the demand of socially active adult patients. Directly the orthodontist considers the counterirritant aspects of the outfit, fashionable alley lingual fitments donate the capacity to delicacy cases close by a resolution and do about to and even beyond that which is achievable with labial appliances. Lingual orthodontics encourages those patients for orthodontic dose who prevail upon aesthetics but hesitant to wear the labial braces.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Comparison of Microleakage among High Strength Flowable Composites Using Total Etch and Self-Etch Adhesives

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ABSTRACT

Background: The recent flow-able composites available in the market claim high strength by increased filler content but their performance in micro leakage prevention in still not comparatively reported.

Aim: The aim of the study was to evaluate and compare the microleakage of five commercially available high strength flowable composite as preventive resin restoration using total etch and self-etch adhesives.

Methodology: 100 first maxillary premolars with prominent fissures were selected for the study and sealed with Filtek-Z350 XT Flow, Gaenial Universal Flow, Beautifil Flow Plus, Arabesk Flow and Grandio SO Heavy Flow. Subsequent to sealant application and embedding, the micro leakage was tested by immersing in methylene blue and subsequent stereomicroscopy.

Results: Filtek Z-350 XT was better in self-etch technique over total etch technique. Arabesk Flow and Grandio SO Heavy Flow were better in total etch technique over self-etch technique.

Conclusion: With considerations for pediatric dentistry, self-etch materials are recommended. Further clinical studies have to be carried out to draw relevant conclusions on the clinical perspectives.

Keywords: High strength sealant, flowable, microleakage

Introduction

The occlusal surface consists of deep, narrow pits and fissures, which make mechanical cleaning difficult and favor plaque accumulation. Consequently, it leads to initiation of dental caries, as 85% of dental caries occurs on them.1,2 Another factor responsible for high incidence of occlusal caries is the lack of salivary access such deep fissures, as it prevents effective remineralization3. Better understanding of the caries process and remineralization has catalyzed the evolution in caries management from GV Black’s “Extension for Prevention” to “Minimally Invasive Techniques”.4

The use of diluted composite resin in preventive resin restoration has provided comparable retention rates with unfilled sealants.5,6 The early clinical success of these restorations and development of improved composite resin system have encouraged recent investigators to use new materials and techniques for preventive resin restoration.

Qin M et al (2005) in his study evaluated the retention and caries protection of a conventional preventive resin restoration with flowable resin composite and a flowable compomer. The retention rate and caries prevention of flowable composite group, used as preventive resin restoration was 84.5% when compared to conventional PRR group which was 80.8% by end of 2 years. They also stated that the drawback of conventional PRR technique (filled resin + unfilled resin) could be due to the use of two different materials within the same preparation.7

The recent flowable composite available in the market are high in strength by increased filler content
which are easier to place, more self-adaptable with good viscosity that allows them to be used for minimally invasive preparations and also as a sealant for the unprepared part of the occlusal surfaces.7

Hence this study aims to evaluate and compare the microleakage of five commercially available high strength flowable composite as preventive resin restoration using total etch and self-etch techniques.

**Materials and Method**

This in-vitro study was planned in the Department of Pedodontics and Preventive Dentistry, Sree Balaji Dental College and Hospital, Chennai, Tamilnadu, following the approval of institutional ethical committee (No. ECR/761/Inst/TN/2015)

One hundred extracted human maxillary first premolar which were caries free, devoid of cracks and not restored, were selected for the present study. All root surfaces of the selected samples were cleaned with ultrasonic scaler to remove periodontal tissue remnants and other organic debris. The coronal and the root surfaces were cleaned with aqueous slurry of pumice with the help of a rubber cup in a slow speed contra-angled hand piece (NAC-EC, NSK). The teeth were then rinsed with water jet, and dried. The samples were then stored in normal saline with 1% thymol crystals at room temperature until subjected to experimental procedure.

The samples were dried with absorbent paper and then divided into 2 groups of 50 each, as shown in table 1. The root surfaces of samples in each subgroup were painted with different colors of nail polish leaving the occlusal surface exposed, to differentiate between the subgroups. Pits and Fissures of all the samples belonging to both Group A and Group B were prepared with fissurotomy bur (SS white, micro STF) to a depth of 0.6mm width and 1.5mm height (which co-related with the dimension of the bur as provided by the manufactures). After preparation, samples were stored in distilled water. The occlusal surfaces of all samples were etched for 30 seconds with 35% phosphoric acid (Scotchbond, 3M ESPE). They were then rinsed with water from three-way syringe and dried with a chip blower until chalky white appearance was visible, followed by application of respective bonding agent to the prepared surface with applicator tip and then thinned out using chip blower and cured as per the manufactures instruction with the help of Woodpecker light cure unit (850mW/cm²-1000mW/cm²). Respective sealant was applied and cured according to manufacturer’s instructions.

<table>
<thead>
<tr>
<th>Group (n = 100)</th>
<th>Subgroup (Material)</th>
<th>No. of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (total etch) (n=50)</td>
<td>A1 Filtek-Z350 XT Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>A2 G-aenial Universal Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>A3 Beautifil Flow Plus</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>A4 Arabesk Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>A5 Grandio SO Heavy Flow</td>
<td>10</td>
</tr>
<tr>
<td>B (self-etch) (n = 50)</td>
<td>B1 Filtek-Z350 XT Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>B2 G-aenial Universal Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>B3 Beautifil Flow Plus</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>B4 Arabesk Flow</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>B5 Grandio SO Heavy Flow</td>
<td>10</td>
</tr>
</tbody>
</table>

All the samples were then thermo-cycled in water bath for 500 cycles between 5 ± 2°C, 37 ± 2°C, 55 ± 2°C, with a dwell time of 30 sec. After thermo-cycling the samples were subjected to pH cycling. Artificial saliva and demineralizing solution were prepared according to Chaudhary et al., 2012.8 Each pH cycle consisted of immersing the samples in artificial saliva for 11.5 hours and then in demineralizing solution for 0.5 hours at 37ºC. This pH cycling was done two times in 24hrs for a period of two weeks.

After pH cycling the samples were washed in distilled water and dried with the absorbent paper. The apices of all the samples were sealed with epoxy resin and coated with a double layer nail polish leaving the occlusal surface. They were then immersed in a 1% methylene blue dye solution for 48 hours at room temperature. After which the samples were rinsed in distilled water for 5 seconds to remove the superficial dye and then dried with an absorbent paper.

Each tooth sample were embedded in an auto polymerizing clear acrylic resin block and sectioned bucco-lingually at the mesial, center (middle) and distal surfaces of the restored tooth using hard tissue microtome (Leica SP 1600, Germany). The degree of dye penetration in the occlusal surface of mesial, center (middle), distal was examined under stereomicroscope (MZS0745T+SDI,
Microleakage was assessed by a single observer using criteria described by Zervou et al. The depth of dye penetration on both buccal and lingual side of each slice was assessed and the deepest depth of dye penetration was recorded, tabulated and subjected to statistical analysis.

Statistical analysis was carried out by using Statistical Packages for Social Sciences (SPSS) 20.0 for Windows. One-way analysis of variance was used to compare the microleakage measures of different groups. Multiple comparisons between groups were analyzed using the Mann-Whitney test. Statistical analysis was conducted at a significance level of p<0.05.

Table 2: Comparison of Mean Microleakage Scores within Group A (total etch) Samples (Mann whitney U test)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SD</th>
<th>p -value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 vs A2</td>
<td>1.10 ± 0.92 vs 1.47 ± 1.22</td>
<td>0.280(NS)</td>
</tr>
<tr>
<td>A1 vs A3</td>
<td>1.10 ± 0.92 vs 0.93 ± 1.31</td>
<td>0.150(NS)</td>
</tr>
<tr>
<td>A1 vs A4</td>
<td>1.10 ± 0.92 vs 0.30 ± 0.65</td>
<td>0.005(HS)</td>
</tr>
<tr>
<td>A1 vs A5</td>
<td>1.10 ± 0.92 vs 0.60 ± 1.16</td>
<td>0.005(HS)</td>
</tr>
<tr>
<td>A2 vs A3</td>
<td>1.47 ± 1.22 vs 0.93 ± 1.31</td>
<td>0.700(NS)</td>
</tr>
<tr>
<td>A2 vs A4</td>
<td>1.47 ± 1.22 vs 0.30 ± 0.65</td>
<td>0.000(HS)</td>
</tr>
<tr>
<td>A2 vs A5</td>
<td>1.47 ± 1.22 vs 0.60 ± 1.16</td>
<td>0.000(HS)</td>
</tr>
<tr>
<td>A3 vs A4</td>
<td>0.93 ± 1.31 vs 0.30 ± 0.65</td>
<td>0.080(NS)</td>
</tr>
<tr>
<td>A3 vs A5</td>
<td>0.93 ± 1.31 vs 0.60 ± 1.16</td>
<td>0.200(NS)</td>
</tr>
<tr>
<td>A4 vs A5</td>
<td>0.30 ± 0.65 vs 0.60 ± 1.16</td>
<td>0.734(NS)</td>
</tr>
</tbody>
</table>

Table 3: Comparison of Mean Microleakage Scores within Group B (self-etch) Samples (Mann Whitney U test)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean ± SD</th>
<th>p -value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 vs B2</td>
<td>0.43 ± 0.73 vs 1.60 ± 1.22</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>B1 vs B3</td>
<td>0.43 ± 0.73 vs 1.20 ± 0.85</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>B1 vs B4</td>
<td>0.43 ± 0.73 vs 1.53 ± 1.04</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>B1 vs B5</td>
<td>0.43 ± 0.73 vs 2.27 ± 0.94</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>B2 vs B3</td>
<td>1.60 ± 1.22 vs 1.20 ± 0.85</td>
<td>0.22(NS)</td>
</tr>
<tr>
<td>B2 vs B4</td>
<td>1.60 ± 1.22 vs 1.53 ± 1.04</td>
<td>0.88(NS)</td>
</tr>
<tr>
<td>B2 vs B5</td>
<td>1.60 ± 1.22 vs 2.27 ± 0.94</td>
<td>0.030(S)</td>
</tr>
<tr>
<td>B3 vs B4</td>
<td>1.20 ± 0.85 vs 1.53 ± 1.04</td>
<td>0.25(NS)</td>
</tr>
<tr>
<td>B3 vs B5</td>
<td>1.20 ± 0.85 vs 2.27 ± 0.94</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>B4 vs B5</td>
<td>1.53 ± 1.04 vs 2.27 ± 0.94</td>
<td>0.00(HS)</td>
</tr>
</tbody>
</table>

SD - Standard Deviation; NS - Non-significant; HS - Highly-significant; S - Significant
Table 4: Comparison of Mean Microleakage Scores between Group A and B Samples. (Mann Whitney U test)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 VS B1</td>
<td>1.10 ± 0.92 vs 0.43 ± 0.73</td>
<td>0.02(S)</td>
</tr>
<tr>
<td>A2 VS B2</td>
<td>1.47 ± 1.22 vs 1.60 ± 1.22</td>
<td>0.64(NS)</td>
</tr>
<tr>
<td>A3 VS B3</td>
<td>0.93 ± 1.31 vs 1.20 ± 0.85</td>
<td>0.08(NS)</td>
</tr>
<tr>
<td>A4 VS B4</td>
<td>0.30 ± 0.65 vs 1.53 ± 1.04</td>
<td>0.00(HS)</td>
</tr>
<tr>
<td>A5 VS B5</td>
<td>0.60 ± 1.16 vs 2.27 ± 0.94</td>
<td>0.00(HS)</td>
</tr>
</tbody>
</table>

SD - Standard Deviation; NS - Non-significant; HS - Highly-significant

1. **Intragroup comparison of total etch technique**
   - Arabesk Flow (Group A4) and the Grandio SO Heavy Flow (Group B5) are found to be highly better, compared with Filtek Z-350 XT Flow (Group A1) and G-aenial Universal Flow (Group A2).

2. **Intragroup comparison of self-etch technique**
   - Filtek Z-350 XT Flow (Group B1) was better compared with other groups.
   - G-aenial Universal Flow (Group B2) was better compared with Grandio SO Heavy Flow (Group B5).
   - Beautifil Flow (Group B3) and Arabesk flow (Group B4) were better over Grandio SO Heavy Flow (Group B5).

3. **Intergroup comparison of both total etch and self-etch technique**
   - Filtek Z-350 XT (Group B1) was better in self-etch technique over total etch technique (Group A1).
   - Arabesk Flow (Group A4) and Grandio SO Heavy Flow (Group A5) was better in total etch technique over self-etch technique (Group B4 and Group B5).

**Discussion**

Traditionally, the tooth surface with questionable active caries has been contraindicated for sealant treatment. In these situations preventive resin restoration, which is a conservative approach to treat pit and fissure caries, has been shown to be very successful in studies over a period of 15 years. 11, 12

Nevertheless, temperature fluctuation in the oral environment can result in microleakage allowing bacterial
penetration at sealant enamel interface. The techniques of thermo-cycling and pH cycling are frequently used to determine the extent of microleakage of any restorative material. Microleakage strictly refers to ingress of oral bacteria, after breakdown of the resin tooth interface which has approximate diameter of 0.5 µm. Methylene blue was used in our study as the size of the molecules was 1.2 nm and moreover it is readily detectable under visible light, soluble in water and diffuses freely. Table 2 shows the mean microleakage scores of various subgroups of Group A samples. The lowest mean value was observed in Group A4 (0.30) whereas the highest mean value was observed in A2 (1.47). The lowest score of Group A2 could be attributed to the lower filler content (64%) and hence better flow and adhesion when compared to Group A2 which had a filler content of 69%. Table 3 shows the mean microleakage scores of various subgroups of Group B samples. The lowest mean value was observed in Group B1 (0.43) whereas the highest mean value was observed in Group B5. The lowest mean value of Group B1 could be due to the smaller particle size (20 nm) enabling better adhesion in comparison to Group B5 which had a particle size of 1000 nm. Table 2 shows comparison of mean microleakage scores within Groups A (total etch) samples using Mann-Whitney test. A4 and A5 were highly significant over A1 and A2.

Table 3 shows comparison of mean microleakage scores within Groups B (self-etch) samples using Mann-Whitney test. B1 was highly significant over the other groups. Table 8 shows intergroup comparison of different high strength flowable composite material. B1 was significant over A1 with p value of 0.02. This could be attributed to the formation of a better hybrid layer with good adhesion and less microleakage in self-etch technique, whereas the rinsing could have affected the hybrid layer in the total etch technique even though the particle size was smaller (20 nm). A4 and A5 was highly significant over B4 and B5 with p value of 0.00, which could be attributed to the lesser penetration of the material to the hybrid layer due to the larger particle size (700nm and 1,000nm respectively) resulting in less adhesion and more microleakage in the self-etch technique.

Conclusion

Within the limitations of the study, Arabesk flow and Grandio SO were highly useful in pediatric dentistry (Total etch technique). 3M (Filtekz350) was good in self-etch technique. As behaviour management and time consumption are very important factors in pediatric dentistry, self-etch materials are seen as a significant improvement over other etching techniques. Further clinical studies have to be carried out to draw relevant conclusions on the clinical perspectives.

Acknowledgement

Authors wish to thank DST-FIST (Ref no. SR/FST/College-23/2017) Government of India, New Delhi, for utilizing the funded research equipment facilities of Sree Balaji Dental College and Hospital, Pallikaranai, Chennai, Tamilnadu, India.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Cognitive Linguistic Profile Post Road Traffic Accident

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ABSTRACT

In India the incidence of Road Traffic accidents is reported to be 4,64,910 in 2017 among which 1,47,913 lives were dead and 4,70,975 persons were injured. Road traffic accidents result in various complications which will affect the person’s quality of life. One such complication is cognitive linguistic deficit. This case study is about a young man who has cognitive linguistic deficit which is a result of road traffic accident. The patient exhibited several complex cognitive-linguistic issues during the assessment. This includes reduced semantic memory, spared generative memory, reduced speech intelligibility, extensive surgical management and other behavioural problems. And he has speech and language difficulties such as reduced speech intelligibility, paraphasia, circumlocutions were present.

Keywords: Traumatic brain injury, cognitive-linguistic, paraphasia, circumlocution.

Introduction

More than 100,000 lives are lost in India every year and more than 1 million suffer from serious head injuries. The secondary brain injury can result in increased mortality and disability. Traumatic brain injury (TBI) is a sudden damage to the brain due to any blow or external force which is applied to the head. Causes may include car or motor cycle crashes, falls, sports injuries etc., TBI can result in cognitive linguistic impairment and it can often result from right hemisphere brain damage. But this does not have direct effect on language abilities. After TBI people can have problems with attention, problem solving, memory and interpretive language, in which it affects the communication abilities[1]. A person with a cognitive-linguistic disorder may have difficulty paying attention to a conversation, difficulty in topic maintenance, comprehending jokes and metaphors. And mostly cognitive linguistic impairment vary in severity, if a person is having mild deficit may simply have difficulty concentrating in a noisy environment[2]. In contrast if a person with a severe impairment may unable to communicate at all. Generally cognitive domains include memory, executive function, processing and problem solving skills. These domains are controlled by many cortical and sub cortical structures within the brain. If the frontal lobe of the brain becomes damaged due to any trauma, or a stroke happens in the right hemisphere, these cognitive processes can stop working properly. Cognitive deficits also affects the processing skills such as the ability to comprehend what others are communicating[3,4].

Case Presentation: The patient, aged 27, came to the department of speech and language pathology with the complaint of slurred speech. The patient is a case of road traffic accident polytrauma with left frontal depressed fracture and left fronto-parietal subdural haematoma with brain swelling, he underwent left fronto-temporo-parietal decompressive craniotomy and evacuation of subdural haematoma before one year at tertiary care hospital. Cranioplasty was done. The patient was alert, oriented and conscious during the assessment. Following speech, language and cognitive profile was assessed through formal and informal assessment. Speech profile includes since respiration is one of the pre-requisite
factor for speech production, the pattern of breathing was observed during non-speech and speech activity and the client has thoracic breathing pattern, breath support for speech was observed to be inadequate. Patient’s articulation was assessed and he is able to produce consonants and vowels in isolation, CV combinations, word, and sentence level but his speech intelligibility was observed to be poor hence speech intelligibility rating score is 4 (Can understand with difficulty and concentration by family members, but not by others). Articulatory errors were also observed to be present. Language profile reveals that the patient was able to comprehend simple sentences. He was observed to have paraphasia (paraphasia are unintended utterances) and circumlocution(Mostly observed in patients with aphasia when they have difficulty in retrieving any words)in his spontaneous speech. The patient was able to repeat the words and phrases presented by the clinician but was unable to repeat the sentences without missing out words. Confrontation naming, Lexical generative and responsive naming was spared. Word finding difficulties were observed to be present. Cognitive-linguistic profile includes : auditory subtests such as sound count, letter and word discrimination and month backward counting, he was unable to perform all the above mentioned task ; The patient’s episodic memory, working memory, semantic memory, reasoning and problem solving are assessed informally and it reveals impaired cognitive-linguistic skills. The following test tools are administered such as Frenchay’s Dysarthria Assessment (FDA is a test tool which is used to assess severity of Dysarthria) impairment were found in aspects with respect to respiration, function of tongue(protrusion) was observed to be inadequate, he also exhibits difficulty in alternate movements of lips during speech. Overall range and speed of articulators was observed to be reduced. He was unable to perform other task of laryngeal section(pitch variation and loudness variation and has reduced maximum phonation duration.). Speech intelligibility was observed to be reduced in sentence level and conversation. The patient’s speech intelligibility was assessed by using Aliyavar Jung National Institute of Hearing Handicap speech intelligibility rating scale (It is a rating which is assess the individual’s speech intelligibility) and he was given a score 4 (can understand with difficulty and concentration with family members, but not by others).Evaluation of speech subsystems revealed that the patient’s prosodic aspects were inadequate. No concerns regarding swallowing were raised. Through informal cognitive – linguistic assessment, the client had remarkable cognitive – linguistic deficits.

**Discussion**

Road traffic accidents are one of the major cause (60%) for traumatic brain injury followed by falls (20 to 25%)\(^5\). Almost 96 million people are estimated to suffer from traumatic brain injury caused by road traffic accident. Brain injury because of road traffic accident is more common among southeast Asia and Europe \(^6\). The higher order language, general language abilities and cognitive functions are more likely to be affected due to the traumatic brain injury and it was well supported by the study done by Caroline H.S Barwood et al., in which they had included 16 patients with mild traumatic brain injury and they examined the high -level language and cognition based test tools, it revealed the reduced cognitive-linguistic ability compared to age-matched group\(^7\).

**Conclusion**

Traumatic brain injury caused by road traffic accident can result in cognitive-linguistic deficits. Even though there are more studies which talks about cognitive-linguistic deficits due to traumatic brain injury there is a need for more studies across different regions and population. And detailed speech and language evaluation needed to be carried out and in order to assess higher-level language and cognitive-linguistic abilities formal test tools to be used by the speech-language pathologist.

**Ethical Clearance:** Not required since it is a review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCES**


“Eagle’s Syndrome Causing Dysphagia and Throat Pain”—A Case Report

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ABSTRACT

Eagle syndrome is a condition caused by an elongated ossified styloid process, the cause of which remains unclear. This is a rare finding that often goes undetected in the absence of radiographic studies. Eagle syndrome can occur unilaterally or bilaterally and most frequently results in symptoms of dysphagia, headache, pain on rotation of the neck, pain on extension of the tongue, change in voice, and a sensation of hypersalivation. In this case, we present the diagnostic CT and lateral view plain film radiography findings of a 42-year-old woman with clinical evidence of Eagle syndrome.

Keywords: Eagle’s syndrome; Styloid process elongation; Stylohyoid ligament Ossification

Introduction

Eagle syndrome is a condition caused by an elongated styloid process. Unilateral face, neck and ear pain, stinging pain, foreign body sensation and dysphagia can be observed with this syndrome. Rarely, the elongated styloid process may cause pain by compressing the cervical segment of the internal carotid and the surrounding sympathetic plexus, and that pain spreading along the artery can cause neurological symptoms such as vertigo and syncope.

Case Report: A 42-year-old woman presented at the Otolaryngology Clinic complaining of dysphagia and vague throat discomfort that she had experienced continuously for slightly more than a year. She also complained of occasional radiating pain to her left ear. She had no history of any neck trauma or any surgery done in the neck region.

During the physical examination, a solid mass was felt on palpation of the left tonsillar fossa, and radiographic studies were ordered. Lateral view plain film radiographs showed an elongated ossified styloid process, with the left larger than the right (Fig 1). CT provides complimentary information to that of plain radiography, including definition of the relationship of calcifications to surrounding neck soft tissue structures in the axial plane (Fig 2). On the left, the thick calcified process extended from the stylomastoid foramen to the hyoid bone. So she was diagnosed to have Eagle’s syndrome and was advised for surgical excision of elongated styloid process.

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Figure 1: Orthopantomogram showing elongated left styloid process
Figure 2: CT Neck sagittal reconstruction showing elongated left styloid process

Discussion

Eagle syndrome is a group of symptoms that includes recurrent throat pain, foreign body sensation, dysphagia, and/or facial pain as a direct result of an elongated styloid process or calcified stylohyoid ligament. Although approximately 4% of the population is thought to have an elongated styloid process, only a small percentage (between 4% and 10.3%) of this group is thought to actually be symptomatic. No data could be found to correlate degree of elongation of the styloid to severity of symptoms.

Diagnosis is made both radiographically and by physical examination. Palpation of the styloid process in the tonsillar fossa is indicative of elongated styloid, as the normal styloid process is not palpable. Palpation of the tip of the styloid should may exacerbate existing symptoms. Confirmation of Eagle’s syndrome can be made by radiographic studies. Most frequently, a panoramic radiograph is used to determine whether the styloid process is elongated. In reviewing these radiographs, it should be noted that the normal length of the styloid in an adult is approximately 2.5 cm whereas an elongated styloid is generally >3 cm in length. Although Eagle syndrome is thought to be caused by an elongated styloid process or calcified stylohyoid ligament, the presence of an elongated styloid process is not pathognomonic for Eagle syndrome because many patients with incidental findings of an elongated styloid process are asymptomatic. Lateral view radiographs of the skull can be substituted for panoramic radiographs (as in this case), and an anteroposterior view radiograph should be obtained to determine whether there is any lateral deviation of the styloid. As stated earlier, CT is useful in that it provides complementary information to that provided by plain radiographic studies.

The actual cause of the elongation is a poorly understood process. Several theories have been proposed: 1) congenital elongation of the styloid process due to persistence of a cartilaginous analog of the stylohyal (one of the embryologic precursors of the styloid), 2) calcification of the stylohyoid ligament by an unknown process, and 3) growth of osseous tissue at the insertion of the stylohyoid ligament.

The pathophysiological mechanism of symptoms is debated as well. Theories include the following: 1) traumatic fracture of the styloid process causing proliferation of granulation tissue, which places pressure on the surrounding structures; 2) compression of adjacent nerves, the glossopharyngeal, lower branch of the trigeminal, or chorda tympani; 3) degenerative and inflammatory changes in the tendinous portion of the stylohyoid insertion, called insertion tendonitis; 4) irritation of the pharyngeal mucosa by direct compression or post-tonsillectomy scarring (involves cranial nerves V, VII, IX, and X); and 5) impingement of the carotid vessels, producing irritation of the sympathetic nerves in the arterial sheath.

Treatment of Eagle syndrome is both surgical and nonsurgical. Nonsurgical treatments include reassurance, nonsteroidal anti-inflammatory medications, and steroid injections. Surgical treatment is by one of two methods. Otolaryngologist W. Eagle preferentially used a transpharyngeal approach through which the elongated portion of the styloid process was removed. Although this technique does avoid external scarring, it has been heavily criticized because of the increased risk of deep space neck infection and poor visualization of the surgical field (must be performed through the mouth). Alternatively, the elongated portion can be removed by an extraoral approach. Although both procedures are effective in removing an elongated styloid process, the extraoral approach is thought to be superior because of the decreased risk of deep space neck infection and better visualization of the surgical field.

Ethical Clearance: Approval obtained from the Ethics committee of Sree Balaji Medical College & Hospital

Conflict of Interest: None

Source of Funding: Self
REFERENCES


Management of Oropharyngeal Dysphagia Post Hemi-Mandibuloglossectomy

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ABSTRACT

Dysphagia is a growing concern in patients with tongue cancer that leads to malnutrition, dehydration, weight loss, reduced functional abilities, and fear of eating and drinking which can also lead to depression and reduced quality of life. Glossectomy is removal of the entire or parts of the tongue which may lead to difficulty in swallowing, speech, breathing activities etc. Rehabilitating patients with glossectomy pose a great challenge for the clinicians and hence a careful observation and evaluation of residual oral function should be always carried out in such patients. This article throws light on management of swallowing difficulty secondary to hemi-mandibuloglossectomy in a 79 year old male patient with tracheostomy and Ryle’s Naso-Gastric tube with the attempt of restoring the speech and function of the patient through speech and swallowing therapy.

Keywords: Dysphagia, mandibulo glossectomy, Aspiration.

Introduction

Dysphagia is present in almost 50% of head and neck cancer survivors. Often tongue cancer patients present with oro pharyngeal dysphagia and other co-morbidities like malnutrition, dehydration, weight loss, reduced functional abilities, and fear of eating and drinking which further deteriorates their inability to function and hamper their quality of life (QOL). Dysphagia is present in almost 50% of head and neck cancer survivors. Often tongue cancer patients present with oro pharyngeal dysphagia and other co-morbidities like malnutrition, dehydration, weight loss, reduced functional abilities, and fear of eating and drinking which further deteriorates their inability to function and hamper their quality of life (QOL)1.

Glossectomy is performed mainly for patients who have primary lesion in the tongue and other regions such as floor of mouth. Glossectomy results in severe oral dysfunction with swallowing and resultant aspiration. This procedure can be done via different approaches depending on the size and extent of the lesion. Other associated procedures that are done to glossectomy patients includes tracheotomy, feeding tube placement, neck dissection, floor of mouth resection or mandibulectomy. This case report describes the management of the oro pharyngeal dysphagia in patient with tongue cancer who underwent hemi mandibulo glossectomy and tracheostomy2,3.

Case History/Examination:

A 79 years old male patient reported with the chief complaint of difficulty in swallowing and impaired speech due to partial resection of tongue and the patient had a history of squamous cell carcinoma of the tongue and underwent tracheostomy and mandibuloglossectomy for the same. The patient was also assisted with nasogastrostomy tube for feeding (Ryle’s tube). The patient underwent videolaryngofluoroscope which revealed normal vocal fold movement, with mild aspiration on the left side. Both formal and informal assessments were carried out which includes functional intake oral scale, dry swallow, 4 finger test, Cranial nerve examination, modified water swallow test, Dysphagia severity scale, eating status scale. Vegetative skills such as biting, chewing, blowing, swallowing and sucking were observed to be inadequate. Speech intelligibility was assessed using

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AYJNHH revealed a score of 4 (i.e., can understand with difficulty and concentration by family members but not by others). Voicing was observed to be present (Stoma occluded). The patient also had normal pitch and quality with inadequate loudness and endurance. Drooling and pooling of food was observed to be present. The patient was unable to form and control bolus. The patient was unaware of residue present in his mouth, and hard palate. Reduced anterior and posterior tongue movement were observed. The patient also had slow oral transit time, reduced velar elevation/nasal regurgitation. Repeated swallow per bolus and reduced pressure on bolus was observed to be present.

Cranial nerve examination was done using MMSA. Functions of V cranial nerve was affected such as mouth opening, closing, moving the jaw left or right, open jaw while pushed up, clenching of teeth or biting together. Functions of IX cranial nerve such as pharyngeal movement, posterior one third of the tongue were affected. Sensory Functions of VII cranial nerve such as taste (Sweet, salt, sour and bitter) was observed to be affected which was assessed using solution of sugar, salt, vinegar and onion juice and motor functions of XII cranial nerve such as protrusion, and lateralisation were also observed to be affected.

Swallowing assessment done using dysphagia severity scale reveals Food aspiration with no effect of compensatory techniques or food consistency changes is seen, Saliva Aspiration and Oral problems with significant symptoms of preparatory or oral stage without aspiration were observed to be present.

Swallowing Therapy: Management involves hemimandibuloglossectomy surgery and speech and swallowing therapy was provided for 2 weeks, 40 minutes per day. Swallowing therapy techniques includes breathing techniques were provided in order to regulate the normal breathing for swallowing – occlusion of the stoma, supraglotticswallowing maneuver provided in order to protect the airway from aspiration of food and liquid by closing the airway before swallowing, Oro motor exercises for increasing oromotor control, to increase the swallowing pressure and for increasing the adductions of tissues top of the airway. Sensory stimulation (thermal-tactile stimulation), head tilt towards the stronger side and multiple swallowing techniques were used in order to improve the swallowing efficiently.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Pre Therapy Progress</th>
<th>Post Therapy Progress</th>
</tr>
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<tbody>
<tr>
<td>Modified water swallowing test</td>
<td>1 (no swallow, cough and/or frequent breathing)</td>
<td>3 (swallowed successfully with normal breathing)</td>
</tr>
<tr>
<td>Speech intelligibility rating scale</td>
<td>4 (can understand with difficulty and concentration by family members but not by others)</td>
<td>3 (can understand with concentration and effort specially by sympathetic listener)</td>
</tr>
<tr>
<td>Dysphagia severity scale</td>
<td>2&amp;3 (Food aspiration- food aspiration with no effect of compensatory techniques or food consistency changes)</td>
<td>2 (Food aspiration- food aspiration with no effect of compensatory techniques or food consistency changes).</td>
</tr>
<tr>
<td>Eating status scale</td>
<td>1(tube feeding scale)</td>
<td>2(oral &lt; tube)</td>
</tr>
<tr>
<td>Food test</td>
<td>-</td>
<td>3 (swallowed successfully with normal breathing)</td>
</tr>
<tr>
<td>Functional intake oral scale</td>
<td>1 (tube dependent- nothing by mouth)</td>
<td>3 (tube dependent with consistent intake of liquid or food)</td>
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Discussion

Oropharyngeal dysphagia was present in 50.6% of patients, mostly to solid foods (72.4%)(4). The complete rehabilitation of glossectomy patient, aims at improving the resonance, developing altered articulating surface as well as the pattern which would diminish the deficiencies related to speech and deglutition(1).

This article presents a case report on the management of swallowing consequent to hemimandibuloglossectomy with the attempt of restoring
the comfort, speech and function of the patient through speech and swallowing therapy. Glossectomy patients experience difficulties in the pharyngeal phase of swallowing as well as in the oral phase.4,5,6

Post-swallow residue is considered to be a sign of swallowing impairment and on subsequent swallows it is assumed to pose a risk on aspiration. Post-swallow residue in one or both pharyngeal spaces was significantly associated with impaired swallowing safety on the subsequent clearing swallow for the same bolus (2). Swallowing therapy techniques includes breathing techniques were provided in order to regulate the normal breathing for swallowing – occlusion of the stoma, supraglottic swallowing maneuver provided in order to protect the airway from aspiration of food and liquid by closing the airway before swallowing, Oro motor exercises for increasing oromotor control, to increase the swallowing pressure and for increasing the adductions of tissues top of the airway.8,9,10

**Conclusion**

Evaluation of the patient with Hemi mandibuloglossectomy along with the tracheostomy due to tongue cancer has its impact on swallowing which results in the oropharyngeal dysphagia and reduced clarity in speech. All these difficulties can be restored with the appropriate swallowing and speech therapy options. Well planned efforts could provide efficient and successful rehabilitation, by restoring the comfort and functions of the patient in swallowing, speaking and also enhances the quality of life that are best accomplished in an interdisciplinary team environments.

**Ethical Clearance:** Not required since it is a case report

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCES**


“Osteopoikilosis–Benign Osteosclerotic Dysplasia”—A Case Report

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ABSTRACT

Osteopoikilosis is a rare autosomal dominant or sporadic osteosclerotic dysplasias characterised by homogenous, small, multiple, discrete, symmetric round or ovoid radio densities in cancellous bones. Recognition of this asymptoamatic condition by plain radiograph makes other expensive investigations unnecessary. Here we present a case report of 28 yrs-old male incidentally found to have osteopoikilosis.

Keywords: Osteopoikilosis, Benign bone lesions, Asymptomatic

Introduction

Osteopoikilosis is an asymptomatic, autosomal dominant or sporadic, sclerosing dysplasia characterized by multiple, discrete round or ovoid radio densities in cancellous bones.

Case report: A 28 yrs-old male with history of trauma 2 months ago and complains of right upper limb weakness since then came for MRI brain study as suggested by neurologist. MRI revealed a subacute intraparenchymal hemorrhage in left parietal lobe with peri-lesional edema. Radiograph of right shoulder joint was done which revealed multiple, discrete round/ovoid radio densities juxta-articularly involving head of humerus and scapula. Radiograph findings were consistent with Osteopoikilosis. Radiographs of left shoulder joint and pelvis were done to look for involvement of other bones. Consent was taken from the patient.

Discussion

Osteopoikilosis (Osteopathia condensans disseminata; Spotted bone disease) is an asymptomatic sclerotic dysplasia initially described by Albers-Schonberg and Ledoux-Lebard and associates in the early twentieth century. This disorder is seen in both men and women and may become evident at any age. Both inherited and sporadic forms have been reported. An autosomal dominant pattern that becomes more and more prominent in each succeeding generation has also been described.1,2

Osteopoikilosis is an asymptomatic, clinical manifestations, if present are usually mild. Radiologically the abnormality appears as small, well defined, ovoid or lanceolate sclerotic lesions arranged symmetrically around the joints, more commonly the epiphysis and metaphysis of long tubular bones.1–4 Histopathologically these lesions correspond to lamellar osseous tissue containing Haversian systems.3,4

Dermatological abnormalities in form of closely situated, elevated, whitish fibrocollagenous infiltrations (dermatofibrosis lenticularis disseminia or the Buschke–Ollendorff syndrome), a predisposition to keloid formation and scleroderma like lesion are seen in approximately twenty five percent of the cases. Associations with dwarfism, dystostias, premyelopathic

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syndrome due to spinal stenosis, organ anomalies (coarctation of aorta, double ureter) and in 15–20% of patients mild articular pain with or without joint effusion have also been reported.2,3

In an epidemiological study of familial Osteopoikilosis by Benli et al a predominance of these lesions was found in the phalanges of hand (100%) followed by carpal bones (97.4%), metacarpals (92.3%), foot phalanges (87.2%), metatarsals (84.4%), tarsal bones (84.6%), pelvis (74.4%), radius (66.7%), ulna (66.7%), sacrum (58.9%), humerus (28.2%), tibia (20.5%) and fibula (12.8%).5

On serial radiographs these sclerotic lesions may show an increase or decrease in size or number with occasional disappearance in children, in sharp contrast with adults in whom these lesions remain more or less static.1

Differential considerations for this abnormality include osteoblastic metastases, tuberous sclerosis and mastocytosis. The blastic metastases primarily involve the axial skeleton, demonstrate osseous destruction and show uptake on bone scintigraphy. The sclerotic lesions in mastocytosis and tuberous sclerosis on the other hand are less well defined, asymmetric and show lesser periarticular preference.6 These findings along with exclusion of the primary malignancy by imaging of the prostate, serum PSA levels, endoscopy, colonoscopy, breast imaging and other ancillary tests may help to arrive at the diagnosis of Osteopoikilosis.

However, Mungovan et al suggested that in a setting of characteristic radiological findings of Osteopoikilosis an abnormal bone scan does not exclude its diagnosis.7

Conclusion
Diagnosis of this asymptomatic condition by plain radiograph makes other expensive investigations unnecessary. Review of other sclerosing bone dysplasias is made to guide easy assessment of such lesions and differentiating the pathologies.

Ethical Clearence: This study was duly cleared by the ethics committee of Sree Balaji Medical college & Hospital

Conflict of Interest: Nil

Source of Funding: Nil

REFERENCES
**Xylene—A Potential Health Hazard—A Review**

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**ABSTRACT**

Xylene is a colorless liquid with the molecular formula C₈H₁₀. A flammable, non-explosive aromatic hydrocarbon, xylene consists of a benzene ring with two attached methyl groups. Xylene occurs naturally in petroleum and small amounts occur in gasoline and jet fuel. It is used in paints, inks, glues and other products. The population at large is expected to be exposed primarily to mixed xylenes, rather than to any of the xylene isomers individually. The general population can be exposed to xylene via inhalation of indoor and workplace air, automobile exhaust, tobacco smoke, xylene-containing solvents, ingestion of contaminated drinking water, and dermal absorption of xylene containing products. Xylene is released primarily from industrial sources. The existence of hazards in the workplace has raised concerns about the potential of these substances for adverse effects.

**Keywords:** Xylene, Dyspnoea, Occupational

**Introduction**

Xylene (Greek word xylo, -wood), xylol or dimethyl benzene is any one of three isomers of dimethyl benzene, or a combination thereof. With the formula (CH₃)₂C₆H₄, each of the three compounds has a central benzene ring with two methyl groups attached at substituents. They are all colorless, flammable liquids, some of which are of great industrial value. The mixture is referred to as both xylene and, more precisely, xylenes. Xylene is released primarily from industrial sources. Studies have shown that xylene is well-absorbed by the inhalational, oral and to some extent by the dermal route. Following prolonged exposure especially by occupational means it is likely to get accumulated chiefly in the muscle and adipose tissues. The health effects of xylene depend on the route of its exposure (1). Inhalational exposure is the most common route of exposure (2, 3). Most of the xylene that enters the body leaves within 18 h following the end of the exposure. Significant amounts of xylene can get accumulated in the body on prolonged exposure as seen in occupationally exposed personnel. Several health hazards have been identified with acute and chronic xylene exposure. These can range from milder symptoms such as dizziness to severe lung congestion with focal areas of interalveolar hemorrhage followed by death. Chronic exposure often results in dizziness, eyes, nose and throat irritation.

**Routes of Exposure:** Exposure to xylene can occur via inhalation, ingestion, eye or skin contact. It is primarily metabolized in the liver by oxidation of a methyl group and conjugation with glycine to yield methyl hippuric acid, which is excreted in the urine. Smaller amounts are eliminated unchanged in the exhaled air. Xylene causes health effects from both acute (<14 days) and also chronic (>365 days) exposure. The type and severity of health effects depends on several factors, including the amount of chemical you are exposed to and the length of time you are exposed for. Individuals also react differently to different levels of exposure. (4)
Inhalational exposure: Acute inhalational exposure to mixed xylene at 200 ppm for 3-5 minutes resulted in irritation of the nose and throat (5). An autopsy of a worker who died owing to several hours of exposure to xylene fumes while painting and reported focal areas of intra-alveolar haemorrhage and pulmonary oedema with severe lung congestion were seen at the acute exposure of 100 ppm (6). An extensive study has reported the signs and symptoms of workers who have been chronically exposed to mixed xylene. A significant increase in throat and nasal irritation has been found in study. Decreased pulmonary function and dyspnoea was reported among histology technicians chronically exposed to xylene in the laboratory. In the same study cardiovascular effects such as flushing, palpitations and chest pains were seen among the histology technicians (7). The author also reviewed 175 workers who are chronically exposed to mixed xylene at 14 ppm has observed a reduction in the grasping power in the extremities. No adverse hepatic and renal effects were observed in the same palpitations and chest pains (8). Several authors have reported various gastrointestinal symptoms such as gastric discomfort, nausea and vomiting in workers chronically exposed to xylene vapours. A number of subjective neurological symptoms such as anxiety, dizziness, inability to concentrate and forgetfulness have been observed among subjects chronically exposed to xylene vapours. A number of subjective neurological symptoms such as anxiety, dizziness, inability to concentrate and forgetfulness have been observed among subjects chronically exposed to xylene vapours (7, 8). Spontaneous abortions were observed in females as pathology technicians who are exposed to formalin and xylene. Although the study could not conclusively conclude that xylene was the direct cause of this effect (9).

Oral exposure: In a post-mortem examination of a person who had committed suicide by the consumption of xylene, occurrence of pulmonary congestion and oedema were noted. No adverse effects were noted in the cardiovascular or gastrointestinal systems. The report was concluded that the death of the person was due to a centrally mediated depression of the respiratory system (10). In the report of an accidental ingestion of xylene in a person, it was found that it resulted in a persistent coma for more than 26 hours (11).

Dermal exposure: In acute dermal exposure of xylene by hand immersion technique in humans by Engstrom et al., and Riihimaki and Pfaffli, it was reported that it was associated with vasodilatation of the skin of the hand, dryness and scaling of the area and skin erythema of the hand. It was also found that in patients with a history of atopic dermatitis who were symptom-free, it resulted in the development of toxic eczema of the hands of such subjects on exposure to xylene. It was also found that in such patients a three time greater absorption rate of xylene was observed compared to the other subjects in the study (12, 13).

Palmer and Rycroft in 1993 also reported the occurrence of urticaria in a female technician of cytology laboratory who was predominantly exposed to vapours of xylene in the occupational environment. It was effectively proved that it was as a result of direct exposure to xylene by the performance of a closed patch test which elicited severe erythema and whealing of the skin (14).

Ocular exposure: Industrial exposure often means simultaneous exposure to a mixture of chemical agents. Many aliphatic and aromatic industrial solvents cause neurotoxic symptoms. Short-term exposure to xylene concentrations below the Finnish threshold limit value (4.1 µmol/l, 435 mg/m3) probably does not cause significant disturbances in the vestibular or central visual system. Higher peak exposure to xylene, particularly combined with the influence of alcohol, might increase accident hazards during or after work (24). Several studies have been observed irritation of the eye on exposure to xylene vapours (5, 6, 15).

Nervous System: The main effect of inhaling xylene vapor is depression of the central nervous system, with symptoms such as headache, dizziness, nausea and vomiting. The effects listed below can begin to occur with exposure to air levels of about 100 ppm. They are reversible and become more noticeable and serious as the length of time of exposure increases (16). Effect of xylene on the central nervous system is attributed to the liposolubility of xylene in the neuronal membrane. It has been suggested that xylene disturbs the action of proteins essential to normal neuronal function either by disruption of the lipid environment in which the membrane proteins function or by direct interaction with the proteins in the membranes (17). It has been suggested that a metabolic intermediate like methyl benzaldehyde could be responsible for the toxicity of xylene. Oxidation of xylene to these intermediates by microsomal enzyme systems may occur in the brain (17). Changes in the levels of various neurotransmitters and lipid composition have been observed in several brain areas following acute- and intermediate-duration exposure to xylene. It is
unclear whether these represent direct effects of xylene or are secondary changes resulting from nonspecific central nervous system depression. Long-term exposure may lead to headaches, irritability, depression, insomnia, agitation, extreme tiredness, tremors, impaired concentration and short-term memory. This condition is sometimes generally referred to as “organic solvent syndrome.” Unfortunately, there is very little information available that isolates xylene from other solvent exposures in the examination of these effects.

**Eyes, Nose and Throat:** Xylene is a strong compound that is used in many household and industrial products. Xylene poisoning can occur when someone swallows these substance by accident and breathes in their fumes. Exposure to approximately 200 ppm can cause Irritation of the nose and throat. Unintentional splash in the eye may damage the surface of the eye, which will heal within a few days.

**Lungs:** Irritation to lungs causes chest pain and shortness of breath when exposed to xylene at a levels of 200 ppm or greater. Extreme overexposure (e.g., in a restricted space) can result in pulmonary edema, a potentially life-threatening condition in which the lungs fill with fluid. However, there is no evidence that repeated, low-level exposure has any long-term effects on the lung.

**Liver and Kidney:** At very high levels of exposure of xylene can injure the liver and kidneys, but this is extremely unlikely to happen without noticeable effects on the nervous system. Generally, such damage is reversible. Low-level occupational exposure does not affect the liver and the kidneys.

**Blood:** There is no evidence that exposure to xylene affects the blood cells in humans. Earlier reports of low red blood cell counts (anemia) may have been due to contamination of xylene with benzene.

**Gastrointestinal Tract:** Symptoms of nausea, vomiting and gastric discomfort were observed in workers exposed to xylene vapors which were reversible.

**Musculoskeletal System:** Workers exposed to xylenes (TWA 14 ppm) reported reduced grasping power and reduced muscle power in the extremities more frequently than the unexposed controls. This is due to the neurological effect rather than a direct effect on the muscles.

**Skin:** Xylene, like other organic solvents, can dissolve the skin’s natural protective oils. Frequent or prolonged skin contact can cause irritation and dermatitis, dryness, flaking and cracking of the skin. Damaged skin may allow greater absorption of chemicals. Xylene easily penetrates most ordinary clothing and can become trapped in ordinary gloves and boots. Xylene trapped in the clothing can cause burns and blistering.

**Cancer:** There is inadequate evidence for the carcinogenicity of Xylene in humans.

**Reproductive System:** The available animal information is insufficient to connect xylene with any reproductive effects. Xylene has produced fetotoxic effects like delayed ossification and behavioral effects in animals, in the absence of maternal toxicity. Xylene inhaled by a woman can reach a developing fetus and can contaminate her breast milk. It is recommended that pregnant and nursing women minimize their exposure to xylene, just as they should minimize their exposure to alcohol, tobacco and other drugs.

**Conclusion**

This study suggests implementing environmental monitoring systems and giving special attention in order to reduce the hazards of xylene. It is carcinogenic for blood components with other aromatic hydrocarbons, so single xylene should be evaluated both in occupational and experimental studies. Xylene emission is high in developed, developing as well as in underdeveloped countries due to extensive usage of petroleum refineries, vehicles, industries and chemical plants. So toxicologists give attention to its noxious effects with its long term use on public health and high exposure of xylene. Efforts to diminish the health hazards in the environment should be made to generate a safer living atmosphere by making the environmental health departments familiar with the health hazards of xylene, safety measures and emergency procedures. Usage of proper personal protective equipment is essential such as decent fume hood, proper white coat, and eye protector, mask to cover nose and mouth, while dealing with health hazardous chemicals like xylene.

**Ethical Clearance:** Not required since it is a review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil
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Phytochemical analysis of the Ethanolic Extract of the Leaves of Gymnema Sylvestre

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ABSTRACT

Gymnema sylvestre is a medicinal plant for the potential management of diabetes mellitus. The leaves are used in herbal medicinal preparation. The present study deals with the antidiabetic and hypolipidemic properties with ethanolic extract of Gymnema sylvestre leaves. The result of the phytochemical study shows its therapeutic value and for treating the patient with type 2 diabetes mellitus.

Keywords: Gymnema sylvestre, Glycosides, Hypoglycemic, Diabetes mellitus.

Introduction

During the last decades, the medicinal plants are used for long term therapy for human diseases. However, now a day, there is an increased demand for using herbs in therapy instead of using synthetic drugs which may have adverse effects on human.

Prevalence of diabetes is increasing with increased changes in the lifestyle at alarming rate. Gymnema sylvestre (Fig-1) is a valuable belonging to the family Asclepiadaceae commonly known as ‘Gurmar’, is one of the most important indigenous medicinal plants of India. The use of this plant is to cure diabetes mellitus in India. The plant is documented to have a beneficiary effect in diabetes due to presence of gymnemic acid.

The gymnemic acid (Fig-2) in leaves suppresses the transport of glucose from the intestine into the blood stream resulting lowering of blood sugar level, cholesterol level, balancing insulin level and also promotes weight loss. Traditionally Gymnema or gurmar is a large woody climbing plant. Both the dried leaf and root powder are used for diabetic medicine. The leaves of Gymnema are reported to be bitter flavor, they temporarily paralyze the sensory perception of sweet and it is also known as sugar destroyer for this amazing property. Gymnema leaves

Fig.1: Gymnema sylvestre

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have the mixture of bioactive constituents tri-terpenes, glycosides and saponin property viz, gymnemic acid, gymnemagenin and gurmarin which represents the antidiabetic property. The leaves of the plant are also used as a digestive, hypoglycemic, antiviral, antiallergic and antiobesity (2) agent for the treatment of diabetes, obesity and dental caries. The main constituent of Gymnema is believed to be gymnemic acid, a mixture of 17 different saponins. This plant consists of gymnamine and the dammarene-type saponins gymnemasides1-5 is responsible for hypoglycemic and antisaccharin effect of the plant. The purpose of this work is concern with screening the plant for antidiabetic and hypoglycemic properties of leaves of Gymnema sylvestre. Gymnema sylvestre has anti diabetic properties and the plant is used as an herbal medicine through the world. Plant triterpenoid Saponin in the cells of plant parts called gymnemic acid and its component gymnemagenin which is the principle control of diabetic (1).

The plant has been used in traditional medicine, most notably to control blood sugar. The Gymnema is used as a lipid-lowering agent and for weight loss has also been examined, primarily in animal studies. However, less or no information is available to support the use of Gymnema for any indication.

Morphology of Gymnema sylvestre:
Gymnemasylvestre (3) is a large, stout, much-branched woody climber. Leaves are opposite, more or less pubescent, usually elliptic or ovate. The flowers are small and yellow in colour, up to 3 inches in length. The taste of leaf is slightly bitter. Chewing the leaves destroys the ability to discriminate the sweet taste, giving it its common name, gurmar or sugar destroyer (4). Gymnema sylvestre is one of the plants with antidiabetic property. The Gymnema leaf powder has a faint pleasant aromatic odour which is tasteless.

Uses of Gymnema:

The following are the wide range of uses of the Gymnema sylvestre

- Reduction in the blood sugar
- Weight loss
- Metabolic syndrome
- Root juice for snake bite
- Root bark is useful as an emetic and expectorant
- Analgesic for body ache
- Also used for malaria and, digestive stimulant, laxative, appetite suppressant and diuretic.
- Moreover it is used as Anti-inflammatory, anodyne (painkiller), liver tonic, emetic, thermogenic, stomachic, anthelmintics, cardiotonic, expectorant, antiptyretic, and uterine tonic.
- Significance place in the treatment of jaundice, constipation, cardiopathy, asthma, bronchitis, amenorrhoa, conjunctivitis, renal and vesical calculi, dyspepsia, leucoderma, and Parkinsonism.
- Conditions like piles, colic pain, dyspsy, phlegm, eye troubles, cardiac, and respiratory diseases are treated with the extract of this plant.

Side Effects of Gymnema: Chronic usage of the drug leads in lowering the blood pressure. It is a hepatotoxic substance which causes damage to the liver. The Gymnemic acid and Gurmarin suppresses the ability to detect the sweet taste (4). Gymnema has been reported to possess a sweet-taste suppressing effect, attributed to the peptide gurmarin (5-9)

Phytochemical Screening: Chemical test were carried out using standard procedures to identify the constituents as described.

Freshly prepared extracts were subjected to preliminary phytochemical analysis to find the presence of the following phytoconstituents, Cardiac glycosides, Anthraquinones, Tannins, Saponins and alkaloids have hypoglycemic (11) activities. These analyses will determine the biologically active compounds that contribute to the flavour, colour and other characteristics of leaves and show their medicinal activity and the hypoglycemic activity of the plant extract.

Sample Extraction were carried out with ethanol and the resulting extract was utilized for the phytochemical analysis

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tests</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>2'</td>
<td>Flavanoids</td>
<td>-</td>
</tr>
<tr>
<td>3'</td>
<td>Glycosides</td>
<td>+</td>
</tr>
<tr>
<td>4'</td>
<td>Steroids</td>
<td>+</td>
</tr>
<tr>
<td>5'</td>
<td>Triterpenoids</td>
<td>+</td>
</tr>
<tr>
<td>6'</td>
<td>Coumarin</td>
<td>+</td>
</tr>
<tr>
<td>7'</td>
<td>Phenol</td>
<td>+</td>
</tr>
</tbody>
</table>
8' Tanin +
9' Protein -
10' Saponins +
11' Sugar +
12' Anthocyanin -
13' Betacyanin -

Note: +-> Indicates Presence and - -> Indicates Absence of the Phytocomponents

Chromatography: Identification of Gymnemagenin By Thin Layer Chromatography:

After hydrolysis: 100 mg of Gymnema sylvestre extract was dissolved in 10ml of 50% ethanol, and then add 2ml of KOH and heat on a boiling water under refluxed for an hour and then cooled. In this 1.8ml of 1N HCL was added and heated on water bath after cooling the solution. The pH was adjusted to 7.5 to 8.5 with 11%KOH. This solution was dissolved with 50% ethanol and filtered, then 10 microlitre was applied on thin layer chromatography. Gymnemagenin is identified after hydrolysis, and the plate is kept in the solvent system for absorption. The solvent system proportion should be isopropyl alcohol:methanol:chloroform:acetic acid (5:1:3:0.5). Finally, the plate were dried to enable the full colour spot which shows the presence of Rf value 0.34. The (Fig-3) shows the presence of gymnemagenin is given below

![Fig. 3: Thin layer Chromatography](image)

Standard Quantity:

Adult Oral administration (age ≥18):

Hyperlipidemia: patients with type 2 diabetes mellitus, 400mg of Gymnema extract for 18–20 months or 2ml of an aqueous decoction (10 g shade-dried powdered leaves per 100ml), three times daily.

Conclusion

Herbal compounds have received much attention for management of various diseases. When compared it is also safer than synthetic drugs. Anatomical characterization provides further support towards authentication and elimination of adulteration of market sample of potent medicative plants as Gymnema sylvestre. The Gymnema leaf main part is gymnemic acid contains gymnemagenin, which plays a role by treating the diabetic. Presence of different types of phytochemical constituents such as alkaloids, tannins, saponins, anthraquinone and glycosides give an idea that the ethanolic leaf extract of Gymnema Sylvestre can be used as an accessible source for type 2 diabetes mellitus. Further research is necessary to find the active compounds within these plants with their full spectrum of efficacy.

Acknowledgement

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Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

Source of Funding: Self.

Conflict of Interest: Nil.

REFERENCES


Occupational Hazards of Xylene and its Preventive Measures

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ABSTRACT

Xylene is an aromatic hydrocarbon known for its wide usage in tissue processing, staining and cover slipping in the histology laboratory. The hazards of xylene are well documented, making it a potential occupational hazard for the histopathological technicians. As every other profession became cautious of the occupational hazards, the very speciality that identifies the illnesses became one of the last to become aware and remedy its own hazards. This article aims to discuss the toxicity of xylene and safety measures to counteract the hazards of xylene.

Keywords: Toxicity of xylene, xylene substitutes, xylene

Introduction

The primary purpose of this study is to provide public health officials, physicians, toxicologists, and other interested individuals and groups with an overall perspective of the toxicology of xylene. Xylene or xylol or dimethyl benzene is an aromatic hydrocarbon liquid which is widely used in industry and medical laboratories as a solvent. Xylene is primarily a synthetic chemical. It is a colorless, flammable liquid or gas occurring naturally in petroleum, coal and wood tar, with sweet smell and is so named because it is found in crude wood spirit (Gr. xy‘lon-wood). [1] Xylene was first isolated and named in 1850 by the French chemist Auguste Cahours (1813–1891), having been discovered as a constituent of wood tar. [2]

C₆ H₄ (CH₃)₂ is the chemical formula. It is referred to as “dimethyl benzene” because it consists of a six-carbon ring to which two methyl groups are bound. The three forms of xylene in which the methyl groups differ on the benzene ring: metaxylene, ortho-xylene, and para-xylene (m-, o-, and p-xylene). These different forms are referred to as isomers.

The current Occupational Safety and Health Administration permissible exposure limit for xylene is 100 ppm as an 8-h time-weighted average (TWA) concentration. [2] The National Institute for Occupational Safety and Health recommended exposure limits for Xylene at 100 ppm as a TWA for up to a 10-h work shift and a 40-h work week and 200 ppm for 10 min as a short-term limit. [3]

Studies have shown that xylene is well-absorbed by the inhalational, oral and to some extent by the dermal route. The amount of biomarker of xylene exposure in urine can be analyzed using techniques such as High Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC) [1]. Inhalational exposure is the most common route of exposure [1, 4].

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Uses of Xylene: There are many uses of xylene, both in its pure state and in compounds. It is widely used in several industries as well as in dental and medical arenas.
In histology, xylene is used to process and stain tissues. These tissues can then be used in microscopy. This aids histopathology technicians who look at tissues to determine the presence of disease. In tissue processing, tissue has to be embedded in a medium (such as paraffin) to support it and allow it to be cut without damaging the tissue. Fixed tissue is then dehydrated, removing water from the tissue by escalating grades of alcohol. Alcohol, however, is not miscible with paraffin (something that is miscible can mix well with another substance).

Exposure Risks of Xylene: Xylene also poses risks to skin and eyes and is considered a skin irritant. The skin quickly absorbs it. Because xylene is so efficient at removing fats, any contact with the skin will have the same effect. This can lead to drying and cracking of the skin and dermatitis.

Relevance to Public Health: People may be exposed to xylene at hazardous waste sites by inhalation of contaminated air, drinking contaminated water, or dermal contact with contaminated water or subsurface soils and sediments. Both human and animal data suggest that mixed xylene, m-xylene, o-xylene, and p-xylene all produce similar effects, although the individual isomers are not necessarily equal in potency with regard to a given effect. Available case reports, occupational studies, and studies on human volunteers suggest that both short- and long-term xylene exposures result in a variety of adverse nervous system effects that include headache, mental confusion, narcosis, alterations in body balance, impaired short-term memory, dizziness, and tremors.

Preventive Measures

Substitution: After the hazardous effects of xylene became unquestionable, many potential substitutes became available. The Substitutes should perform the same function and also should lessen the hazard. The following chemical components like Limonene reagents, Aliphatic hydrocarbon mixtures, Aromatic hydrocarbon mixtures and Mineral oil mixtures are the substitutes marketed with various trade names. These components have their own advantages and disadvantages.

Local exhaust ventilation: The workplace can be modified to reduce the inhalational hazards by installing local exhaust ventilation with a proper hood. This is very effective in controlling the hazards because it removes the contaminant rather than diluting it. It should be in a fixed position, located close to the source of the hazard. A well-designed hood takes advantage of the natural movement of the contaminant. As the air moves through the duct, it creates friction against the duct walls. Friction is greater at the corners, bends and obstructions of the duct. The overall duct length should be kept as short as possible with as few bends as possible. Various types of air-cleaning devices can be used, like fabric filters, charcoal filters, cyclones, electrostatic precipitators and scrubbers.

Proper protective equipment: Personal hygiene practices and protective equipment reduce the amount of a substance that is absorbed by the worker’s body after he or she has been exposed to it and also prevent hazardous toxic chemicals from being carried home. They include

- Thoroughly washing hands and removing outer protective clothing before entering clean areas
- Usage of impervious clothing such as Buna-N-rubber or Viton gloves and impervious aprons
- A face mask or full-face organic respirator to reduce the inhalational hazards
- Safety goggles/face shields for eye protection
- Periodic medical examinations and biological monitoring of the worker’s body fluids to detect if the exposure to xylene is within limits.

Routine Observation: Xylene can be detected in the end-exhaled air, venous blood and the urine of exposed individuals. However, urinary levels of methylhippuric acid, a metabolite of xylene, appear to correlate better with airborne xylene concentrations than blood or breath concentrations of xylene. Determination of a worker’s exposure to airborne xylene is made using a charcoal tube (100/50 mg sections, 20/40 mesh). Samples are collected at a maximum flow rate of 0.2 L/min until a maximum air volume of 12 L is collected. The sample is then treated with carbon disulfide to extract the xylene. Analysis is conducted by gas chromatography using a flame ionization detector. This method has a sampling and analytical error of 0.10.

Emergency Procedures: In the event of an emergency, remove the victim from further exposure, send for medical assistance and initiate the following emergency procedures.
1. **Eye exposure:** If xylene or a solution containing xylene gets into the eyes, immediately flush the eyes with large amounts of water for a minimum of 15 min, lifting the lower and upper lids occasionally. Get medical attention as soon as possible.

2. **Skin exposure:** The contaminated skin should be washed with soap and water for at least 15 min. If irritation persists, get medical attention.

3. **Inhalation:** If xylene vapors are inhaled, move the victim at once to fresh air and get medical care as soon as possible. If the victim is not breathing, perform cardiopulmonary resuscitation; if breathing is difficult, give oxygen. Keep the victim warm and quiet until medical help arrives.

4. **Ingestion:** If xylene or a solution containing xylene is ingested, give the victim several glasses of water to drink. Get medical help immediately. Do not induce vomiting if the person is unconscious as it is associated with the danger of pulmonary aspiration.

**Discussion**

Xylene, a synthetic hydrocarbon produced from coal tar, is a widely used as a universal solvent. Various health effects due to xylene exposure have been documented in the literature. A number of theories exist for the mechanisms by which xylene exerts its toxic effects on the various systems of the body. The pulmonary, gastric, and ocular effects of xylene are attributed to the irritant nature of the chemical [1]. Some authors have suggested that certain metabolic intermediates such as methylbenzaldehyde may be responsible for the toxic effects of xylene. Inhibition of pulmonary microsomal enzymes by the binding of such toxic metabolites thereby inactivating the enzymes also might contribute to the toxic nature of xylene [10].

The mechanism of nephrotoxicity of xylene may be related to the reactive metabolite formation which subsequently causes irritation of the renal tissues or direct membrane fluidization [1, 10,11,12]. Padilla and Lyerly in their study have demonstrated a decrease in the axonal transport of stimuli following xylene exposure [13]. A decreased hypothalamic catecholamine levels following exposure to xylene has been observed by Andersson et al., [14,15].

Dermal absorption is also a major route of xylene exposure especially among the laboratory workers. Hino et al., has stated that workers with eczema of the hands had higher urinary methyl hippuric acids (xylene metabolite). He has attributed the removal of ceramide of the corneal layer of the skin epithelium thereby leading to the disruption of epithelial barrier to this exaggerated percutaneous absorption of xylene in such atopic individuals [16,17].

In case of oral exposure emesis with ipecac syrup could be done only when one is certain that there is no likelihood of aspiration thereby leading to aspiration pneumonitis [1, 18]. Ellenhorn and Barceloux have suggested the usage of activated charcoal in order to limit the absorption of the chemical in the intestines [1,19]. Sevcik et al., has performed haemodialysis and haemperfusion in order to hasten the removal of xylene from the body [1,20,21].

The biological exposure index of xylene according to ACGIH is 1.5 grams of methyl hippuric acid per gram creatinine in the urine of the exposed workers [22]. As the level of urinary methyl hippuric acid correlates to that of xylene exposure, steps should be taken to detect their levels in the urine of workers periodically. Increase in the levels of the urinary metabolite warrants the necessary steps to reduce their exposure [1,23].

In the field of medical technology histopathology technicians are occupationally exposed to xylene as it forms an integral part of pathological laboratory as a clearing agent of tissue samples. In recent years many researchers have identified xylene substitutes [22].

Ankle and Joshi have suggested the usage of diluted dish washing solution (DWS) to deparaffinise histopathological tissue sections [24]. Metgud et al., have done a study to compare the advantages of xylene free methods over conventional xylene during routine tissue processing. They concluded that such alternatives produced equally good histopathological results [25].

Kunhua et al., have suggested the usage of White oil No. 2 and 14% N-Heptane (SBO) as a novel non-toxic xylene substitute [26]. Premalatha et al., have reported that Mineral oil is a bio friendly substitute of xylene for deparaffinisation of histological sections [27]. Buesa and Peshkov have also highlighted the usage of vegetable oils and limonene based substitutes as clearing agents in the place of xylene [28, 29]. The introduction of such substitutes can help in circumventing the toxic effects of xylene [28-30].
Conclusion

Efforts to reduce the health hazards in the histology laboratories should be made to create a safer working atmosphere by making the histopathology technicians more familiar with the health hazards of xylene, safety measures and emergency procedures. The hazards of xylene are well documented, but the substitutes are not so thoroughly evaluated. Most of the less-expensive alternatives to xylene do not have the same miscibility with alcohol, wax and resinous mountants, and nearly all are sold under trade names without any obvious disclosure of the chemicals of which they are composed. The assumption that they are safe just because the manufacturer says so is ill advised. It may not be comforting to get exposed on a daily basis to large volumes of a product of unknown chemical composition and largely untested health effects. Usage of proper personal protective equipment and a decent fume hood prevents the hazardous effects of xylene. In view of the established adverse effects of xylene, the Indian Association of Occupational Hygiene should make a law to safeguard the histopathology technicians against occupational hazards.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Phytochemical Investigation and Antimicrobial Activity of Root Extracts of *Withania Somnifera* (L.) Dunal. against Drug-Resistant Bacterial Pathogens

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ABSTRACT

With the emergence of multidrug resistance among clinical bacterial pathogens there is a growing need for the development of herbal alternatives for the effective therapeutic management of bacterial infections. Plants and plants products have long been used in traditional folk medicine worldwide. Hence this study was designed to test the antimicrobial efficacy of *Withania somnifera* L. Dunal. (root) against drug resistant bacterial pathogens. Extracts of *W. somnifera* (L.) Dunal (root) was prepared by cold percolation method. Antimicrobial activity of different solvent extracts of *W. somnifera* (L.) Dunal. (root) was studied against drug-resistant clinical isolates of Gram-positive cocci (vancomycin resistant *Enterococcus faecalis* and Methicillin resistant *Staphylococcus aureus*), and Gram-negative bacilli (ESBL *Escherichia coli* and *Pseudomonas aeruginosa*). The standard strains of ATCC 25922 *E. coli*, ATCC 25923 *S. aureus*, ATCC 27853 *P. aeruginosa*, and ATCC 29212 *E. faecalis* were used as controls. Antibacterial activities of extracts were evaluated using agar well diffusion method. Minimum inhibitory concentration was determined by microbroth dilution method. All the extracts (methanol, ethanol, acetone and chloroform) were inhibitory to gram positive bacteria tested. Nevertheless, inhibitory effect was pronounced in the methanol and ethanol extract, against Gram negative bacteria (Both ATCC and clinical strains). Further based on the phytochemical and GC-MS analysis, it could be speculated that the antibacterial activity exhibited by the methanol extract of *W. somnifera* root could be attributed to the presence of phenolic compounds, flavonoids, steroids and terpenes.

Keywords: Antibacterial efficacy, ESBL, *E. coli*, *Withania somnifera*, MRSA, VRE, *Pseudomonas aeruginosa*.

Introduction

Antimicrobial resistance is one of the greatest threats currently faced by the global community. With the emergence of multidrug resistance among clinical bacterial pathogens the therapeutic management of such infections are limited leading to increased morbidity and mortality1,2. Nevertheless, there is a substantial drop in
the discovery of newer antibiotics\(^3\). Plants and plants products have long been used in traditional folk medicine worldwide. As per the WHO report, nearly 70-95% of the people in the developing countries currently rely on traditional medicines for primary care\(^4\). A traditional system of medicine practiced in India, Ayurveda (a component of AYUSH) is primarily based on the plant extracts and other plant derivatives for the treatment of various ailments\(^5\). Hence, the exploration and evaluation of plant based potential antimicrobial compounds against drug resistant pathogens gains significance. The traditional way of testing the efficacy of herbal extracts on susceptible bacterial strains and standard strains becomes inappropriate. Hence, this study was designed to test the antimicrobial efficacy of plant extracts on drug resistant bacterial pathogens.

*Withania somnifera* (L.) Dunal. (commonly known as Ashwagandha, Indian Ginseng) belongs to the family Solanaceae. *W. somnifera* is widely cultivated in India and has long been used in traditional systems of medicine. Aswagandha is rich in alkaloids, (isopelletierine), steroidal lactones (withanolides, withaferins), saponins containing an additional acyl group (sitosterolides VII and VIII), and withanolides with a glucose at carbon 27 (sitosterolides IX and X)\(^6\)\(^8\). Withanolides are the main constituents of this plant, which is similar to the ginsenosides of Panax ginseng and hence called as Indian Ginseng. Among the Withanolides, withaferin A and withanolide D are known to possess the most biological activity. Various studies have proved the antioxidant, anxiolytic, memory enhancing, antiparkinsonian, antivenom, anti-inflammatory, hypolipidemic and antitumor properties of *W. somnifera*. Of note, *W. somnifera* extracts were reported to induce catecholamines and antioxidants, glutathione, glutathione peroxidase and hence is used in the treatment of various ailments including stress, anxiety, insomnia arthritis and neurodegeneration\(^7\)\(^8\). The antibacterial potential of *W. somnifera* root extract against bacterial pathogens has been reported by previous studies\(^9\)-\(^12\). Nevertheless, antibacterial potential of *W. somnifera*on drug resistant bacterial pathogens is yet to be explored. Hence, this study was designed to assess the antibacterial efficacy and the phytochemical constituents present in the root extracts of *W. somnifera*.

**Materials and Method**

The root of *W. somnifera* was shade dried and powdered; the active principles were extracted with different solvents with increasing polarity such as Acetone, chloroform, methanol and ethanol by cold percolation method. These solvents were evaporated to dryness using vacuum evaporator. The dry powder of the different extracts were dissolved in 10% DMSO\(^13\).

The extracts were screened for antibacterial activity against clinical isolates of ESBL-producing *Escherichia coli, Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus* (MRSA), and vancomycin-resistant *Enterococcus faecalis* (VRE).

The resistant phenotype exhibited by the study isolates was confirmed by standard microbiological methods. According to the CLSI guidelines, ESBL production was confirmed by combined disc method using ceftazidime (CAZ): 30 μg; ceftazidime -clavulanic acid (CAC: 30 μg/10 μg) and cefotaxime (CTX: 30 μg); cefotaxime-clavulanic acid (CEC: 30 μg/10 μg) against clinical isolates of ESBL-producing *Escherichia coli, Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus* (MRSA), and vancomycin-resistant *Enterococcus faecalis* (VRE).

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**Statistical Analysis**

Mean and standard deviation of the zones of inhibition were measured from the three sets of experiments in each case. One-way ANOVA was used to assess the statistical significance of the same.
Results

The results of antibacterial activity exhibited by various extracts of *Withania somnifera* (roots) against clinical isolates and control strains of Gram-positive and Gram-negative bacteria are depicted in Table 1. The MIC of the various solvent extracts is indicated in Table 2. GC–MS assay was also performed to find out and segregate potential compounds for the antibacterial activity [Figure 1]. GC-MS analysis revealed the presence of 66 phytochemical constituents (Table 3).

![Figure 1: Gas chromatography–mass spectrometry analysis of the methanol extract of *W. somnifera* (root).](image)

**Table 1: Antibacterial activity of the different extracts of *W. somnifera* (root)**

<table>
<thead>
<tr>
<th>W. somnifera (root) extracts against the bacterial isolates tested.</th>
<th>Methanol</th>
<th>Ethanol</th>
<th>Acetone</th>
<th>Chloroform</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. aureus</em> ATCC 25923</td>
<td>15.33 ± 1.528</td>
<td>13.00 ± 1.000</td>
<td>15.67 ± 0.578</td>
<td>17.67 ± 0.578</td>
</tr>
<tr>
<td>MRSA (clinical isolate)</td>
<td>20.67 ± 0.578</td>
<td>17.67 ± 0.578</td>
<td>15.00 ± 1.000</td>
<td>17.00 ± 1.000</td>
</tr>
<tr>
<td><em>E. faecalis</em> ATCC 29212</td>
<td>15.33 ± 1.528</td>
<td>15.67 ± 0.578</td>
<td>13.67 ± 0.578</td>
<td>15.33 ± 0.578</td>
</tr>
<tr>
<td>VRE (clinical isolate)</td>
<td>15.00 ± 1.000</td>
<td>12.67 ± 0.578</td>
<td>13.33 ± 0.578</td>
<td>15.00 ± 1.000</td>
</tr>
<tr>
<td><em>E. coli</em> ATCC 25923</td>
<td>11.67 ± 0.578</td>
<td>11.67 ± 0.578</td>
<td>8 ± 0.00</td>
<td>8 ± 0.00</td>
</tr>
<tr>
<td>ESBL producing <em>E. coli</em> (clinical isolate)</td>
<td>10.33 ± 0.578</td>
<td>11.33 ± 0.578</td>
<td>8 ± 0.00</td>
<td>8 ± 0.00</td>
</tr>
<tr>
<td><em>P. aeruginosa</em> ATCC 27853</td>
<td>10.67 ± 0.578</td>
<td>11.33 ± 1.155</td>
<td>8 ± 0.00</td>
<td>8 ± 0.00</td>
</tr>
<tr>
<td>ESBL producing <em>P. aeruginosa</em> (clinical isolate)</td>
<td>9.33 ± 0.578</td>
<td>25.67 ± 0.578</td>
<td>8 ± 0.00</td>
<td>8 ± 0.00</td>
</tr>
</tbody>
</table>
Table 2: MIC of the extracts of *W. somnifera* (root).

<table>
<thead>
<tr>
<th>Bacterial tested</th>
<th>MIC (µg/mL) of the extracts of <em>W. somnifera</em> (root).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methanol</td>
</tr>
<tr>
<td><em>S. aureus</em> ATCC 25923</td>
<td>75</td>
</tr>
<tr>
<td>MRSA (clinical isolate)</td>
<td>75</td>
</tr>
<tr>
<td><em>E. faecalis</em> ATCC 29212</td>
<td>&gt;150</td>
</tr>
<tr>
<td>VRE (clinical isolate)</td>
<td>&gt;150</td>
</tr>
<tr>
<td><em>E. coli</em> ATCC 25923</td>
<td>150</td>
</tr>
<tr>
<td>ESBL producing <em>E. coli</em> (clinical isolate)</td>
<td>&gt;150</td>
</tr>
<tr>
<td><em>P. aeruginosa</em> ATCC 27853</td>
<td>75</td>
</tr>
<tr>
<td>ESBL producing <em>P. aeruginosa</em> (clinical isolate)</td>
<td>75</td>
</tr>
</tbody>
</table>

Table 3: Phytochemical profile of the extracts of *W. somnifera* (root).

<table>
<thead>
<tr>
<th>S. No</th>
<th>Constituents</th>
<th>Methanol</th>
<th>Ethanol</th>
<th>Acetone</th>
<th>Chloroform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steroids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Triterpenes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Sugars</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Alkaloids</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Phenolic groups</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Flavones</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Saponins</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>Tannins</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9</td>
<td>Anthroquinone glycosides</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10</td>
<td>Amino acids</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Discussion**

The results of the agar well diffusion assay revealed that, the methanol and ethanol extracts of *W. somnifera* exhibited better antibacterial activity against MRSA compared to ATCC *S. aureus* (p=0.0048, p=0.0022). However, no statistical significance was found with regard to the antimicrobial activity of acetone and chloroform extracts against the standard and clinical strains of *S. aureus*. Also, methanol extract of *W. somnifera* was found to be exhibit pronounced antibacterial activity against MRSA compared to the ethanol, acetone and chloroform extracts (p=0.0031, 0.0011, 0.0053).

Ethanol extract of *W. somnifera* was found be effective against ATCC *E. faecalis* but not VRE (p = 0.0031). However, no statistical significance was found with regard to the antimicrobial activity of methanol, acetone and chloroform extracts against the standard and clinical strains of *E. faecalis* (p = 0.7677, 0.5185, 0.6434).

Methanol and ethanol extracts of *W. somnifera* was found be effective against ATCC *E. coli* and ESBL producing *E. coli* (clinical strain). Both the acetone and chloroform extracts did not possess antibacterial activity against both the standard and clinical strains of *E. coli* and *P. aeruginosa*. Interestingly, ethanol extract of *W. somnifera* was found be effective against drug resistant clinical isolate of *P. aeruginosa* compared to all the other extracts (methanol, acetone and chloroform, p=0). Our findings are in contrast with Alam et al., (2012) who had reported WSroot ethanol to exhibit pronounced antibacterial activity against *E. coli*, but not against *P. aeruginosa*.

Phytochemical analysis and GC-MS analysis of the methanol extract of *W. somnifera* (root) revealed the presence of steroids, triterpenes, phenolic compounds, saponins, tannins. Previous reports had documented the inhibitory potential of flavonoids against pathogenic bacterial species. The active constituents of root extract of *W. somnifera* is reported to be similar.
to that of the Asian ginseng (Panax ginseng) viz., steroidal lactones with ergostane, including withanone, withaferin, withanolides, withasomidieneone and withanolide C7. Mishra et al., 2007 has also documented the presence of withanolides, a steroidal lactone to be abundant in in the methanol extracts of W. somnifera roots. Terpenoids have been reported to possess a broad spectrum antibacterial activity. In line with these reports it could be speculated that the antibacterial activity exhibited by the methanol and ethanol extracts of W. somnifera root could be attributed to the presence of phenolic compounds, flavonoids, steroids, terpenes and withanolides.

Antioxidant compounds such as ascorbic acid, anthocyanin and polyphenols have been reported to exhibit antibacterial activities. These compounds are reported to cause hyper-acidification at the plasma membrane interface of the pathogen, which ideally alters ATP synthesis by the disruption of the H+ -ATPase. These antioxidants are also documented to initiate iron deprivation or hydrogen bonding with vital proteins such as microbial enzymes thereby inhibit microorganisms. Ascorbic acid, anthocyanin and polyphenols with antioxidant potential are reported to be vulnerable to polymerization in air through oxidation reactions and the polymerization size is known to govern their toxicity. Consequently, oxidized condensation of antioxidant compounds may result in the toxification of microorganisms. Jaleel, 2009 has reported the root of W. somnifera is a good source of both enzymatic and non-enzymatic antioxidants. Previous studies have confirmed the presence of ascorbic acid in the in the root extract of W. somnifera. In line with various studies, it could be speculated that the antioxidants ascorbic acid, anthocyanin and polyphenols in the root extract of W. somnifera might contribute to its antimicrobial activity against the drug resistant gram positive and gram negative pathogens tested in this study.

Acknowledgement

Authors wish to thank DST-FIST (Ref no. SR/FST/College-23/2017) Government of India, New Delhi, for utilizing the funded research equipment facilities of Sree Balaji Dental College and Hospital, Pallikaranai, Chennai, Tamilnadu, India.

Ethical Clearance: Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGL. (Registration no: ECR/761/Inst/TN/2015)

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Conflict of Interest: Nil

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Nasal Colonization of Methicillin Resistant *Staphylococcus aureus* and its Plausible association with Infected Foot Ulcers in Diabetic Patients

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ABSTRACT

Diabetic Foot ulceration is one of the major devastating complication of diabetes. Diabetic foot ulcers (DFUs) infected with multidrug resistant bacterial strains is often associated with prolonged hospital stay, increased treatment cost, significant morbidity and mortality. DFU infected with Methicillin Resistant *Staphylococcus aureus* (MRSA) if untreated may lead to amputation.

Materials & Method: Type 2 diabetic Subjects (Mean age 56 years)(n=27) with infected foot ulcers were included in his study. After wound debridement, samples were taken from the base of the ulcer using sterile cotton swabs and nasal swabs were also collected from the study subjects and were processed as per standard Microbiological methods.

Results: The overall isolation rate of *S. aureus* in DFU was 18.5%. Among the *S. aureus* isolates screened for MRSA, all the isolates from the DFU ulcers (n=4) and those isolated from the nares (n=3) of the diabetic subjects were found to be MRSA. Of note, 3 of the study subjects in whom MRSA was isolated from the DFU samples were found to harbour MRSA in their nares. Nevertheless, all the isolates were susceptible to linezolid, netilillin, gentamicin and amikacin. No significant statistical difference was observed in the antimicrobial resistance percentage among the DFU and nasal isolates.

Conclusion: Our study results imply that, screening for MRSA colonisation would better predict a patient’s probability of MRSA infection and guide the clinicians in antimicrobial treatment decision making.

Keywords: Diabetic foot, MRSA, Methicillin

Introduction

Foot ulceration in diabetes is one of the most significant and devastating complication of diabetes and is a major medical, social and economic problem. Diabetic foot ulcers (DFU) especially those infected with multidrug resistant bacterial strains is often associated with prolonged hospital stay, increased treatment cost, significant morbidity and mortality¹. If not treated promptly, DFU can lead to amputation of the infected foot. *Staphylococcus spp* especially, *S. aureus* is the most common pathogen isolated from DFU, of which 15-30%
are reported to be Methicillin Resistant *Staphylococcus aureus* (MRSA)\(^2,3\).

Previous studies document that, patients with asymptomatic nasal colonization of MRSA may serve as potential reservoir for transmission of MRSA and are at higher risk of acquiring subsequent MRSA-associated infections\(^4,5\). Also, mean nasal carriage rate of MRSA in patients with insulin dependent diabetic is reported to be 56.4\(^\%\)\(^6\), thereby are at potential risk of acquiring MRSA-associated infections, especially DFU. Hence, this study was aimed to determine the prevalence of MRSA and antimicrobial susceptibility profile of MRSA isolated from diabetic patients with foot ulcers and to assess the risk of MRSA associated diabetic foot infection (DFI) among the MRSA nasal carriers.

**Materials & Method**

Type 2 diabetic Subjects (n=27, male (n=14): female (n=13) in the age range of 40-72 years (Mean 56 years) with infected foot ulcers were included in his study. Infection of DFU was diagnosed according to the criteria proposed by the International Consensus on the Diabetic Foot\(^7\). Wagner classification was used to grade the ulcers\(^8\). Wound swabs and nasal swabs were collected from the study participants who were admitted for management of DFU in a tertiary care centre in Chennai, South India. Demographic details were collected.

After wound debridement, samples were taken from the base of the ulcer using sterile cotton swabs and nasal swabs were also collected from the study subjects. Samples were transported to the Microbiology laboratory in ice. The samples were processed as per standard Microbiological methods\(^9\).

Gram positive cocci in clusters that were catalase positive were provisionally designated as *Staphylococcus* spp. Discrimination of *S. aureus* from Coagulase Negative *Staphylococci* (CoNS) was performed based on the results of the slide and tube coagulase test followed by selective isolation of *S. aureus* on Mannitol Salt agar. Antibiotic resistance profile of the staphylococcal isolates was determined by Kirby-Bauer method. Susceptibility to amikacin, gentamicin, cephalexin, co-amoxiclav, co-trimoxazole, tetracycline, erythromycin, ciprofloxacin, ofloxacin, norfloxacin, netillin, teicoplanin, linezolid as per CLSI guidelines\(^10\).

Screening for methicillin resistance was done using disc diffusion method, cefoxitin discs (30 µg) and oxacillin (5 µg) diffusion method and oxacillin agar (6 µg/mL) screening method (CLSI, 2018). Detection of vancomycin intermediate resistance *S. aureus* (VISA) was determined using vancomycin discs (30 µg). The minimum inhibitory concentration of oxacillin and vancomycin was determined by microbroth dilution method as per CLSI guidelines\(^10\).

**Results**

The isolation rate of *Staphylococcus* spp from DFU was 18.5\%, of which 80\% were *S. aureus*, while 20\% was found to be CoNS. Of the 27 diabetic subjects included in the study, nasal swabs were collected from 24 subjects. A total of 20 *Staphylococci* were isolated from the external nares, of which 17 (85\%) were found to be CoNS and only 3 (15\%) were confirmed as *S. aureus*.

Among the *S. aureus* isolates screened for MRSA, all the isolates from the DFU ulcers (n=4) and those isolated from the nares (n=3) were found to be MRSA. There was 100\% concordance in the results of cefoxitin disc diffusion method and oxacillin salt agar (6 µg/mL) screening method. All the MRSA isolates ((DFU (n=4), nasal (n=3)) exhibited resistance by both the methods. In our study, the MIC\(_{50}\) and MIC\(_{90}\) of oxacillin against MRSA isolated from DFU samples (n=4) and those from the nares (n=3) was found to be >128 µg/mL. None of the *S. aureus* isolates exhibited resistance to vancomycin. The MIC\(_{50}\) and MIC\(_{90}\) of vancomycin against *S. aureus* isolated from DFU samples (n=4) was found to be 0.5 µg/mL and 1 µg/mL respectively and those from the nares (n=3) was found to have MIC\(_{50}\) and MIC\(_{90}\) of 0.25 µg/mL.

Antibiotic resistance profile of the staphylococcal isolates is depicted in table 1. None of the *Staphylococcus* isolates were resistant to linezolid, netilin, gentamicin and amikacin. No significant statistical difference was observed in the antimicrobial resistance percentage among the DFU and nasal isolates.
### Table 1: Antibiotic resistance profile of Staphylococcus Spp isolated from DFU & nares

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Resistance (n(%))</th>
<th>Nares (n = 20)</th>
<th>P value (fisher exact test) (2 tailed)</th>
<th>Odds Ratio</th>
<th>95% CI Upper limit</th>
<th>95% CI Lower limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefoxitin (30 µg)</td>
<td>4(80)</td>
<td>13(65)</td>
<td>0.64</td>
<td>2.1538</td>
<td>23.1837</td>
<td>0.2001</td>
</tr>
<tr>
<td>Cephalexin (30 µg)</td>
<td>3(60)</td>
<td>11(55)</td>
<td>1</td>
<td>1.2273</td>
<td>9.0173</td>
<td>0.167</td>
</tr>
<tr>
<td>Chloramphenicol(30 µg)</td>
<td>0(0)</td>
<td>2(10)</td>
<td>0.32</td>
<td>0.2045</td>
<td>2.1702</td>
<td>0.0193</td>
</tr>
<tr>
<td>Co-trimoxazole (25 µg)</td>
<td>1(20)</td>
<td>11(55)</td>
<td>1</td>
<td>1.4167</td>
<td>17.4612</td>
<td>0.1149</td>
</tr>
<tr>
<td>Erythromycin (15 µg)</td>
<td>1(20)</td>
<td>3(15)</td>
<td>0</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Gentamicin (10 µg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Amikacin (10 µg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Ciprofloxacin (5 µg)</td>
<td>2(40)</td>
<td>8(40)</td>
<td>0.62</td>
<td>2.25</td>
<td>16.6323</td>
<td>0.3044</td>
</tr>
<tr>
<td>Ofloxacin (5 µg)</td>
<td>3(60)</td>
<td>8(40)</td>
<td>1</td>
<td>1</td>
<td>7.3921</td>
<td>0.1353</td>
</tr>
<tr>
<td>Norfloxacin (10 µg)</td>
<td>4(80)</td>
<td>14(70)</td>
<td>1</td>
<td>1.7143</td>
<td>18.7267</td>
<td>0.1569</td>
</tr>
<tr>
<td>Teicoplanin (30 µg)</td>
<td>2(40)</td>
<td>2(10)</td>
<td>0.17</td>
<td>6</td>
<td>60.4394</td>
<td>0.5956</td>
</tr>
<tr>
<td>Linezolid (30 µg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Netillin (30 µg)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1</td>
<td>NaN</td>
<td>NaN</td>
<td>NaN</td>
</tr>
<tr>
<td>Tetracycline (30 µg)</td>
<td>1(20)</td>
<td>4(20)</td>
<td>1</td>
<td>0.8</td>
<td>8.9115</td>
<td>0.0718</td>
</tr>
<tr>
<td>Rifampicin (5 µg)</td>
<td>0(0)</td>
<td>1(5)</td>
<td>1</td>
<td>0</td>
<td>NaN</td>
<td>0</td>
</tr>
</tbody>
</table>

### Discussion

In our study, *Staphylococcus* was the most frequent bacteria (18.5%), isolated from the DFU specimens of which a high proportion (80%) were *S. aureus*. Our results were in line with findings of previous studies that have reported *S. aureus* as the predominant pathogen isolated from DFU infections (63% (China\(^3\)), 41% (Salem, Tamil Nadu, India\(^11\)), 43% (in Karnataka, India\(^12\), 26% (Assam, India\(^13\)), 43.8% (in Taiwan\(^14\)), 16.47% and 11.8% (in Kenya\(^15, 16\)). Also, a single centre retrospective cohort study of DFU patients from 2010-2016 has reported *S. aureus* as the predominant pathogen associated with recurrent episodes (1-13 episodes) of DFU\(^17\).

The overall incidence of MRSA in our study was 18.5%. This is in line with previous studies that showed by a similar prevalence range of MRSA in DFU is 4-36%, (7% (Murali et al., 2014)\(^8, 7.7% (Benwan et al., 2012)\(^16, 17.9% (Sotto et al., 2012)\(^19, 19% (Sugandhik&Prasandh, 2014)\(^11, 24.1% (Lin et al., 2018)\(^14, 36% (Vu et al., 2014)\(^20, 43.2% (Zubair et al., 2011)\(^11). Also, previous reports have documented that a higher percentage of the *S. aureus* in DFU were MRSA, 63.4% (Tentolouris et al., 2006)\(^22, 60.5% (Shettigar et al., 2016)\(^12, 41% (Jain & Barman, 2017)\(^13. Herein, we report a still higher occurrence of MRSA among *S. aureus*(100%).

In our study, most of the *Staphylococcus* isolates were sensitive to linezolid (100%), netillin (100%), gentamicin (100%), amikacin (100%), teicoplanin (80%) which is in agreement with a recent Indian study\(^13. Of note, 3 of the study subjects in whom MRSA was isolated from the DFU samples were found to harbour MRSA in their nares. This is of clinical relevance as previous reports suggest increased probability of nasal colonisation of diabetic patients with MRSA increases the risk of MRSA in DFU. A recent Taiwanese study reported an overall nasal *S. aureus* carriage rate was 16.4% and nasal MRSA carriage rate was 2.8%\(^14.

MRSA nasal-swab screening is generally used for determining isolation precautions\(^23. In concurrence with the previous reports, our study results imply that, screening for MRSA colonisation at the time of admission (in case of hospital stay)/first visit (in case of outpatients) would better predict a patient’s probability of MRSA infection and guide the clinicians in antimicrobial treatment decision making and would eventually shorten hospital stay and medical costs\(^23, 33.

### Acknowledgement

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for utilizing the funded research equipment facilities of Sree Balaji Dental College and Hospital, Pallikaranai, Chennai, Tamilnadu, India.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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**Conflict of Interest:** Nil

**REFERENCES**


Eagle Syndrome: A Case Report

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ABSTRACT

Eagle’s syndrome (ES) arises when an elongated styloid process or calcified stylohyoid ligament causes recurring throat pain or foreign body sensation, dysphagia, or facial pain. The additional signs may involve neck or throat pain with radiation to the ipsilateral ear. These symptoms and sign could be confused with those attributed to a wide variety of facial neuralgias. ES is diagnosed radiologically and by physical examination. The primary treatment of ES is surgical. Here we report a case in which the patient presented pain and difficulty during swallowing.

Keywords: Eagle syndrome, 3D imaging, tonsillectomy, neck pain.

Introduction

Eagle Syndrome (ES) or Stylohyoid syndrome is an uncommon pathology of the head and neck that creates orofacial pain. The pain is caused by the elongation of the styloid process and by the incomplete or total calcification of the stylohyoid ligament.¹,²

Eagle syndrome is an infrequent, clinical state caused by elongation of the styloid process or mineralization (ossification/calcification) of the stylohyoid ligament. The length of the styloid process is usually 2 to 2.5 cm and elongation beyond 2.5 cm causes Eagle syndrome that was first described in 1937.³ The diagnosis of ES is done by clinical and radiographic methods. Nevertheless, ES is commonly underdiagnosed due to its low prevalence and insufficient knowledge of craniofacial and cervico-pharyngeal syndromes. Furthermore, as its symptoms are miscellaneous, health professionals and patients tend to confuse this disease with other disorders.

Case report: A 38-year-old male patient named Mr. Subhramani M came to the outpatient department of Oral Medicine and Dental Radiology at Sree Balaji Dental College and Hospital, with a chief complaint of pain and difficulty while swallowing food. History revealed pain was insidious in origin, dull to moderate in intensity and intermittent in nature. The intensity of pain was exacerbated by movements such as looking up and turning face to the left side. In addition, the patient also had a sensation of a foreign body in the throat on swallowing. On correlating the chief complaint, history of presenting illness a provisional diagnosis of “Cervicofacial Lymphadenitis” was given. On radiographic examination, Orthopantomogram demonstrated excessively ossified styloid processes bilaterally (Fig 1). The patient also underwent a CT 3D reconstruction imaging which showed a heavily ossified styloid process extending from the base of the skull antero laterally and caudally to the level of hyoid bone on both sides, which measured 6.7 cm on the left side and 6.1 cm on the right side, suggestive of Eagle’s syndrome. (Fig 2)

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Figure: OPG shows an increased length of the styloid process in both right and left side.
Discussion

The prevalence of abnormal styloid process length in the general population is around 4% and it is even higher if calcification of the stylohyoid complex is also considered. Normally, it is an asymptomatic condition. Just 4% of all patients with an abnormal styloid process’ length are symptomatic, meaning the incidence of Eagle syndrome is around 0.16% among global population. Most studies report a length of 25–30 mm as normal for a styloid process. Depending on the clinical features, the Eagle syndrome can be illustrous into two types i.e. the classical and the stylocarotid type. The first type involves history of pharyngeal trauma or tonsillectomy. This type has been related to fibrous or scar connective tissue enmeshed of 5th, 7th, 9th & 10th cranial nerves. In contrast, the stylocarotid forms associate to condensation of the internal and external carotid arteries as well as a stimulation of the perivascular sympathetic fibers. The pain manifests a similar distribution to the course of the carotid vessels, aggravate during different head movements, correspond with a syncopic event, aphasia, irradiates into the infraorbital and parietal area, while both tonsillectomy and neck trauma are typically absent from the patient’s history. ES can be managed by both surgical and nonsurgical means. Nonsurgical treatments require supportive counseling to the patient, analgesics, and steroid injections. Surgical management can be done using transpharyngeal or extraoral method. The latter is thought to be superior because it is less likely to cause deep space infection of the neck.

Conclusion

Eagle syndrome is a complex disorder requiring detailed knowledge of its signs and symptoms to make the right diagnosis and give a suitable succeeding treatment. It can be erroneous for many alternative conditions that must be excluded. Knowledge regarding pain syndromes associated to styloid process is essential for all health professionals involved in the diagnosis and management of neck and head pain to rationalize the line of management.

Ethical Clearance: Not required since it is a case report

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCE


5. Heim N, Faron A, Martini M, Reich RH. Eagle syndrome: a follow-up examination of four patients after surgical treatment via a cervical radiographs or CT scan. ES can be managed by both surgical and nonsurgical means. Nonsurgical treatments require supportive counseling to the patient, analgesics, and steroid injections. Surgical management can be done using transpharyngeal or extraoral method. The latter is thought to be superior because it is less likely to cause deep space infection of the neck.


Deceptive Cyst in the Oral Cavity- A Case Report

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ABSTRACT

Keratocystic odontogenic tumors (KCOTs) are called for their disputed peculiar characteristics, varied origin, unique propensity to recur, disputed treatment methods and can occur anywhere in the jaw, but mainly seen in the posterior part of the mandible. On radiographically, it present, as well-defined radiolucent lesions with smooth and generally corticated margins. They are benign intraosseous tumors of odontogenic origin that occur most mainly in the jaw. The average reported recurrence rate ranges from 30 to 62 present.

Keywords: Keratocyst, Odontogenic, Molar, Ramus

Introduction

An odontogenic keratocyst, which was one, considered as a third most common odontogenic cyst and is replaced by a new term, i.e., “Keratocystic odontogenic tumor”. In 2005 WHO the term as a KCOT due to its tumor nature. and defined as “a benign unicystic or multicystic intraosseous tumor of odontogenic origin, with a characteristic lining of parakeratinized stratified squamous epithelium and potentially aggressive, infiltrative behavior."¹² It is considered as tumor because of following three reasons, i.e. behavior as report before, the KCOT is locally destructive and mostly recurrent, histopathology studies showed the basal layer of the KCOT budding into connective tissue along with mitotic figures in the suprabasal layers and the presence of a tumor suppressor gene- PTCH (patched)³ and multiple KCOTs may present as one of the stigmata of the inherited NBCCS. It is also known as Gorlin syndrome.⁴

Case report: A 27-year-old female had come to the hospital, with a chief complaint of an abnormal finding during the Orthodontic examination of OPG. History revealed that the patient consulted an orthodontist for treatment of malocclusion. The OPG radiograph revealed an abnormal finding for which she was referred to an oral physician. On extraoral inspection, revealed that there was no facial asymmetry or evidence of swelling, ulceration, and sinus tract and fistula formation over the cheek and on palpation, it was non-tender. On intraoral examination, there was no evidence of swelling in alveolar mucosa in relation to 38, 37. On palpation, it was non-tender, obliteration and expansion of the buccal cortical plate were noticed. Based on the OPG radiograph features a provisional diagnosis of Benign Odontogenic cyst/tumor of the left mandible.

Investigation: Routine blood investigations revealed normal values. An intraoral periapical radiograph (IOPA) revealed a radiolucency in relation to 37, 38 extending to the anterior border of ramus posteriorly. Superiorly extending from the alveolar ridge corresponding to 37, 38 teeth region. (Fig: 1) The mandibular occlusal radiograph revealed normal anatomic landmarks in relation to 34, 35, 36, 37, and 38 with the mild expansion of the cortical bone. (Fig: 2) The site of the lesion was present in relation to the left side of ramus and posterior body of the mandible which was approximately 4 x 2cm in size and oval in shape, extended from the mesial, root of 37 in the periapical region to the posterior of the ramus of mandibular, periphery was well defined corticated border, smooth in margin, internal structure was completely
radiolucent and the effect on surrounding structure was destruction pattern of bone and the mandibular canal was pushed downward. No evidence of root resorption. (Fig: 3) **CT facial bones,** Coronal view reveals an expansile osteolytic lesion measuring approximately ~4.5 x 1.7 cm involving the angle and the body of the left mandible (HU-26) and mild cortical thinning seen at the region of the angle of the mandible. (Fig: 4) Incisional biopsy and aspiration were done under local anesthesia on the left retromolar area a bony window was created of cystic lining were taken. The microscopic examination revealed cystic lining epithelium with underlying connective tissue stroma, the lining epithelium is 4-6cell layer thick(Fig: 5) and of the parakeratinized stratified squamous type with palisading basal cells and numerous keratin fleck seen within the lumen. (Fig:6)The connective tissue is densely collagenized with diffuse mild chronic inflammatory cell infiltrate and mild vascularity is noticed. Based on clinical, radiographic and histopathologic features a final diagnosis of Keratocystic Odontogenic tumor on the left side of the mandible in relation to the 38, 37 teeth region was given.

**Figure 1:** An intraoral periapical radiograph (IOPA) revealed a radiolucency in relation to 37, 38 extending to the anterior border of ramus posteriorly. Superiorly extending from the alveolar ridge corresponding to 37, 38 teeth region

**Figure 2:** mandibular occlusal radiograph revealed normal anatomic landmarks in relation to 34, 35, 36, 37, and 38 with the mild expansion of the cortical bone

**Figure 3:** OPG in the site of the lesion was present in relation to the left side of ramus and posterior body of the mandible which was approximately 4 x 2cm in size and oval in shape, extended from the mesial, root of 37 in the periapical region to the posterior of the ramus of mandibular, periphery was well defined corticated border, smooth in margin, internal structure was completely radiolucent and the effect on surrounding structure was destruction pattern of bone and the mandibular canal was pushed downward

**Figure 5:** The microscopic examination revealed cystic lining epithelium with underlying connective tissue stroma, the lining epithelium is 4-6cell layer thick(Fig: 5)

**Figure 4:** **CT facial bones,** Coronal view reveals an expansile osteolytic lesion measuring approximately ~4.5 x 1.7 cm involving the angle and the body of the left mandible (HU-26) and mild cortical thinning seen at the region of the angle of the mandible.
Figure 6: parakeratinized stratified squamous type with palisading basal cells and numerous keratin fleck seen within the lumen

Discussion

OKC is one of the common aggressive odontogenic cysts owing to its comparatively high recurrence rate, frequently seen in the second and third decades. The typical clinical features involve a likely for local destruction and a propensity for multiplicity, mainly when the lesion is related with nevoid basal cell carcinoma syndrome or Gorlin-Goltz syndrome. In inclusion to multiple KCOTs, nevoid basal cell carcinomas, multiple epidermoid cysts, bifid ribs, calcification of the falx cerebri, frontal bossing, also identify NBCCS and medulloblastoma. It may be found in the population, which ranges in age from infancy to old age. There is a slight male predilection. Literature review suggests, mandible is involved in 60%–80% of cases, with a noticeable tendency to involve the posterior body and ascending ramus of mandible. Toller (1967) recommended that epithelial linings of OKCs had inherent growth possible and was the first to propose that there was at least support for concerning them as benign neoplasms. Later, Ahlfors et al. (1984) also proposed that OKC should be considered as a benign cystic neoplasm because of its distinctive features like local destruction and high recurrence, the basal layer of the OKC (KCOT) showed budding into connective tissue and inactivation of PTCH (“patched”), a tumour suppressor gene, which is also seen in NBCC. The patients with OKCs may also complain of pain, swelling or discharge and rarely involve with paraesthesia of the lower lip. Some are unaware of the lesions until they reach a large size or formed pathological fractures. In cases, some OKCs may be determined unexpectedly during the radiographic inspection. In many cases, patients are astonishingly free of manifestation as far as the extent of the cyst to a large size. Nonetheless; at least half of all lesions are come to know as incidental radiographic findings. Due to the tendency of OKCs to grow inside the medullary bone, they can become very large without causing, any clinical signs or symptoms. In the present case there was no pain and discharge was present. In the present case there was no pain and discharge was present. OKCs appear as small, round or ovoid, radiolucent areas with clear sclerotic margins and many are unilocular radioluencies with a smooth periphery. Some of the unilocular lesions have scalloped margins and are misinterpreted as multilocular lesions. The curved internal septa may be present in some cases giving the lesion a multilocular characteristic and may be misdiagnosed as ameloblastoma but the later has a soap bubble or honeycomb pattern. When in a pericoronal position a KCOT may be identical from a dentigerous cyst. The lesion is likely to be a KCOT if the cyst outline is related to the tooth at a point apical to the cementoenamel junction. On histopathology, the epithelium appears 6 to 8 cell layers with wavy parakeratotic epithelial cells; report as corrugated parakeratinized epithelium. The basal layer appear palisade hyperchromatic columnar to cuboidal cells frequently report as “picket fence” or “tomb-stone” characterize with keratinaceous substance in the cystic cavity. Morgan and colleagues classify the surgical treatment technique for KCOT as conservative which involve enucleation, with or without curettage, or marsupialization which maintain the anatomical structures, but have a chance of higher recurrence rate and aggressive treatment which involve peripheral ostectomy, chemical curettage with Carnoy’s solution or en-bloc resection. Some current studies have shown a feasible treatment method for KCOT, such as cyclopamine, a plant-based steroidal alkaloid, which prevents the cellular response to the sonic hedgehog (SHH) signal activity. Zhang et al. suggested that antagonists of SHH signaling factors could successfully treat KCOTs. They recommend that the intracystic injection of a smoothened (SMO) protein antagonist have the greatest potential as a future treatment option. The average reported recurrence rate ranges from 30% to 62%. The presence of residual epithelium after the treatment is one of the contributing parts of the high recurrence rate. KCOT linings are very thin and brittle and so more hard to enucleate than cysts with thick walls. A long-term follow up of 5-10 years is suggested. In some KCOT, linings may have the features of epithelial dysplasia or show characteristics of ameloblastoma. Tumors with such characteristics infrequently develop into squamous cell carcinoma or ameloblastoma.
Conclusion

KCOT is a main odontogenic tumor with neoplastic nature. The complete clinical and radiographic examination together with histopathological investigations should be done. However, with suitable and advanced imaging modalities, we can strongly suspect this entity, and they help us in selecting the necessary treatment protocol, as it is an aggressive tumor.

Ethical Clearance: Not required since it is a case report

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Conflict of Interest: Nil

REFERENCES


Ultrasound-An Eyeopener in the Diagnosis of Maxillofacial Lesions—A Case Report

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ABSTRACT

Vascular anomaly is the term used to implicate various vascular pathology, including proliferating vascular tumors and vascular malformations.

Vascular malformation of the parotid gland is a rare condition where very few cases have been reported in the literature. The clinical and radiological features of vascular malformations often mimic those of other pathologic entities, causing diagnostic confusion. Furthermore, the imaging appearance of low flow and high flow vascular malformations can vary, making the diagnosis challenging. Here we report a case of a 40 years old, female who presented with the complaint of swelling in the left parotid region for one year. Imaging revealed a vascular malformation involving the left parotid gland. Superficial Parotidectomy was planned

Keywords: Vascular Malformation (VMs), Hemangioma, Parotid gland.

Introduction

The benign salivary gland tumor most commonly pleomorphic adenoma involving the parotid gland is usually reported in clinical practise and to find a case of vascular malformation involving parotid gland is rare. The common term used for both tumors and vascular malformations is Angioma¹. In 1996 the International Society for the Study of Vascular Anomalies (ISSVA) classified vascular anomalies into two main groups: proliferating vascular tumours (haemangiomas) and vascular malformations. Vascular malformations are further classified into low and high blood flow groups and complex combined groups. These classification had improved the management and treatment options for various vascular anomalies which are distinct from each other². Vascular tumors are either benign or malignant and Vascular malformations may be lymphatic, capillary, venous, arteriovenous malformations or arteriovenous fistula. Venous malformations (VMs) are the low-flow vascular malformation composed of vascular channels with estimated incidence rate of 1 in 10000³,4.

Capillary and lymphatic malformation are also part of low flow vascular malformation⁵. Here we report a case of low flow vascular malformation involving left parotid parenchyma. It is important to make a radiological diagnosis before performing FNAC, surgical resection in these cases to avoid complications⁶. Interventional radiology plays an important role in diagnosing low flow vascular anomalies over conventional USG.

Case Report: A 40 year old female patient reported to the out patient department with painless swelling in the left side below the ear for 1 year which occurred spontaneously and gradually increased to attain the present size (fig 1). The swelling was increased on tilting the face towards the left side (Turkey Wattle Sign). On physical examination the swelling was soft, non tender, afebrile, compressible, fluctuant and the margins were ill defined. Surface was smooth and the skin over the swelling was pinchable with no visible pulsations. No other secondary changes were present. There was no associated lymph adenopathy. Ultrasonography (USG)
revealed large cystic lesion containing few specks of ring calcification. The cystic spaces show particulate matter with Brownian movement suggesting fluid/abscess (fig2). But the Doppler ultrasound failed to demonstrate high-flow vessels in and adjacent to the mass and did not show any positive Doppler shift. Following this Computed Tomography (CT) was done which showed a moderately defined 5.8*3.8cm sized heterogenous soft tissue density lesion with multiple nodular calcifications, few showing central lucencies suggestive of phleboliths is seen replacing most of the left parotid gland (fig3). Following this contrast was injected in to a vein in the arm and post contrast CT images revealed progressive enhancement of lesion with pooling of contrast in delayed images and no significant washout(fig4 b)

The radiological diagnosis was given as low flow vascular malformation involving left parotid parenchyma. Patient was planned for Superficial Parotidectomy.

Discussion

Vascular lesions has been in discussion for many years and understanding these anomalies is still a challenge to the clinicians. Vascular tumors (hemangioma) refers to cell proliferation are distinguishable from vascular malformation which occurs due to altered vascular morphogenesis. Vascular malformation of parotid gland is a rare condition and the frequency has been 0.5% for Bears et al, out of 760 parotid tumors and at 0.6% for Byars et al, who had reported 460 cases of parotid tumors. There was a marked female predilection in most of the studies by Achache M et al.

Vascular malformation are painless, with no associated symptoms and patients usually complaints of facial asymmetry due to swelling. A typical characteristic feature noted is ‘Turkey wattle sign’ which demonstrates enlargement of facial mass on dependency of the head.

Although clinical diagnosis can be made, surgical intervention demands accurate radiological diagnosis. As a part of radiological investigation USG, plain and contrast enhanced CT was done. Although USG showed cystic lesion with ring calcification, that demonstrates particulate matter with Brownian movement suggesting fluids/abscess but it did not show positive Doppler shift failing to indicate a vascular lesion. Sixteen percent of VMs have minimal or no flow, that might reflect very low flow below detectable limits and a possible cause of diagnostic confusion.

USG is less sensitive in diagnosing vascular anomalies and is useful during the proliferative phase and Doppler ultrasound typically demonstrates high flow vessels surrounding the mass.
Plain CT images showed heterogeneous soft tissue density lesion with nodular calcification suggestive of phleboliths and progressive enhancement of lesion with pooling of contrast was seen in delayed contrast image than immediate contrast image indicating a low flow vascular malformation of left parotid parenchyma. CT is the choice for identifying phleboliths and when the concern involves bony invasion. Though Doppler ultrasound can provide adjuncts for the evaluation of VMs it cannot be used as an effective diagnostic tool in diagnosing low flow vascular malformation. The primary imaging modality of vascular malformation is contrast CT and MRI.

Conclusion

The aim of the treatment is to prevent bleeding, preserve and restore functions and to improve cosmesis. Treatment options are laser, cryotherapy, embolization. Despite improved imaging modalities cure rate continues to be suboptimal for vascular malformations. This probes for further research for improving management of VMs.

Ethical Clearance: Not required since it is a case report

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REFERENCES


Implant Dislodgement into the Maxillary Sinus: A Review Literature

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ABSTRACT

Background: Displacement of dental implants into the maxillary sinus is rare, but it primarily occurs in patients with severe pneumatization of the maxillary sinus and/or deficiency of the alveolar process. Some complications such as the infection of the paranasal sinuses and formation of the oroantral fistula can be followed by the displacement of a dental implant. Therefore, the displaced implant has to be removed immediately with surgical intervention show and another plan for rehabilitation should be considered.

Main body: The conventional procedure for the removal of a displaced implant from the maxillary sinus involves sinus bone grafting and new implant placement performed in two or more steps with a significant time gap in between. Simplification of these surgical procedures can decrease the treatment duration and patient discomfort.

Conclusions: In this review, we discuss the anatomical characteristics of the maxillary sinus and the complications associated with implant displacement into the sinus.

Keywords: Dental implant displacement, Maxillary sinus, Simultaneous treatment

Introduction

Severe maxillary sinus pneumatization and thin residual alveolar bone can lead to the displacement of dental implants into the maxillary sinus during placement or after prosthetic restoration. Biting forces on the implant prosthesis and surrounding structures can also result in displacement of the implant. Displacement can occur more often in patients who undergo simultaneous implant placement and bone grafting after sinus elevation [¹]. Another factor is the decreased height of the residual alveolar bone, in particular implant placement in bone with a minimal height of less than 4 mm with simultaneous bone grafting through sinus elevation [²]. Galindo et al. stated that differences in the air pressure between the maxillary sinus and nasal cavity and an autoimmune reaction to dental implants, which causes bone resorption due to peri-implantitis, can also result in implant displacement [³]. Other influencing factors include the lack of the primary stability, the surgeon’s lack of experience, temporary denture usage without relieffordrilling, and the inappropriate application of force during the removal of nonintegrated implants [⁴]. Immediate removal of displaced implants is usually recommended. However, when the removal is delayed, the sinus infection needs to be controlled by antibiotics and nasal decongestants before removal of the implant using Caldwell-Luc approach or an endoscopic technique [⁵]. After removal of the displaced implant, implant placement with bone grafting can be performed stage by stage. However, this conventional approach is extremely long and delays appropriate rehabilitation of the edentulous area. In this review, we discuss the anatomical characteristics of the maxillary sinus, conventional approach for the removal of displaced...
implants from the maxillary sinus, and complications associated with implant displacement and describe a simplified treatment process for the removal of displaced implants with simultaneous sinus bone grafting and new implant placement.

Discussion

The maxillary sinus is a pyramid-shaped cavity lined with mucoperiosteum-containing cilia. The base is at the lateral nasal wall and the apex is toward the zygomatic bone and zygomatic arch. The maxillary sinus is connected to the nasal cavity through the maxillary ostium, which is an opening into the nasal cavity. This opening is relatively far from the floor of the maxillary sinus. The mucoperiosteal lining of the maxillary sinus is known as the Schneiderian membrane, which is approximately 1.0-2.0 mm thick. The posterior superior alveolar nerve and vessels usually pass through the maxillary sinus, and the average distance from the nerve to the crestal ridge of the alveolar bone is 16.9 mm [6–8]. The maxillary sinus in adults measures 25–35 mm in width, 36–45 mm in height, and 38–45 mm in length [8]. As time passes after the loss of maxillary teeth, the maxillary sinus generally expands to fill in the space through resorption of the alveolar bone. This so-called pneumatization caused by basal bone loss due to reinforced osteoclastic activity in the maxillary sinus membrane [9, 10] can lead to perforation of the maxillary sinus membrane. The other most common factor that contributes to perforation of the sinus membrane is the presence of septa, which exhibits an incidence rate of 31.7% for the premolar region. Complications associated with dental implant displacement into the maxillary sinus may be an intraoperative or postoperative complication. The displaced implant can disturb the anatomy around the maxillary sinus and inhibit mucociliary clearance by the cilia in the sinus membrane. Furthermore, mucosal thickening may occur, and scattered bone graft material may obstruct maxillary ostium to result in maxillary sinusitis and congestion. In the event of maxillary sinusitis and blockage of the ostium, an oroantral fistula can develop. Alberto et al. described that accidentally displaced implants can also migrate from the maxillary sinus to the upper structures such as the paranasal sinuses, orbital floor, or cranial fossa through mucociliary clearance against the force of gravity, changes in the air pressure of the nasal cavity, a foreign body reaction, and local tissue necrosis. Some studies have described that implants displaced into the maxillary sinus may not result in maxillary sinusitis. [11, 12] Galindo-Moreno et al. reported two cases of antral implant migration. The migrated implant that had been left behind on request of the patient showed no signs of clinical complications at 4-year follow-up visit. On the other hand, [13] Regev et al. and Raghoebar et al. suggested that the displaced dental implants in the maxillary sinus result in chronic maxillary sinusitis because of a foreign body reaction and need to be eliminated through surgical intervention, even if the patient is asymptomatic. Treatment modalities for a compromised maxillary sinus containing displaced dental implants as aforementioned, the basic principle is immediate removal of the displaced implant. However, when removal is delayed, the sinus infection should be controlled at the patient’s first visit. To prevent mucosal thickening and maxillary sinusitis, amoxicillin with clavulanate and nonsteroidal anti-inflammatory drugs need to be prescribed with pseudoephedrine hydrochloride for 1 week before surgery. Initially, management strategies for displaced dental implants in the maxillary sinus included the Caldwell-Luc procedure and conservative observation in the absence of signs or symptoms. Lately, minimally invasive maxillofacial surgery is preferred, with functional endoscopic sinus surgery (FESS) and conservative intraoral surgery with the formation of a bony window in the lateral wall of the maxillary sinus being representative procedures. Tsiodoulos et al. reported a case involving a patient who was operated under general anesthesia using a minimally invasive approach. A small rectangular bony window in the lateral wall of the maxillary sinus was created under direct vision. After the removal of the displaced implant from the maxillary sinus, the removed bony window was repositioned at the end of the surgery as it was guided by holes and stabilized by absorbable sutures. Nogami et al. reported a case involving a patient who was operated under local anesthesia. Four holes were created and osteotomy was performed using piezoelectric instruments. Following removal of the bony fragment, the displaced implant was identified with rigid endoscope and removed by dental suction. The bony fragment was repositioned and fixed with absorbable sutures. Subsequently, shorter and wider implants (by 1–2 mm) can be placed with or without sinus bone grafting after confirmation of the residual alveolar bone height and width on cone beam computed tomography images obtained 4–6 months later. In the most of the reported
studies mentioned above, removal of the displaced implant, sinus bone grafting, and new implant placement were divided into two or three individual procedures. Delayed implant placement is usually indicated when primary stability cannot be obtained or when extensive perforation of the sinus membrane or severe sinus infection is present. However, these divided procedures delay rehabilitation of the edentulous area.

**Conclusions**

Dental implants displaced into the maxillary sinus should be removed immediately. However, immediate removal is occasionally not possible because of the patient's condition or the dentist's lack of technical experience. In such cases, maxillary sinusitis should be controlled with proper measures, including antibiotics and nasal decongestants, before surgical intervention. Subsequently, implant removal and simultaneous new implant placement with sinus bone grafting can be performed through an extended bony window. This new approach decreases effort, time, and patient discomfort and accelerates the rehabilitation process.

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**REFERENCES**


The Correlation between Corrosion and Dental Implant Failure—A Review

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ABSTRACT

The commonly used replacement for natural teeth are the titanium dental implants. In spite of many advancement in composition, methods, and structural design, implant failure is a also significant concern for the operating personnel and patient. The lack of Osseo integration is considered to be the major factors leading to the failure of implant. The Occlusal overload, compromised systemic status of the patient, smoking, and implant characteristics are among the other major causes for implant failure. The purpose of this condensed review is to discuss whether corrosion has to play a role in the failure of a dental implant.

Keywords: corrosion, occlusal load, surface roughness.

Introduction

The history of the dental implant goes back to 3000 B.C., to the period when the ancient Egyptian civilization prospered. In this book, we will cover the history of dental implants from the time of Allen’s report, which in 1687 was the first to mention dental replantation and transplantation, and from the 1800s, the period where the practice of modern surgery started, along with the concepts of sterilization and disinfection[10,11]Dental implants in modern odontology, which has become an important option for the replacement of missing single teeth in partially or totally edentulous patients, with very good success rates. Despite complications associated with treatment with implants may occur, and failure can be divided into mainly two categories: early failure, which occurs before the prosthetic phase of treatment takes place and is mainly related to surgical problems that occur during implant placement; and late failure, which can arise from pathologic events involving an implant that has already Osseo integrated[7,8].

Review of Literature

To study the various causes of implant failure by focusing on whether corrosion occurs and if that plays a role in the failure of dental implants thereby giving a foresight on how to handle implant failures (6, 9). Implant failure is caused by many such factors which include perimplantitis, absence of Osseo integration, and implant fracture. It may also be invoked due to operative trauma, micro motion, and overloading. Over the years, many classifications of Implant failures have been proposed by various authors. Till date, no study has suggested the presence of corrosion in any implanted patient and no case of implant failure has been mentioned because of the same (4, 5).

Case Selection and Failure Prevention: The primary regulation is to be filter in selection of cases. Analyze the case completely in a specific manner in accord to the patient’s medical history, and do not involve a very obvious method of treatment as different individuals may need altered treatment criteria as to their separate medical wants (4, 5).

The Working Classification: Working classification classifies implant failures mainly into early and late failures. They are further classified based on etiology, personnel responsible, failure mode, and biological causes (9,8).
Early Failure of Implant: Early failures may occur very soon following placement of implants in the alveolar bone which is between a few weeks to months. They interfere with the healing process or cause altered Healing(6,7).

Etiology of Early Implant Failure:

Implant selection: improper Implant type or bone type, length and diameter of implant, surface impurity, and surface roughness. Surgical placement: off axis placement, lack of initial stabilization, overheating of bone, minimal space between implants, and contamination of implants during placement. Restorative problems: Improper design, occlusal scheme, improper fit, excessive loading, implant fractures. Improper design of prosthesis, Lack of Osseo integration(11,12).

Etiology of Late Implant Failure: Systemic factors diabetes, arthritis, obesity, and osteoporosis. Tissue abuse: smoking, para functional habits, alcoholism, Radiotherapy. Also functional and psychological problems and infections like retrograde perimplantitis(10,11).

Biological Causes of Early Implant Failure: Infections: retrograde perimplantitis, due to traumatic, occlusion, overloading.

Post Operative Care And failures: After successfully placing the implant, it is the patient’s duty to take care of its maintenance in the oral cavity. Inadequate postoperative care, carelessness in maintaining oral hygiene leads to infection in the implant site causing perimplantitis. More bone resorption was noted around fixtures in edentulous patients with poor oral hygiene than in participants with good hygiene (Lindquist et al. 1988).[28] This proves that in addition to surgical precision, personnel involved in its procedure and maintenance are responsible for the fate of implant(3,4).

Conclusion

An implant failure can be of more than one reason. More than a single cause may lead to failure of implant finally. As the dental implants placed are made of titanium, no amount of corrosion has been reported and it has been found that titanium implants are biologically safe. All operating surgeons need to find the necessity to correct the ongoing condition. Accurate data segregation, patient opinion and narrative, and accurate diagnostic instruments will assist in pointing out the reason for the failure of the implant(9,10). An early diagnosis and intervention is always possible if regular patient reviews are undertaken. The treatment option for complications and failing implants is decided by the routing of the actual etiologic causative factor, thus a diagnosis is established and possible etiologic factors identified, the causative agent should be determined and treatment attempted as soon as possible(1,2).

Thus it can be concluded that corrosion does not play any relevance in the failure of dental implants.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Osseointegration of Dental Implants Placed in Free Fibula Graft

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ABSTRACT

Objective: The aim of this article is to review survival/success rate of dental implants inserted in vascularized free fibula grafts.

Background: Placement of dental implants following mandibular reconstruction during ablative surgery using vascularized free fibula grafts has proved to be a successful technique to achieve good mastication and complete dental rehabilitation. Insertion of implants into the new mandible provides a better access to the bone, interdental relationships are easier to assess, and oral rehabilitation can be acquired in a short span of time.

Result: Study design, treatment methods, follow-ups, defect location, and morphology varied among studies. A definite conclusion could not be reached. Future studies with long-term follow-ups are required.

Conclusion: Osseointegration of dental implants is a relatively safe technique with minimal complications. Patient selection plays a vital role, dental implants may be placed primarily, thus reducing the time to oral rehabilitation. Vascularized fibula grafts are a suitable method of mandibular reconstruction and are amenable to be successful in both primary and secondary endosseous implantation.

Keywords: Free fibula; dental implantation; osseointegration

Introduction

The free fibula osteoseptocutaneous flap is the most preferred for reconstruction of composite mandibular defects. Osseointegration in these has proven to be advantageous. Primary osseointegration of dental implant in these has yielded a better results when compared with the placement of implants in the native mandible. Further more elaborate studies are required to find out the specific indications for osseointegration in patients with malignant oral tumors and in those patients who have undergone radiation therapy.

Segmental mandibulectomy is most often preferred in disease or trauma of the mandible and requires vascularized bone grafts such as fibula free flaps to restore the natural arch of the mandible.¹ ² ³ The fibula has become an important donor site to reconstruct larger mandibular defects as well as to provide enough bone bulk for dental implantation.

Dental implantation used for oral rehabilitation results in improved function by allowing the patient to masticate using an implant-supported fixed prosthesis. Improved lip support and oral competence could be achieved thereby overall patient aesthetics was enhanced.

Materials and Method

A PubMed search was performed from 1990 to 2016 limited to English language and human studies. Studies that reported treatment outcome of implants inserted in vascularized free fibula grafts were included. Primary search identified 220 studies. Variables based on which selection of patients was made are, the pathological nature of the mandible and perioperative radiotherapy,
preoperative determination of soft-tissue and bone requirements, number of osteotomies, rigid fixation method, must be considered for adequate surgical planning and to achieve good outcome.

Discussion

Significant functional and cosmetic deformity are observed in patients undergoing segmental mandibulectomy. Reconstruction with free fibula restores the natural contour of the mandibular arch and recreates the aesthetic mandibular border. The fibula free flap has sufficient bone width and height for large segmental mandibulectomy defects and support osseointegrated implants.

Granulation tissue and soft-tissue overgrowth near dental implants was the most common untoward event. This has also been described in prior reports. The survival outcomes and rates of implant-supported prosthesis use were similar in those implanted primarily and secondarily.

The effects of irradiation on the outcomes of dental implants remain controversial.

Sclaroff et al evaluated the effects of radiation on 22 patients undergoing primary dental implantation of fibula and iliac crest grafts and found no significant differences between those who received radiation therapy and those who did not.

On the other hand, when comparing 22 irradiated and 22 nonirradiated patients, Salinas et al did not find that irradiation exposure affected implantation success rates that were receiving radiation treatment after the fibula free flap. Therefore, a minimum wait period of 6 months after irradiation to place dental implants.

The timing of implantation remains controversial. In properly selected patients, primary implantation allows for better access to the grafted bone to be implanted, eliminates a second operation to place the implants, and allows for oral rehabilitation in a shorter time.

Urken et al first reported primary dental implantation in 9 patients. They concluded that dental restoration provides an additional step in the rehabilitation of patients undergoing oromandibular reconstruction.

Wei et al described their experience with patients undergoing primary dental implantation but cautioned that patient selection is important when considering a primary implantation approach. The timing of implantation becomes clinically important when considering the potential decreased life expectancy of those undergoing such procedures for oncologic reasons. The overall time from segmental mandibulectomy to complete dental rehabilitation with an implant-fixed prosthesis was decreased by nearly half in those implanted simultaneously compared with those implanted in a delayed fashion.

Chiapas et al raised the concern of fibula graft position as it relates to the native mandible. Since the fibula has a shorter vertical height than the native mandible, it has to be placed either at the lower border of the mandible, which improves cosmesis, or at the upper border of the mandible, which decreases implant height. Placing the graft at the lower border of the mandible offers good aesthetic results for facial contour.

Some authors have performed “double barrel” reconstruction, while others placed the fibula graft in between and filled the lower mandibular border with soft tissue to accomplish both goals.

Conclusions

Vascularized free fibula bone grafts provides a firm basis for the placement of dental implants in jaw reconstruction. Implants placed in fibula bone grafts were shown to integrate normally. The double-barrel technique, or increasing the height of the fibula flap by vertical distraction osteogenesis before implant placement in the mandible, is desirable from a functional and esthetic point of view.

Ethical Clearance: Not required since it is a review article

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REFERENCES


Osseous Coagulum in the Placement of Immediate Implant

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ABSTRACT

Loss of tooth causes more of a psychological trauma to the patient than functional loss, particularly if the tooth loss is in the aesthetic segment. Traditional protocols suggested a consolidation period of 3-4 months before placing dental implants. Immediate implant placement, defined as the placement of dental implant immediately into fresh extraction socket site after tooth extraction, has been considered a predictable and acceptable procedure.

Keywords: Dental Implants, Functional loss, Immediate implant, osseoprogenitor, cortico-cancellous, coagulum.

Introduction

Tooth loss causes more psychological trauma to the patient particularly in the aesthetic segment. Immediate implant placement, defined as the placement of dental implant immediately into fresh extraction socket site after tooth extraction, has been considered a predictable and acceptable procedure.

Some of the benefits are like the post extraction periods are eliminated, significant reduction in number of surgical visits, alveolar height and width are preserved. The angulation of the implants are better leading to improved aesthetics and axial occlusal loading. But there are some of the limiting factors in placement of immediate implants, and one of the factor is the void around the implant. Osseous coagulum being a autogenous grafting material is an ideal grafting material.

Block and Kent, 1991 described indications and contraindications for immediate dental implants placement into the extraction sites.

Indication for Immediate Implants:

1. Traumatic loss of teeth with a small amount of bone loss;
2. Tooth lost because of gross decay without purulent exudates or cellulites;
3. Inability to complete endodontic therapy;
4. Presence of severe periodontal bone loss without purulent exudates;
5. Adequate soft tissue health to obtain primary wound closure.

Contradiction for Immediate Implants:

1. Presence of purulent exudates at the time of extraction;
2. Adjacent soft tissue cellullites and granulation tissue;
3. Lack of an adequate bone apical to the socket;
4. Adverse location of the mandibular neurovascular bundle, maxillary sinus and nasal cavity;
5. Poor anatomical configuration of remaining bone.

Rationale Behind Usage of Osseous Coagulum as a Grafting Material: Autogenous bone grafts have been adopted as gold standard from the beginning. The advantages are as follows:
1. There is possibility to retain cell viability.

2. Graft revascularization and no possibility of disease transmission and contain live osteoblasts osteoprogenitor cells and heal by osteogenesis.

Autogenous bone grafts can be harvested either from intraoral or extra oral donor sites. Multiple intraoral locations have been used including the maxillary tuberosity, exostoses, extraction sites and edentulous ridges. The use of osseous coagulum in implant dentistry was first described by E.Carl. Robinson. It uses the mixture of cortico-cancellous autogenous bone particles mixed with blood.

Case Report: A 28 year male patient reported to the outdoor department of oral and maxillofacial surgery at SreeBalaji Dental College and hospital, Chennai with a chief complaint of trauma to anterior tooth and subsequent loosening of the tooth. Clinical examination revealed a fractured tooth and grade 2 mobility suggesting poor prognosis. Radiological evaluation revealed vertical fracture in the root, so it was decided to extract the tooth. The patient was given detailed explanation the procedure, course and cost of the procedure.

Pre-surgical radiographic evaluation was carried out with IOPA radiograph, OPG for appropriate treatment planning. The diameter of the socket at the crestal level was 5mm and the length of the socket was 12mm.

Surgical Placement of Implant: After proper treatment planning, endo-osseous implant measuring 5x13mm in dimension was selected following an injection of lignocaine with 1:100,000 adrenaline, atraumatic extraction of fractured tooth. The extracted socket was evaluated for osseous defects. All the walls were found to be intact. The extraction socket was debrided and after sequential drilling, implant was placed in the socket with an insertion torque of 45NCM. The remaining void was filled up with osseous coagulum. Adequate primary stability of the implant was achieved. Post-op radiograph was taken (IOPA radiograph). Impression was taken with silicon impression materials and healing screw was secured to the implant. Primary closure was done with 2 interrupted sutures.

The patient was put on antibiotic coverage and analgesics for 5 days. The impression was poured with type 4 stone. The abutment was fabricated outside the patient’s mouth on a working cast. The working cast was sent to laboratory for preparation of metal-ceramic crown.

After 2 weeks of healing period the implant was loaded with cement retained crown. The patient was followed up at 3 months, 6 months, 12 months, 18 months.

Discussion

The biologic advantage of immediate implant is the contention that the implant will prevent postsurgical bone resorption seen following tooth extraction as a normal part of the socket healing, it reduces the treatment cost duration, consolidation period. The vitality and osteogenic potential of the osseous coagulum makes it the choice of grafting material. Bacterial contamination is one of the most important factor in the outcome of grafting and prognosis of the implant. Rinsing the collected bone with chlorhexidine can reduce the amount of bacterial contamination.
REFERENCE


Ethical Clearance: Not required since it is a case report

Source of Funding: Nil

Conflict of Interest: Nil
Psychotropic Drugs Induced Parafunctional Habits and its Influence on Dental Implants: A Review

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ABSTRACT

Success of dental implants is multifactorial, it needs efforts from clinician as well as the patients, this article deals with one of the significant factor that causes failure of dental implants which is the parafunctional habits ie the parafunctional habits associated with patient who receives implants which in turn causing implant failure. Antipsychotic drugs also plays a crucial role in developing the parafunctional habits. It is very much acceptable that the parafunctional habits knowingly or unknowingly causing implant failure to that particular patient who has those habits, habits counselling plays a vital role in minimizing its detrimental effects on implants.

Keywords: Parafunctional habits, Implants.

Introduction

Parafunctional habits most commonly refers to the abnormal oral habits like bruxism, tongue thrusting, nail biting or pencil chewing. Patients come to oral and maxillofacial surgeons in need to replace their missing teeth with the best option and choice of treatment, most of the patients doesn’t have the realization of their abnormal oral habits and it becomes straightaway the duty of oral and maxillofacial surgeons to educate the patients about the parafunctional oral habits and its ill effects on receiving dental implants.

Dental implantation is itself technique sensitive and the patient’s part also plays a vital role in the success of the implants. patient’s concern must be fulfilled at the end of the day in a best possible way by the clinician. Thus this article speaks about the education of parafunctional habits to patients and their avoidance to receive the best possible replacement to their natural teeth.

Discussion

Thorough history taking before explaining the procedural aspects of the replacements plays a crucial role. By doing this we can easily find out the parafunctional habit associated with particular patient who comes for the treatment. Pre operative evaluation like bone mapping, radiographs, and the cast models will be the useful tools in planning the surgical procedures. If the patient is suspected to have bruxism, the particular tooth that is in premature contact must be trimmed down slightly and the precise occlusion is achieved and during the final capping procedures the intentional 2mm gap must be given so that the premature occlusal contact of the implant to the normal tooth is avoided of the already known bruxism patient1,2.
If the patient comes for the replacement of the lost tooth with the tongue thrusting habits, patients must be advised to undergo orthodontic treatment for achieving proper occlusion and if there is any skeletal abnormalities then orthognathic surgical procedures must be advised and explained to patient to achieve normal orthognathic profile and hence the tongue thrusting is minimized\(^{4,5,6}\).

**Fig. 2: orthodontic therapy to prevent tongue thrusting**

If the patient comes with intentional nail biting or pencil chewing habits for the replacement of missing tooth, then the patient must be psychologically counselled about their abnormal habits and if needed habit breaking therapy should be performed and then the implantation is carried on.

**Fig. 3: Dental implantation**

**Conclusion**

This discussion about the parafunctional habits and its interferences with the success of the implants is eye opener for the budding oral and maxillofacial surgeons to narrow down to maintain dentulism. All the external aspects must be well known before going into the implantation procedures.

**Ethical Clearance:** Not required since it is a review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCES**


Warfarin Induced Peri Implantitis—A Review

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ABSTRACT

Peri implant infection is a very commonly seen complication following the placement of dental implants. It usually affects both the soft tissue and hard tissue surrounding the dental implants. Studies have shown the prevalence rates of dental implants to be around 56% (1,2). There are several risk factors predisposing a patient with a dental implant to periimplantitis. Some of these include systemic diseases such as diabetes mellitus, immunosuppressive disorders etc., habits such as smoking and alcoholism, poor oral hygiene and improper maintenance of the dental implant. Although a proper protocol has not been found to treat periimplantitis, several conservative and surgical approaches are used to treat periimplantitis. The baseline of treatment is improving the oral hygiene by means of mechanical cleaning and the usage anti-infective oral rinses (2,3). Laser and photodynamic therapy have been found to yield excellent results in the treatment of periimplantitis and have come into light in the recent years. Surgical therapy includes resective therapy and regeneration using bone replacement grafts. The following is a brief review of the various studies done, to understand the etiology, risk factors and treatment modalities of periimplantitis (4).

Keywords: Periimplantitis, peri implant infections, review, periimplantitis treatment

Introduction

In the current scenario, dental implants have become an indispensable means of therapy in dentistry. According to reports, the success rate of implants have been estimated to be around 82.9% (1). The success of a dental implant demands a holistic approach. Post surgical hygiene and soft tissue management are integral components of every dental implant which has been placed. Periimplantitis is bone loss around an implant that is caused by bacteria. The pathogens causing periodontitis and periimplantitis are the same, such as A. actinomycetemcomitans, P. gingivalis, T. forsythia. Bone loss around a dental implant, or gingival inflammation, provides a nidus for anaerobic bacteria, which eventually leads to continued bone loss. According to several studies, the prevalence of periimplantitis is as high as 56%. The most common sign of infection is the presence of exudate. The initial management of periimplantitis includes debridement, short term systemic and local antibiotics, topical chlorhexidine. When there is continued bone loss and recurrence of exudates, surgical intervention will be require for correction.

Discussion

The purpose of this paper is to assess and study the clinical characteristics, the risk factors and the treatment modalities of periimplantitis. To begin with, there have been several definitions that have been reported for periimplantitis. At the consensus for periimplantitis, it has been defined as an infection with suppurative associated with clinically significant progressing marginal bone loss, after the adaptive phase, usually restricted to the first year of function. The American Academy of periodontology, periimplantitis is an inflammatory process around an implant that includes both soft tissue inflammation and loss of supporting bone.
Prevalence: Several studies have been done to analyse the prevalence of periimplantitis.

According to Zitzmann et al., the incidence of periimplantitis is higher in those who have a history of periodontal inflammation. Lindhe and Meyle reported that the incidence of periimplantitis is between 28 and 56%. Mombelli et al. reported periimplantitis in 20% of all implanted patients and in 10% of all inserted implants.

Pathogens: According to a study conducted by Ralf Smeets et al., periimplantitis has been described as a polymicrobial anaerobic infection. A number of pathogens have been detected such as Prevotella intermedia, Porphyromonas gingivalis, Treponema denticola, and Tannerella forsythia. According to Salvi et al., Staphylococcus aureus plays a predominant role in periimplantitis as it has a high affinity towards titanium.

Risk Factors: There are several factors that can predispose a patient with a dental implant to periimplantitis. Although the severity of every factor varies, smoking has been found to be the greatest risk factor. Those with a compromised oral hygiene are also at a high risk of developing periimplantitis. A lack of keratinized gingiva or other soft tissue defects at the site of implantation, systemic diseases such as diabetes mellitus, immunosuppression etc., A history of periodontitis, history of previous failure of one or more implants are some of the other factors predisposing patients to periimplantitis. Wilson et al. in 2009 described iatrogenic causes such as cementisint to also be a cause for periimplantitis to occur. A lack of proper occlusion and parafunctional habits are some of the other reasons for periimplantitis.

Clinical Characteristics: A release of exudate around the site of the dental implant is a common indicator of peri implant pathology. An increased probing depth of the periodontal pocket, sometimes accompanied with bleeding is another characteristic feature, due to the bone loss around the implant. Radiographically, a radiolucency surrounding the dental implant in the shape of a saucer or rounded beaker is observed.

Treatment: The most important step in the treatment of peri-implantitis is improved oral hygiene. The patient should be informed and properly instructed to maintain good oral hygiene.

Treatment Using Drugs: Javed et al. concluded that the usage of systemic and local antibiotics helped in the reduction of pocket depth within a span of one to six years. The commonly used antibiotics are doxycycline, minocycline, amoxicillin and metronidazole. Apart from antibiotic application, antiseptic rinses can also be used as a treatment modality.

Periodontal Treatment: Curettage with Teflon, carbon, plastic and titanium coated curettes has been found to be effective. A reduction in the bleeding has been found after cleaning with the help of piezoelectric scalers as well as hand instruments. Air polishing therapy has been reported to yield.

Laser Therapy: Er : YAG, Er, Cr:YSGG lasers with increased frequency have been used to treat periimplantitis. The results of such treatment yielded better results than that with curettage.

Photodynamic Therapy: It is a relatively new treatment modality, that has come to light in the recent years. It is an alternative approach to decontaminate dental implants. Injecting photosensitive dyes into periodontal pockets, followed by its activation with light helps in killing of periodontal pathogens. According to a study conducted, this therapy helped in significantly reducing the number of prevotella intermedia/nigrescens, Fusobacterium species and beta hemolytic Streptococcus. With the limited number of studies performed on photodynamic therapy, it has been found to be a good treatment modality. But it cannot be used as a primary therapy, as a lot more studies have to be performed and more data has to be collected for better evaluation.

Discussion

Surgical therapy is usually the last treatment modality opted. It usually is a combination of resective and regenerative procedures. Lang et al in the year 2004, introduced the AKUT concept which comprised of a basic regular recall of the implanted patient with repeat assessment of plaque, bleeding, suppuration, pockets and radiological evidence of bone loss. Zitzmann et al introduced a concept of systemic periodontal therapy which is a more widely accepted concept. According to this concept, oral hygiene of the patient has to be constantly checked and improved when necessary through mechanical cleaning and local anti-infective treatments. Only if the above mentioned treatment modalities fails, should resection or regeneration be opted for as the line of therapy.
The principle behind resective therapy is elimination of the peri implant osseous defect through ostectomy and decontamination of bacteria. Serino et al proved through studies that surgical pocket elimination along with bone contouring had tremendous effect on patients with active peri implant disease⁴. Studies show that after and open reduction of the inflamed peri implant soft tissue, followed by osseous surgery, 48% patients showed no signs of periimplantitis and 77% showed peri implant pocket depths of less than 6mm only⁹. Romeo et al showed that marginal bone loss after resective surgery with implantoplasty than that after resective therapy alone. Although resective surgery yields good results, in terms of good aesthetics and long time survival points, regeneration is preferable. Guided bone regeneration has been proven to yield excellent results as per several studies conducted. Singh et al in 1993 showed that there was greater bone regeneration and re-osseointegration during the submerged healing. Grunder et al found that there was no difference between either ways of healing. Lagervall et al conducted a retrospective study with 150 patients, by raising the periodontal flap followed by osteoplasty, followed by the use of bone replacement. A total of 69% was determined to be the success rate for both the procedures. Although several studies have been performed, the results are not sufficient enough to prove the efficacy of bone defect fillings and hence more studies have to be performed to bring more light to this form of treatment.

Conclusion

As stated above, although quite a few several studies have been performed, a proper treatment protocol for periimplantitis has not been implemented. Studies have been conducted using various materials and over various populations. In most of the studies, the follow ups are very short or the sample size used is less.

Paying proper attention to the risk factors that the patient is prone to, followed by maintenance of good oral hygiene can bring about a huge reduction in the number of patients with periimplantitis. Like the famous quote goes – ‘prevention is better than cure’. Steps should be taken by both the implantologist as well as the patient to prevent such peri implant infections which thereby lead to a complete failure of the paced implant.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Non Self Tapping and Self Tapping Implants of the Dental Practice: A Technique Based Compasion

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Abstract
The Working of self-tapping and nonself-tapping implant design in terms of implant stability, durability and ease in bone present in the maxilla and mandible It involved a total of 150 implants: 75 self-tapping and 75 nonself-tapping. The implants were placed in the various segments of the maxilla and mandible in sites prepared with either lateral bone-condensing or with bone-drilling techniques. Implant stability measurements were performed immediately after implant placement and weekly during a 12-week follow-up period.

Both types of implants placed after bone techniques results in agreeably good stability immediately after placement, as well as during the complete 12-week observation time. After bone condensation, there were no much variation in initial stability or in complete implant stability.

Keywords: tapping, stability, bone preparation.

Introduction
A dental implant is a titanium screw which is placed into bone to replace missing teeth. The implant mimics the root of a tooth in function. It is not only biocompatible, but actually fuses to bone by osseointegration. The growth of osseointegrated implants symbolizes one of the most significant breakthroughs in current dental practice in the oral rehabilitation of partially or fully edentulous patients. The subject of osseointegration or functional ankylosis was first given to us by Branemark and Schroeder through their extraordinary research work. Osseointegration is a direct structural and materialistic union between living bone and surface of the dental implant. A leap towards improved aesthetics and simplified use has blossomed in the application of dental implants in the replacement of teeth.

Self Tapping and Non Self Tapping Dental Implants:
Self tapping dental implants: The design and quality of the apical section of the implant is in such a manner that it is achievable to place it into alveolar bone ridges as it expands the bone by itself. The shape is also self-cutting and self-tapping so the dental implant acts as its own drill (a further time saving design feature) thus only minimal bony preparation is required. This means that once the dental implant site has been prepared using either drilling or, in many cases, site forming, the dental implant can be placed easily.

The self-tapping implants produced exceedingly greater stability than nonself-tapping implants during the entire follow-up period. Thus concluding that the bone drilling is not an effective technique for improving implant stability and, following this technique, the use of self-tapping implants is highly recommended. Implant stability optimization in the soft bone can be achieved by lateral bone-condensing technique, regardless of implant macro design.
Pre tapping: The majority of implants these days are screw in type implants and they come with various aesthetics and highly customized abutments. The “tap in” is an older type of implant.

The poring and rough texture of the implant surface helps it in osseointegration and requires levels of bone preparation before the placement. It is also called non screwing type or non threaded implants\(^{7,9}\).

Study Design: The consisted of two groups group A with “single” tapping implants and 75 samples. Thus 75 implants in total. Out of a vast category only single implant cases of that term were taken into consideration. the second group – b consisted of 75 members with single implants of the self tapping or screw implant category\(^{10}\).

Study: The study involved not only the stability and success of placement but also esthetical and maintenance phase analysis. The materials collected were the pre operative and post operative photographs of the implant site, implant details, review photographs and patient opinion on esthetics and maintenance of the implant. Technique sensitivity was kept in mind of the placement of the implant for each and every case. The data segregation was done and inferred subjectively\(^{3,4}\).

Results

Taking into account both the groups of implants placed significantly higher stability without haste after surgery, also during the complete 12-week observation period compared with those placed following bone drilling. After bone condensation, there were no gross variation in initial stability or in long term implant stability after the first week between both implant types\(^{9}\). From 2 to 12 postoperative weeks, significantly higher stability was shown by self-tapping implants. After bone drilling, self-tapping implants achieved significantly higher stability than non-self-tapping implants during the entire follow-up period. Also measures are made to follow up the cases for stating the longevity of the complete set of samples\(^{8,9}\).

Conclusion

The aftermath of the respective study suggests that bone preparation is not an effective technique for improving implant stability of pre tapping implants and, following the study, the use of self-tapping implants is highly recommended. Implant stability optimization in the soft bone can be achieved by lateral bone-condensing technique, regardless of implant macro-design.

Ethical Clearance: Not required since it is a review article

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REFERENCES


Fluoride Release and Recharge of Glass Ionomer Cements

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ABSTRACT
Dentistry has grown a long way from treating conditions to preventing them. Dental caries is one such condition where preventive measures have been adopted to a greater extent. The fluoride anticariogenic action is greatly related to inhibition of demineralization and remineralization of incipient carious lesions. Reports have shown that fluoride released from fluoride-containing restorative materials effectively protected the enamel from demineralization in the region near to the restorative materials.

Keywords: Dental Caries, Fluoride, GIC

Introduction
Dentistry has through years grown a long way to change its perception from treating conditions to preventing them. Dental caries is one such condition, where in its prevention greatly relies on the magical word, “Fluoride”. Its anticariogenic action is greatly related to inhibition of demineralization and remineralization of incipient carious lesions. Reports have shown that fluoride released from fluoride-containing restorative materials effectively protected the enamel from demineralization in the region near to the restorative materials. Amongst the various fluoride-releasing restorative materials, glass ionomer cements (GICs) are novel. This is due to their efficacy in resisting secondary caries formation around restorations.

Glass ionomer cements are made up of a powder and a liquid component. The powder is a calcium fluoroaluminosilicate glass and liquid is composed of polyacrylic acid. These components, when mixed together, undergo a setting reaction involving neutralization of the acid groups by the powdered solid glass base. Significant amounts of fluoride ions are released during this reaction. Modifications of GICs include silver alloy admix, cermet, resin modified glass ionomer cements (RMGIC), compomers and giomers. Comparison of fluoride release between glass ionomer cement, compomers and giomers showed that conventional GICs released higher amounts of fluoride than the latter two.

This review aimed to summarize the various factors related to fluoride release and recharge of glass ionomer cements.

Pattern of fluoride in GIC: There is an initial burst effect of fluoride, which then decreases gradually to reach a sustained release pattern. The initial burst effect can be attributed to 2 reasons: 1) glass particles dissolve in polyalkenoate acid during the setting reaction and 2) initial superficial rinsing effect. The sustained fluoride release during the following days occurs due to the ability of fluoride to diffuse through cement pores and fractures. This initial burst effect is desirable as it reduces the viability of bacteria that may have been left out in the inner carious dentin. Fluoride release is said to be highest during first 10 hours and gradually it decreased to low levels in 3 days. Based on one study, a monthly fluoride release consisting of 200-300 µg/cm² is reported to be sufficient to completely inhibit enamel demineralization.

Factors controlling fluoride release from GIC

Method of mixing: Comparison of short term fluoride release of a hand-mixed and capsulated system of a
restorative glass ionomer cement showed that the fluoride release at a given time was considerably greater for the capsulated system than for the hand-mixed system.\(^9\)

**Effect of pH:** More fluoride is released from GIC when the environment is at a lower pH. Thus, greatest amount of fluoride is released when it is needed the most to prevent secondary caries.\(^7\)

**Nature of fluoride incorporated:** Conventional GIC was compared to glass ionomer activated with fluoride solutions with regard to fluoride release. Apparently, former released significantly higher amounts of fluoride. This could possibly be due to the fact that fluoride liberated by degradation of glass in conventional GICs are probably higher than those introduced in the cements by mixing solution.\(^10\)

**Recharge of GIC**

**Methods of fluoride recharge of GIC:** Use of fluoride mouthwash, fluoridated toothpaste, professional application of fluoride and fluoride in public water supplies are methods of recharge of GIC.\(^5\)

**Factors controlling fluoride release in GIC**

**Glass filler content – With regard to type IX GIC:** Glass filler content with fewer monovalent ions cross linking the polymer chains holding them close together could possibly be the reason for low fluoride release from type IX GIC. This leads to less water transport and, consequently less fluoride release.\(^11\)

**With regard to Compomers:** In compomers, after curing and before contact with water, the fluoride is not free, but bound in the filler particles. These are are enclosed in the polymerized matrix and in the first phase of setting, thus accounting for the low fluoride release.\(^12\)

**With regard to Giomers:** Giomer contains surface prereacted glass ionomer as a fluoride component and thus the fluoride glass within giomer has little or no glass ionomer matrix phase. There is lack of any significant acid base reaction and hence giomer showed little amount of controlled fluoride release after recharge.\(^13,14\)

**Sodium Fluoride:** Disintegration of the matrix regions around glass fillers caused by spodium fluoride solution may result in enhancement of the fluoride recharge ability of the material.\(^15\)

**Toothpaste:** Due to the high viscosity and sticky nature of toothpastes, they are difficult to wash off and are thus trapped in pores and release more fluoride. With the use of scrubbing effect, higher amount of fluoride is possibly incorporated.\(^16\)

**Porosity of materials:** Higher porosity allows deeper diffusion of the recharging agent into the restoration, leading to a higher amount of fluoride storage and release.\(^17\)

**Effect of temperature:** High temperature during topical fluoride application may increase the fluoride recharging and re-release ability of glass ionomer cements.\(^18\)

**Age of the specimen:** Amount of fluoride re-release following recharge is said to increase with the age of the specimen. Fluoride taken up after recharging is likely to occupy the sites which have been previously occupied by fluoride before its release. Thus the amount of fluoride recharger may be limited to the inherent fluoride releasing ability of each material. This is due to the fact that the sites occupied by intrinsic fluoride are fixed and limitative within the materials.\(^19\)

It is reported that the material with higher fluoride release has a higher fluoride recharging ability. Among various restorative materials, type VII GIC is said to have the highest fluoride release and recharging ability. A material’s fluoride releasing property is inversely proportional to its mechanical properties. Thus, restorative materials with high fluoride release have lower mechanical properties.\(^20\)

**Conclusion**

AAPD guidelines for restorative materials states that GIC s have chemical bonding to both enamel and dentin; thermal expansion similar to that of tooth structure; biocompatibility; decreased moisture sensitivity when compared to resins and finally uptake and release of fluoride which has made them universally acceptable and reliable as a restorative material.\(^21\)

**Ethical Clearance:** Not required since it is a review article

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Facio Genito Popliteal Syndrome—A Review

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ABSTRACT

The finding of cleft lip and/or palate, congenital sinuses of the lower lip, popliteal pterygium, and genital anomalies in any combination was first termed Popliteal Pterygium Syndrome (PPS) by Gorlin and Pindborg in 1964. Rintala and Lahti (1970), on the basis of the term not being fully descriptive, suggested the eponym facio-genito-popliteal syndrome. Nevertheless, it is the original term which is commonly used. The pathogenesis of the syndrome is obscure, though it has been suggested that the hereditary factor involved predisposes to developmental arrest. In some publications the names of Fevre and Languepin are used as an eponym. A more descriptive term suggested for the condition, on the basis of incomplete expression of the features of the syndrome, is ‘facio-genito-popliteal syndrome’. However, the most widely used term for this disorder is ‘popliteal pterygium syndrome’. Autosomal dominant inheritance with highly variable expressivity and incomplete penetrance is widely accepted.

Keywords: Facio-genito-popliteal Syndrome, Popliteal Pterygium Syndrome.

Introduction

The finding of cleft lip and/or palate, congenital sinuses of the lower lip, popliteal pterygium, and genital anomalies in any combination was first termed Popliteal Pterygium Syndrome (PPS) by Gorlin and Pindborg in 1964. Rintala and Lahti (1970), on the basis of the term not being fully descriptive, suggested the eponym facio-genito-popliteal syndrome. Nevertheless, it is the original term which is commonly used. The pathogenesis of the syndrome is obscure, though it has been suggested (Rintala and Lahti, 1970) that the hereditary factor involved predisposes to developmental arrest (Pashayan et al., 1974).¹²

In some publications the names of Fevre and Languepin are used as an eponym. A more descriptive term suggested for the condition, on the basis of incomplete expression of the features of the syndrome, is ‘facio-genito-popliteal syndrome’. However, the most widely used term for this disorder is ‘popliteal pterygium syndrome’. Autosomal dominant inheritance with highly variable expressivity and incomplete penetrance is widely accepted.³

Interferon regulatory factor 6 (IRF6): IRF6 is the principal gene involved in this disorder. The location of mutations identified in families with PPS is non-random. In 34 of 36 families with PPS, the mutation is located in exons 3, 4 or 9.⁴

Cleft lip and cleft palate (CLP) are common disorders that occur either as part of a syndrome, where structures other than the lip and palate are affected, or in the absence of other anomalies. Van der Woude syndrome (VWS) and popliteal pterygium syndrome (PPS) are autosomal dominant disorders characterized by combinations of cleft lip, CLP, lip pits, skin-folds, syndactyly and oral adhesions which arise as the result of mutations in interferon regulatory factor 6 (IRF6). IRF6 belongs to a family of transcription factors that share a highly conserved N-terminal, DNA-binding domain and a less well-conserved protein binding domain. To date, mutation analyses have suggested a broad genotype–
phenotype correlation in which missense and nonsense mutations occurring throughout IRF6 may cause VWS; in contrast, PPS-causing mutations are highly associated with the DNA-binding domain, and appear to preferentially affect residues that are predicted to interact directly with the DNA.5

IRF6 plays a key role in the formation and maintenance of the oral periderm, spatio-temporal regulation of which is essential for ensuring appropriate palatal adhesion. In mammals, adhesion and fusion of the palatal shelves are essential mechanisms during the development of the secondary palate; failure of these processes leads to the congenital anomaly, cleft palate. The mechanisms that prevent pathological adhesion between the oral and palatal epithelia while permitting adhesion and subsequent fusion of the palatal shelves via their medial edge epithelia remain obscure. In humans, mutations in the transcription factor interferon regulatory factor 6 (IRF6) underlie Van der Woude syndrome and popliteal pterygium syndrome.6

Clinical Features: The features of the syndrome are highly variable and show a wide range of expressivity even within families. Orofacial, cutaneous, musculoskeletal, and genital anomalies occur.

Orofacial Anomalies: Characterised by cleft lip with or without cleft palate, paramedian lower lip sinuses, eyelid webbing, syngnathia. Orofacial anomalies also include micrognathia, ankyloblepharon, and choanal atresia. Intraoral tissue bands (syngnathia) were found in 42-6% of cases. They can seriously affect mouth opening and need to be removed surgically within the first year of life, or directly after birth if limitation of opening the mouth is so severe that feeding problems occur. Ankyloblepharon filiforme adnatum is found in approximately 20% of cases.3, 7

Theogaraj et al reports in their paper three prevailing theories to explain the aetiology of choanal atresia as follows:
1. Persistence of the bucconasal membrane.
2. Persistence of the buccopharyngeal membrane.
3. Overgrowth of the horizontal and vertical processes of the palatine bone.

Cutaneous and Musculoskeletal Anomalies: The popliteal web contains a palpable cord of connective tissue, and may contain the popliteal artery and the peroneal nerve. The cord usually extends from the heel to the ischial tuberosity. It may seriously limit extension, abduction, and rotation of the leg. In some subjects it was reported to be so tight that the heel almost touched the buttocks, while in other cases it could just be felt as a tight string without any severe limitation of the range of movements. Absence of muscles or abnormal muscle and tendon insertion may occur. On surgical intervention, care must be taken not to cut the vessels or nerves which supply the lower leg. The popliteal webs make this syndrome particularly important to the orthopaedic surgeon. The resultant fixed flexion deformity can be severe, at times approximating the ischium to the calcaneus. The neurovascular bundle is contained in the web’s posterior subcutaneous (S.C.) margin, which makes surgery precarious and difficult.8 Anomalies of nail and digits, talipes equinovarus, spina bifida occulta, bifid ribs, and short sternum are also described.3, 7

Genitourinary Anomalies: Genital anomalies include hypoplastic labia majora, vagina and uterus, clitoral hypertrophy, cryptorchidism, bifid or absent scrotum and ambiguous genitalia.3, 7

Growth and Mental Development: There is no growth disturbance and intelligence is usually normal.3, 7

Prenatal Diagnosis: Prenatal diagnosis is possible by means of sequence analysis of the IRF6 gene in DNA extracted from the chorionic villus or amniotic fluid, or by means of intrauterine ultrasound.9

Prenatal sonography may detect an associated cleft lip/palate along with inability of the fetus to stretch the knee. Magnetic resonance imaging is the test of choice before resection of fibrous bands and Z-plasty of the web.10,11

Molecular genetic testing. If the disease-causing mutation has been identified in the family, prenatal diagnosis for pregnancies at increased risk is possible by analysis of DNA extracted from fetal cells obtained by amniocentesis (usually performed at ~15-18 weeks’ gestation) or chorionic villus sampling (usually performed at ~10-12 weeks’ gestation).

Note: Gestational age is expressed as menstrual weeks calculated either from the first day of the last normal menstrual period or by ultrasound measurements.
Ultrasound examination. Prenatal ultrasound examination may detect a cleft lip later in pregnancy, but it is less likely to detect a cleft palate or lip pits. A level 2 targeted ultrasound examination at a center that routinely performs such procedures is most accurate.

Requests for prenatal testing for conditions such as IRF6-related disorders are not common. Differences in perspective may exist among medical professionals and within families regarding the use of prenatal testing, particularly if the testing is being considered for the purpose of pregnancy termination rather than early diagnosis. Although most centers would consider decisions about prenatal testing to be the choice of the parents, discussion of these issues is appropriate. Prenatal testing may provide the benefit of preparing the parents and family for a child with a facial difference or disability. However, the clinical manifestations of IRF6-related disorders are variable and cannot be predicted in the offspring.

Preimplantation genetic diagnosis (PGD) may be an option for some families in which the disease-causing mutation has been identified.

**Diagnosis:**

**Clinical Diagnosis:** IRF6-related disorders span a spectrum from isolated cleft lip and palate and Van der Woude syndrome (VWS) at the mild end to popliteal pterygium syndrome (PPS) at the more severe end.

To make the diagnosis of popliteal pterygium syndrome, an individual must have one or more of the following in addition to features of Van der Woude syndrome listed above:

- Popliteal pterygia
- Syndactyly
- Abnormal external genitalia
- Ankyloblepharon
- Pyramidal skin on the hallux
- Intraoral adhesions

**Molecular Genetic Testing:** Gene. Mutations in IRF6 are known to be associated with Van der Woude syndrome and popliteal pterygium syndrome. Genetic variants in IRF6 contribute risk for isolated cleft lip and palate.

**Clinical testing**

- **Sequence analysis**
  - Popliteal pterygium syndrome. Sequence analysis of exon 4 of the IRF6 coding region detects mutations in approximately 72% of individuals with PPS [de Lima et al 2009]. Additional sequencing of the entire coding region of IRF6 detects mutations in approximately 97% of individuals with PPS (N=37) [de Lima et al 2009].
  - Deletion/duplication analysis
    - Popliteal pterygium syndrome. A study of seven individuals with PPS did not identify any deletions in IRF6 [Schutte et al 1999], nor were any reported in the larger study of de Lima et al [2009]. Since almost all individuals with PPS have had a mutation identified by sequence analysis, the contribution of deletions to this phenotype is likely very small. 12

**Treatment:** The overall prognosis of the popliteal pterygium syndrome is good. Patients often undergo a series of plastic surgery operations, usually starting in the newborn period and extending into puberty.

In the newborn period the ankyloblepharon and oral synechia are excised to enable eye opening and proper feeding.

Cleft lip and palate repair are done in consecutive sessions starting in the first year of life. An artificial palate can be placed temporarily if feeding is difficult. The cleft palate will usually be closed within the first year of life. Speech and hearing problems may develop secondary to the clefting abnormality. If salivation from the lower lip pits is severe, these need to be surgically removed. 3

The bilateral choanal atresia required urgent surgery to establish an airway. Immediately after birth, the baby was intubated because of respiratory distress. 13

Surgical treatment is preferred because the results of conservative treatment, including serial casting or traction, have been unsatisfactory. Among these surgical treatments, lengthening of the soft tissues such as the skin, muscles and ligaments using resection of fibrous bands and Z-plasty was the most preferred technique. 14
An Ilizarov external fixator is commonly used for correction of shortening or deformity, and it is also employed for the treatment of joint contractures. According to Gillen et al. the device allowed all 4 of their patients with PPS to obtain 0° of knee extension, but 15-30° of contracture recurred postoperatively. This is rebound phenomenon is a major obstacle in the treatment of PPS.15

Gradual soft tissue lengthening with an Ilizarov external fixator can be one of the optimal procedures when excision of fibrous band and Z-plasty are not possible due to adhesion to the nerves or blood vessels in the popliteal pterygium. 15

During the operation special attention needs to be given to the vessels and nerves within the pterygium. Postoperatively, plaster casts and physiotherapy are used to maximise long term results. Cryptorchidism may require surgical intervention within the first three years of life.

Genetic counselling: IRF6-related disorders are inherited in an autosomal dominant manner. Most individuals diagnosed with an IRF6-related disorder have an affected parent; however, penetrance is incomplete and de novomutations have been reported. The risk to the sibs of the proband depends on the genetic status of the proband’s parents. If a parent of the proband is affected or has an IRF6 mutation, the risk to the sibs of inheriting the mutation is 50%. Prenatal diagnosis for pregnancies at increased risk is possible if the disease-causing allele in the family member is known. Prenatal ultrasound examination may detect a cleft lip in some fetuses later in pregnancy, but it is less likely to detect a cleft palate or lip pits. 12

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

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Intranasal Local Anaesthesia: A Recent Advancement in Pediatric Dentistry

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ABSTRACT

Intranasal local anaesthesia is a recent advancement in pediatric dentistry. Here we try to give a better and comfortable mode of administration of local anaesthesia for kids for their better cooperation. Intranasal anaesthesia in other words needle free anaesthesia has rapid onset, ease of delivery, painless administration, high medication bio availability as its advantages. Kovacaine mist is a spray type of intranasal local anaesthesia that is effective only on permanent and primary anteriors, primary molars, permanent premolars.

Keywords: Anaesthesia, Intranasal, Kovacaine.

Introduction

Kovacaine mist a needle free local anaesthesia, effective on maxillary anteriors and premolars was introduced by Mark kollar and st. Renatus into the dental world. The most common means of anesthetizing a maxillary tooth is intraoral supra-periosteal injection of local anesthetic, commonly referred to as a maxillary infiltration. Local anesthesia is achieved by penetration of a needle through the buccal mucosa and submucosal deposition of a local anesthetic solution proximal to the root apex of the tooth.

Fear of a painful dental injection and subsequent avoidance behavior are significant barriers to regular visits to the dentist.1 In a study by Eliezer Kaufman, et al. that asked patients to grade pain, discomfort, and pressure on a visual analog scale as associated with needle insertion, operator finger position in the mouth, and pressure at injection, local infiltration in the anterior maxillary region yielded the highest needle insertion and finger position discomfort scores.2 Importantly, patients’ fear of injections can delay needed dental care. Surveys indicate that 30-40 million people in the US avoid going to the dentist because of fear of pain and anesthetic injections.3-5 Therefore an anesthetic procedure that would avoid the discomfort of a local anesthetic injection thus obviating fear and anxiety about receiving a “shot,” would greatly benefit dental patients. Further, for procedures involving more than one maxillary tooth on the same side, a trans-nasally applied anesthetic agent that could anesthetize multiple maxillary teeth at once instead of use of repeated infiltration injections would be a major convenience for patients and dentists.

In addition, avoidance of injection in dental anesthesia eliminates the risk of exposure to blood borne pathogens via needle sticks, a recognized occupational hazard in dentistry. In an ongoing attempt to reduce the risk of exposure to blood borne pathogens, Congress passed the Needlestick Safety and Prevention Act (effective in 2001) that requires the use of needle-free technology whenever possible to eliminate employee exposure to blood and other potentially infectious materials. This law provided further incentive to develop anesthetics that can be delivered in a “needle-free” manner. Infiltration injection may fail because of individual differences in response to the drug administered, cortical plate bone density, tissue vascularity, and variations of neuroanatomy.

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Nasally applied tetracaine hydrochloride has been used successfully and safely for many years for anesthetizing tissues before diagnostic and surgical procedures. Addition of a nasal decongestant to a tetracaine formulation has been used when anesthetizing the nasal cavity. A common nasal decongestant for this purpose is 0.05% oxymetazoline hydrochloride.

### Composition

<table>
<thead>
<tr>
<th>Ingredients</th>
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</tr>
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<tbody>
<tr>
<td>Active ingredient</td>
<td>Tetracaine hydrochloride, USP</td>
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<tr>
<td>Active ingredient</td>
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<td>Viscosity adjuster</td>
<td>Hydroxyethylcellulose, NF (5000 cps)</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Purified water, USP</td>
</tr>
</tbody>
</table>

### Parts of BD Accuspray:

**Dental work without needles**

Delivered as a nasal spray instead of a needle, the nasal spray anesthetizes the upper teeth for dental procedures.

**The ‘Old’ Way**

Anesthetic injection
A needle is inserted into the appropriate location and anesthetic is injected directly towards the nerve pathways. This method can have complications ranging from mild to severe, including:
- Injection into a blood vessel delivering too much anesthetic too fast.
- Injection of air bubble through poor technique.
- Shock from psychogenic trauma.
- Bacterial infection of the needle tract.

**The ‘New’ Way**

Nasal Spray
Anesthetic is sprayed into the nose, where it affects the nerves that travel through the nasal cavity to the upper teeth. This blocks pain signals from traveling back to the brain.

**Applications**

The nasal spray can be used for procedures on all teeth of the upper arch except for the back molars.

**Procedures that can be performed include:**
- Fillings
- Root canals
- Crowns
- Gum procedures

**Parts of BD Accuspray:**

- **Soft conical plug**
  The plug forms a seal with the nostril preventing expulsion of fluid.

- **Malleable stylet**
  The malleable stylet allows 180° positioning of the nasal plug.

- **Accurate dosing**
  The syringe enables the accurate measurement of drugs to be delivered.

- **Pressure**
  High applied pressure ensures that drugs are atomized into a fine mist of particles through the tip of the plug.

- **Atomization spray**
  The spray atomizes drugs into a fine mist of particles: 90-100 microns in size.
Soft conical plug forms a seal with nostril preventing expulsion of the fluid. Through the automisation spray it automises drug into a fine mist of particles 30 – 100 microns. The malleable stylet allows 180 degree positioning of the plug.

**Technique:**

It’s a two way technique. One it s 0 – 15 degree angulation from the middle nasal septum of nose and the other the syringe inserted into the nose is in 45 degree angulation from the imaginary line from the canthus of the eye.

**Mechanism:** Kovacaine mist works on a two way mechanism. one when it is sprayed into the nasal cavity it anaesthetizes the nasal branch of anterior superior alveolar nerve and there by anaesthetizing the maxillary anteriors.on the other hand it anaestetises the infra orbital nerve and the main trunk, whenever middle superior alveolar nerve is connected with anterior superior alveolar nerve it is also anaesthetized.

**Advantages:**
- Rapid onset
- Ease of delivery
- Painless administration
- Bio availability

**Disadvantages:**
- Short active period.
- Works only on maxillary anteriors and primary molars.
- Causes mild irritations like stuffy or running nose, eye tearing, sore throat.

**Kovacaine Mist–Uses in Dental Procedures:**
- Restorative procedures
- Polpotomy
- Pulpectomy
- Extractions
- Majorly helpful in patients with ECC.

**Conclusion**

Kovacaine mist, could potentially be used as a safe and effective alternative to maxillary infiltration for anesthetizing maxillary premolars and anteriors to achieve pulpal anesthesia. Kovacaine mist was well-tolerated by the subjects who received the drug in this clinical trial and had a low rate of adverse events all of which were mild and of short duration, mainly including headache and runny/stuffy nose.
Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Supernumerary Teeth—Mesiodens—A Case Report

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ABSTRACT

Supernumerary teeth may be encountered by the general dental practitioner as a chance finding on a radiograph or as the cause of an impacted central incisor. They may also be found intraorally following spontaneous eruption. The most common supernumerary tooth which appears in the maxillary midline is called a mesiodens. Treatment depends on the type and position of the supernumerary tooth and on its effect on adjacent teeth.

Keywords: Hyperdontia, Mesiodens, Phylogenetic Theory

Introduction

Hyperdontia is a developmental anomaly in which an extra tooth/teeth are formed and these were referred as supernumerary teeth.1-2 According to Garvey et al3a supernumerary tooth is one that is additional to the normal series and can be found in almost any region of the dental arch. According to Schulze4 it is defined as any teeth or tooth substance in excess of the usual configuration of twenty deciduous and thirty-two permanent teeth.

Numerous theories have been proposed to explain the development of the supernumerary teeth but they remain controversial. The first is the phylogenetic theory (atavism) which suggest that the ancestors had three central incisor but now largely been discarded by the embryologist. Next is dichotomy theory which suggests that the tooth bud is split to develop two separate teeth of which one is supernumerary. The third is the hyperactivity of the dental lamina which is the most widely accepted. According to this the remnants of the dental lamina or palatal offshoots develop in to supernumerary teeth. The last is the combination of genetic and environmental factors referred as unified etiologic explanation. Autosomal dominant and a sex linked pattern have also been proposed to be the cause.5

Supernumerary teeth are classified based on number as single or multiple. They are also classified based on morphology as accessory and supplemental. Accessory teeth are again classified based on shape as conical (peg-shaped), tuberculate (barrel shaped) and odontome which can again be either complex or compound. Based on the location in the dental arch they are again classified as Mesiodens (between incisors), paramolars (beside a molar), distomolars (distal to molar) and parapremolars (beside a premolar). Multiple supernumerary teeth can be associated with syndrome or also without it. The various syndromes which are associated with supernumerary teeth are Cleidocranial dysostosis, Gardners syndrome, Cleft lip and palate, Fabry-Anderson’s syndrome, Chondroectodermal dysplasia, Down syndrome, Orofacial dystosis, Crouzon disease, Hallermann Sheriff syndrome and Nance Horan syndrome.6

The prevalence of supernumerary teeth ranges from 0.15% to 3.9%in the permanent teeth in normal population and this increases to 28% in cleft lip and palate patients. It is five times more common in maxilla than mandible. Sexual dimorphism was reported by many authors with

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male to female ration of 2:1. It is less common in deciduous teeth with an incidence of 0.3% to 1.7%. Majority of the supernumerary teeth remain impacted and only 25% of the anterior supernumerary teeth erupt spontaneously. The frequency of erupted primary supernumerary teeth is greater than the permanent supernumerary teeth (75 Vs 25%). Mesiodens is the most frequent supernumerary teeth encountered with an overall prevalence of 0.15 to 1.9%. It may occur individually or as multiples were it is referred as mesiodentes. Mesiodentes in the permanent dentition is called rudimentary mesiodentes and those seen in primary dentition as supplemental mesiodentes. Based on morphology they can be conical, tuberculate and molariform. Mesiodens may erupt normally, stay impacted, appear inverted, take an ectopic position and follow an abnormal path. Palatally placed mesiodens is the most common type and is usually unerupted.

The various problems associated with supernumerary teeth are failure of eruption, displacement of permanent tooth, crowding, delayed eruption, diastema, rotations, development of cystic lesions and resorptions of adjacent teeth. Management is mainly extraction but the time depends on the developmental stage of dentition i.e. primary, mixed and permanent.

**Case Report:*** An 5 year old male patient reported to the department of pedodontics and preventive dentistry with a complaint of presence of conical shaped tooth in the anterior region(Fig 1). His medical was unremarkable. His family history revealed that his father had a erupted mesiodens on the palatal aspect which was later extracted. No significant abnormality was noted in the extra-oral examination. Intra-oral examination revealed a normal soft tissues and a primary dentition stage. Mesioocclusal caries was noted in the lower right and left second primary molar and upper right and left first primary molar.

Distoocclusal caries was noted in the upper right and left upper second primary molar. Root stumps were also seen in the lower right and left first primary molar region. Caries was also found on the mesial surface of right and left upper lateral incisor and in both the proximal surface of left upper central incisor He was on his first dental visit. A conical shaped supernumerary tooth was found in the place of right upper central incisor. History revealed that primary incisor exfoliated uneventfully and replaced by this supernumerary tooth.

Radiographic examination included intra-oral periapical radiographs for the entire molar segment and for the upper anterior region. Treatment plan was explained to the parent and an informed consent was obtained.

A proper size celluloid crown (Company) was selected, trimmed and using light cured composite (company) the erupted supernumerary teeth was reshaped as primary central incisor(fig 2). Pulpal therapies were done for all the primary molars and stainless steel crowns (Company) were placed. Crown and loop space maintainar was given in the lower second primary molar area after the extraction of the lower first primary molars. The carious upper anterior teeth were restored with composite (Company).
Discussion

Any extra tooth in the dental arch is referred as supernumerary teeth. Supernumerary teeth in the midline between the central incisors are referred as mesiodens. These teeth are most commonly associated with many syndromes but no such syndromes were seen for the patient.

The development of supernumerary teeth remains controversial and unknown, but it considered as a multifactorial inheritance disorder. Of the several theories proposed the hyperactivity of the dental lamina is most commonly accepted. According to this theory the remnants of dental lamina or the palatal extension of the active dental lamina could develop into an additional tooth. But genetics factors are also strongly suggested for its development. As it is reported in familial generations, siblings and also in twins it is thought to be of autosomal dominant condition. Since it is more common in males some proposed it could be of a sex linked pattern. Thus the cause could be due to genetic predisposition and as the child is a male it can also be of sex linked pattern but both are not confirmatory.

The various complication that could arise as a result of supernumerary teeth are failure of eruption, displacement of permanent tooth, crowding, delayed eruption, diastema, rotations, development of cystic lesions and resorptions of adjacent teeth. Apart from this a new complication encountered was the early exfoliation of the right primary central incisor due to eruption of normally placed mesiodens. This exfoliation was considered early as there were no permanent tooth was erupted until now and the root of the contralateral primary central incisor shows only mild root resorption.

Since the erupted mesiodens was not esthetically pleasing both to the child and the parent it was reshaped as primary right central incisor as it was in a favorable position in the dental arch. Similar case was also reported by Tatel who reshaped the mesiodens as a left primary central incisor for a 3 year 9 month old child. Crown and loop space maintainer was given to the lower second primary molars as the permanent first molar were erupting to prevent any space loss. The parents were also informed about the rotated permanent central incisor and they may need any interceptive procedures later when it erupts spontaneously or even when it failed to erupt.

Conclusion

Esthetics is of great concern even to the child. Restoring it will increase the self esteem of the child. In the modern preventive dentistry treatment approach early detection and management of all supernumerary teeth is a necessary part of it. Timely intervention will eliminate the occurrence of various complications and hence radiographic evaluation on suspected patients is of much importance. But in this case only time should reveal whether surgical removal at a very early stage has any positive outcome.

Ethical Clearance: Not required since it is a case report

Source of Funding: Nil

Conflict of Interest: Nil

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Effect of Positive Dental Video on Dental Anxiety in Children Using Chota Bheem-Chutki Scale

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ABSTRACT

Context: Dentists should detect the patient’s level of anxiety and eliminate the anxiety prior to the treatment to provide a successful treatment and to establish a positive attitude towards dentistry.

Aim: To evaluate the effect of exposure to positive dental experience video on dental anxiety among 6 to 11 years old children using Venhams picture test and Chota Bheem-Chutki scale.

Method and Material: Hundred children between 6 to 11 years were selected randomly for the study. Pre-intervention anxiety level was recorded using Chota Bheem Chutki scale (CBCS) and Venham picture test (VPT) while the children were sitting in the waiting area. After that the positive dental experience video was shown to the children for 2 minutes. Later, the anxiety level of children was again measured using both the scales. That was taken as the post intervention scores.

Statistical analysis used: All the scores were statistically analyzed by SPSS version 22. Paired t test was used to compare the scores obtained from both the scales and Pearson correlation test was performed to obtain correlation among the scales used in the study.

Results: The mean anxiety score of children before intervention and after intervention using VPT was 3.25 ± 1.67 and 0.43 ± 1.32; for CBCS was 1.84 ± 0.71 and 1.05 ± 0.21. The difference between intervention and after intervention value was highly statistically significant p-value <0.001.

Conclusions: This study showed that exposure to positive dental video can significantly reduce anticipatory dental anxiety in children.

Keywords: Dental anxiety, Venham picture test, Chota Bheem Chutki scale,

Introduction

Dental anxiety is a major barrier for dental care utilization. It is confirmed that anxious patients have more decayed and missing teeth which impacts seriously on the quality of their lives. Anxiety is defined as a non specific feeling of apprehension, worry, uneasiness/dread, the source of which may be vague or unknown. Dental anxiety refers to patient’s specification toward dental situation-associated stress. Despite the technical advantages dental anxiety remains to be a major problem. It is present worldwide and not limited to a population or country. Child’s dental anxiety has
always been a matter of concern for the dentists due to its various complications like prolonged chairside time, behavioural management problems, avoidance of dental care and the strong influence it has on the child’s future attitude towards the dental treatments. Assessment of dental anxiety in children and addressing the individual’s needs is a crucial factor in patient management. Dental anxiety in patients is also a recognized problem for the dental health care providers. Anxious patients were considered the most stressful situations a dentist might face. Increased levels of dental anxiety obscure the proper diagnosis of the actual dental problem. It also affects the quality of the treatment performed. Anxiety yields a negative attitude towards dentistry thus reflecting in the relationship between the patient and the dentist. Hence, it is of paramount importance that dentists should be able to accurately detect the patient’s level of anxiety and eliminate the anxiety prior to the treatment to provide a successful treatment and to establish a positive attitude towards dentistry. One approach known as modeling given by Kuhn and Allen may be used to develop positive associations with dentistry through the promotion of positive images of children experiencing dental treatment. Several scales have been developed to measure the anxiety level of the patient. One such scale is the Venham picture test (VPT) which uses eight pairs of images that expresses various anxiety levels. VPT have been used in numerous studies to assess dental anxiety before dental treatment; however, these scales present with certain drawbacks such as figures on the VPT scale are all male which might pose difficulties when a young patient is a girl. In addition, the ambiguous nature of some figures on the scale are confusing for the child to choose, thus making it a time consuming procedure. Moreover, the figures used in these scales are not familiar for the children. The newly devised Chota Bheem Chutki scale (CBCS) developed by Sadana G et al using the popular cartoon characters Chota Bheem and Chutki expressing six different expressions overcomes the disadvantages of VPT scale.

**Aim**

1. To evaluate the effect of exposure to positive dental experience video on dental anxiety among 6 to 11 years old children using Chota Bheem-Chutki scale

**Objective**

1. To find out anticipatory anxiety level in children before intervention and determine the impact of positive dental experience video on dental anxiety of children.

2. To compare anticipatory anxiety level in children before intervention and after intervention.

3. To find out the reliability of the CBCS in comparison to VPT scale

**Subjects and Method**

The sample size for the present study was calculated using the formula:

\[ n = \frac{4PQ}{L^2} \]

\[ P = 6.3\% \text{ (as per previous studies); } Q = 100 - P, L = 5\% \]

The present study was conducted to evaluate the effect of exposure to positive dental video on dental anxiety among 6 to 11 years old children visiting the outpatient department (OPD) of paedodontics and preventive dentistry using Chota Bheem-Chutki scale. The children were selected randomly based on the inclusion and exclusion criteria.

**Inclusion Criteria:**

- Children with no history of major illness
- First dental visit
- Accompanied by the parent or guardian.

**Exclusion Criteria:**

- Physically and mentally challenged children
- Children with history of previous dental visit
- Children that became upset at viewing the video

Parents/guardians were informed regarding the study and consents were obtained from them. The study was started after taking ethical clearance by the ethical committee of the institute.

The parents and the children were made to sit in the waiting area and the anxiety level of the children was recorded using CBCS and VPT. The children were asked to point out the image which they felt that best related their emotional state at that moment. This was taken as the pre intervention score. After that the positive
A dental experience video was shown to the children for 2 minutes. Later, the anxiety level of children was again measured using both the scales. That was taken as the post intervention scores. All the scores were statistically analyzed by Statistical Package for the Social Sciences (SPSS) version 22. Paired t test was used to compare the scores obtained from both the scales and Pearson correlation test was performed to obtain correlation among the scales used in the study.

**Results**

A total of 100 children reporting to the department of paedodontics and preventive dentistry during their first dental visit were selected for the study.

Table I illustrates the mean anxiety score of children before intervention and after intervention using VPT which was $3.25 \pm 1.67$ and $0.43 \pm 1.32$ the difference between these value was highly statistically significant $p$-value $<0.001$

Table II illustrates the mean anxiety score of children before intervention and after intervention using CBCS which was $1.84 \pm 0.71$ and $1.05 \pm 0.21$ the difference between these value was highly statistically significant $p$-value $<0.001$

Table III shows the correlation between CBCS and VPT before intervention and after intervention which was $r = 0.560; p<0.001$ and $r = 0.848; p<0.001$ a strong correlation was found between VPT and CBCS

**Discussion**

Dental anxiety is a common condition in children and adolescents. Various studies have shown a prevalence of around 6–20% independently of culture and country.$^{8,14}$ There are number of instruments are available to measure dental anxiety in children.$^{15}$ The Venham picture scale is widely used and easily administered.$^{16}$

In the present study relatively new Chota Bheem-Chutki scale was used since it is simple, easy to understand and children are familiar with the cartoon characters used in the scale, therefore they can easily relate them to it. 6 to 11 years old children were selected for the study as they were likely to have the cognitive ability to self-report their anxiety.$^{17}$

In the present study the anxiety level of children in waiting area was found to be high similar to the study done by Gangwal RR et al (2014), $^{18}$ this could be due to a close connection between the development of dental anxiety in children and family dental fear.$^{19}$ Bergius M et al (1997) identified that high dental anxiety level in children was associated with vicarious learning in the family.$^{8}$

<table>
<thead>
<tr>
<th>Table I: Distribution and comparison of anxiety scores using VPT before intervention and after intervention</th>
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<tr>
<td><strong>No. of subjects</strong></td>
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<td>VPT pre</td>
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<td><strong>P value</strong></td>
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<th>Table II: Distribution and comparison of anxiety scores using CBCS before intervention and after intervention</th>
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<td>CBCS pre</td>
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<th>Table III: correlation of CBCS with VPT before and after intervention</th>
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<td><strong>No. of Subjects</strong></td>
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<td>CBCS with VPT (pre)</td>
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<td>CBCS with VPT (post)</td>
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In the present study it was found that the anxiety level of children following exposure to two minute positive dental video reduced significantly compared to the initial anxiety level in waiting area similar to the studies done by Fox and Newton (2006)\(^6\) and Gangwal RR et al (2014)\(^8\) who showed that viewing positive images of dentistry and dentists resulted in short-term reduction in anticipatory anxiety in children.

In the present study, there was a strong correlation between VPT and CBCS similar to the findings of Sadana G et al (2016).\(^7\) Furthermore, when child patients were asked which scale was the simplest and easiest to understand, majority of them chose the CBCS.

**Limitation:**

- Positive dental video used in the study were not validated
- Cartoon characters used are not universally acceptable

**Conclusion**

This study showed that exposure to positive dental video can significantly reduce anticipatory dental anxiety in children. Chota Bheem Chutki scale yielded comparable results to the Venham picture test, it can be used as a new alternative tool for dental anxiety assessment in young children.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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**Conflict of Interest:** Nil

**REFERENCE**


Formocresol—Myths and Facts

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ABSTRACT

Formocresol is used in endodontic therapy for pulp canal sterilization. Formocresol contains 10% formaldehyde, 35% cresol, and 15% glycerol. Various researchers have said that formocresol is effective in fixing the pulpal tissue, and it also has an impact on the enzymes and connective tissue surrounding the apices of the treated teeth. Hence, this paper reviews the history, sources, pharmacokinetics of formaldehyde and cresol, carcinogenicity, mutagenicity, clinical success and controversies regarding the safety of formocresol as medicament.

Keywords: Formocresol, controversies, endodontic therapy

Introduction

Formocresol has been utilized by dentists for over 100 years as a medicament in the treatment of primary teeth requiring therapeutic pulpotomies. Even today most dentists use formocresol manufactured at the same composition recommended in 1904 (Buckley type formula, 19% formaldehyde, and 35% cresol in a vehicle of 15% glycerine and water).

Formocresol is regarded as the gold standard and remains the most commonly used material for pulpotomies. Probably the first report of formaldehyde containing pulp medicament being used was in 1874 when Nitzel applied a Tricresol-formalin tanning agent.

Some concern has been expressed by Lewis BB et al in 1981; Ranly DM in 1984; Ketley CE et al in 1991; Waterhouse PJ in 1995 in the last 25 years regarding the use of formocresol for vital pulpotomy treatment of primary molars due primarily to its mutagenic, carcinogenic, and toxic potential when used in high concentrations and under specific conditions.

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Ubiquity of Formaldehyde: Daily formaldehyde exposure is a fact of life. Formaldehyde is found in the air we breathe, the water we drink, and the food we eat. The World Health Organization (WHO) has estimated that daily consumption of formaldehyde approximates 1.5–14 mg/day (mean, 7.8 mg/day), although daily intake from food is difficult to evaluate. Owen et al in 1990 estimated that North Americans eating a typical North American diet ingest 11 mg/day. In unpopulated areas, outdoor air contains approximately 0.2 parts per billion (ppb) of formaldehyde. In populated areas with truck and automobile traffic, however, air concentrations range between 10 and 20 ppb. There have also been instances of high concentrations of formaldehyde in the air inside homes. In 2002–2003, Health Canada found formaldehyde levels of 2–81 ppb in homes in Prince Edward Island and Ottawa, Canada. Second-hand cigarette smoke might contain up to 0.4 ppm of formaldehyde. The National Institute for Occupational Safety and Health in the United States has stated that formaldehyde is immediately dangerous to health and life at concentrations of 20 parts per million (ppm) and higher.

The estimated formaldehyde dose associated with 1 pulpotomy procedure, assuming a 1:5 dilution of formocresol placed on a no. 4 cotton pellet that has been squeezed dry, is approximately 0.02–0.10 mg.

Sources of Human Formaldehyde Exposures

- Atmospheric formation: Photochemical oxidation of organic compounds
- Internal combustion engine exhaust
- Fertilizer production
- **Hydrogen sulfide scavenger:**
  - oil operations
- Household products:
  - Dishwashing liquid
  - Antiseptics and disinfectants
  - Carpet cleaners
  - Carpets
- Preservatives and embalming solutions
- **Cosmetics (maximum concentration, 0.3% v/v):**
  - Fingernail hardeners (maximum concentration, 5% v/v)
- Tire and rubber manufacturing
- Paper products
- Adhesives
- Latex paints
- **Resin production:**
  - Phenolic-formaldehyde resin
  - Urea-formaldehyde resin
  - Pentaerythritol resin
- Permanent press fabrics
- Manufactured wood products
- Forest and brush fires
- Tobacco products

**Pharmacokinetics and Metabolism of Formaldehyde:**
As a normal cellular constituent, it is mostly present in a nonreactive, reversibly bound form. Formaldehyde is produced endogenously from certain amino acids and choline, as well as by oxidative demethylation of steroids and xenobiotic. According to Casanava M *et al* in 1988 the concentration of endogenous formaldehyde in the blood of rats, monkeys, and humans is approximately 0.1 mm, and this concentration is not measurably altered by exposure to airborne formaldehyde.

Exposure of humans, monkeys or rats to formaldehyde by inhalation does not alter the concentration of endogenous formaldehyde in the blood because of its rapid metabolism. Following intravenous infusion, the biological half-life of formaldehyde in monkey blood is approximately 1.5 minutes, with a concurrent rise in formic acid levels indicating metabolism of the formaldehyde. *Bhat HS et al in 1988* expected exogenous formaldehyde has with a biological half-life of 1.0 to 1.5 minutes in human plasma.

Formaldehyde, and the oxidation product formate, is key intermediates compounds in the “one-carbon pool”, which in turn is utilized for the biosynthesis of purines, thymidine, and certain amino acids, which are incorporated into DNA, RNA, and proteins during macromolecular synthesis. Formaldehyde also reacts covalently with amino and sulphydryl groups in target tissues and with DNA, forming unstable hydroxymethyl protein adducts, known as DNA-protein cross-links (DPX). It has been shown that DPX may act as a replication block, which could lead to a variety of deleterious effects including chromosomal aberrations, deletions, or even cell death.

**Pharmacokinetics of Cresol:** The second active ingredient in formocresol, cresol, has received little attention in the debate about formocresol safety or in investigations of formocresol efficacy. According to Ranly D in 1984, Cresol has poor solubility, and because of this, it has been assumed that it does not enter systemic circulation. Cresol is highly lipophilic, however, and has been shown to completely destroy cellular integrity, which presumably would allow for deeper tissue fixation by the formaldehyde component of formocresol. No data exist regarding cresol metabolism or elimination in humans or other mammals, and there is virtually no information about environmental sources of cresol to which humans might be exposed. Last, no human studies have been published that have examined plasma concentration after exposure to cresol.

Benzyl alcohol is present as a bacteriostatic preservative in many multidose intravenous drugs and solutions. It also occurs naturally in many plants, including raspberries and tea, and is an essential ingredient in many essential oils. Benzyl alcohol is oxidized rapidly to benzoic acid, conjugated with glycine in the liver, and excreted as hippuric acid. It has no carcinogenic or mutagenic potential, and the allowable daily intake, as established by WHO is 5 mg/kg.
Mutagenicity, Genotoxicity, and Cytotoxicity: Exposure of cells to formaldehyde leads to the formation of DPX. The most common types of DNA damage induced by formaldehyde are clastogenic lesions; including sister chromatid exchanges (SCEs), micronuclei and chromosomal aberrations, and deletions. Levels of formaldehyde-induced DPX are considered to represent a good molecular dosimeter of formaldehyde exposure at sites of contact and are frequently used for risk modeling and prediction of formaldehyde carcinogenicity for different species. DPX have been shown to occur only at the site of initial contact in the nasal mucosa of rats and in the upper respiratory tract of monkeys exposed to formaldehyde4.

Dental studies have not supported the contention that formaldehyde, as used in dentistry, is mutagenic. Zarzar et al in 2003 performed formocresol pulpotomy on 20 children by using Buckley's original formula. Peripheral venous samples were collected from each child immediately before and 24 hours after the pulpotomy, and lymphocytes were collected from each blood sample for cell culture and cytogenetic analysis. No statistically significant differences were found between the 2 groups in terms of chromosomal aberrations, chromatid breaks, or chromatid gaps. Also, Zarzar et al concluded that formocresol is not mutagenic and he observed chromosomal aberrations in 1 (5%) of the 20 patients but were unable to determine whether formocresol or other variables accounted for this finding.

Ribeiro et al in 2004 and 2005 reported 2 studies respectively that assessed the mutagenic potential of formocresol as well as several other chemicals commonly used in dentistry. With a mouse lymphoma cell line, cultured human fibroblasts, and a series of formocresol dilutions similar to clinical doses, these authors found that formocresol did not produce detectable DNA damage and should not be considered genotoxic.

Laboratory investigations of root canal sealers containing formaldehyde, which are used in endodontic procedures, have demonstrated cytotoxicity by Huang Th et al in 2004. For several reasons, however, these investigations are not comparable to formocresol pulp studies. A larger quantity of formaldehyde is released from root canal sealers than during Pediatric formocresol pulpotomy because of the large quantity of sealer used. Moreover, contact of formocresol with vital pulp tissue during pulpotomy is restricted to only a few minutes, whereas root canal sealer remains in the root canal and forms part of the final restoration, with the potential for further release of formaldehyde3,4,5.

Carcinogenicity: There is considerable evidence that prolonged inhalation of formaldehyde induces highly nonlinear dose-related increases in the incidence of tumours of the anterior and posterior lateral meatus of rats. There is marked increase in tumour incidence at concentrations greater than 6ppm (7.2mg/m3) formaldehyde while concentrations of 2ppm (2.4mg/m3) and lower do not induce malignant nasal tumours.

The most recent evaluation by IARC in 2004 reclassified formaldehyde as being “carcinogenic to humans”. This conclusion is largely based on the statistics from reports of increased mortality from nasopharyngeal cancer which have emerged from studies of US industry workers published by NCI. However, only a small number of peoples all of whom worked at a single industrial plant were found to have cancer. Nevertheless, the Chemical Industry Institute for Toxicology Centres for Health Research (CIIT) in 1991 considers that the risk of developing cancer is negligible until formaldehyde exposure reaches levels associated with cytotoxicity, which is in the range 600 to 1,000ppb.

The possibility that inhaled or ingested formaldehyde might induce cancers at sites distant from the respiratory or gastrointestinal tracts has been investigated in numerous long-term toxicity studies performed in rodents. Leukaemia was not observed in any of 7 long-term inhalation bioassays in rodents, and it was not observed in 3 drinking water studies in which rodents were exposed to doses as high as 1.9 – 5 g/L. Leukaemia was observed in a single drinking water study, in which Wistar rats were exposed to doses as high as 1.5 g/L. That study, however, is regarded by the Cancer Assessment Committee of the U.S. Food and Drug Administration as questionable, and the data are unreliable because of a lack of critical detail and questionable histopathologic conclusions.

Immune Sensitization: According to Block RM et al in 1976, despite evidence from dogs that formocresol can produce antigenic activity in dental pulp tissue but Rolling and Thulin in 1976 found no increase in either immune response or allergic reactions in 128 children who had undergone formocresol pulpotomy.
More evidence supports the work of Rolling and Thulin. A Canadian study done by Pross HF et al in 1987, urea formaldehyde foam insulation (UFFI) off products in the homes of subjects with asthma found that long-term exposure had no effect on immunologic parameters. Doi et al in 2003, found that the prevalence of IgE sensitization to formaldehyde was very low among Japanese children, regardless of whether they had asthma; furthermore, they found no clinical relevance of formaldehyde-specific IgE. Hence, the suggestion that formocresol “sensitizes” children has not been supported.

**Buckley’s Formocresol:** The use of formaldehyde for the disinfection of inflamed pulps first was reported by Lepkowski in 1897. This technique caused intolerable pain, but it was not until 1904 that a modified formula was introduced by Buckley. This latter material contained Tricresol and glycerine on an empiric basis (rather than on a chemical or biological basis) and was clinically more acceptable.

Garcia-Godoy et al in 1982 used a 1 min application of full strength formocresol, and found that it produced less inflammatory response and tissue reaction when compared with 3 min and 5 min applications.

The cytotoxic effects of formocresol, although known to earlier workers, were not fully understood and were based upon subjective criteria. Buckley in 1904 stated that there was no necessity to use formaldehyde in the same strength in non-vital teeth containing nonsupputative material as in teeth which contained putrescent material. Straffon and Han in 1968 concluded that a lesser concentration of 1/50 formocresol solution did not interfere with the prolonged recovery of connective tissue and that it might have suppressed the initial inflammatory response. Loos and Han in 1971 concluded that a 1/5 concentration of Buckley’s formocresol was as effective as the full strength formula, and allowed for a faster recovery of the affected cells and therefore represented a safer medicament. Gazi et al in 1981 found that a 50% dilution of formocresol in propylene glycol was significantly less irritating than a full-strength formula.

**Quantitation and Timing of Formocresol:** Intracanal medications (of nonspecific disinfecting agents) are applied in various ways and quantities. Their use is controversial. Some authorities recommend large quantities, while others favor smaller amounts. Some confine the medication to the coronal portion of the canal, whereas others rely on a vehicle, such as a paper point, to carry the liquid drug apically.

_Sommer et al in 1962 suggest_ applying medications to a blunted paper point that has been placed into a dried canal. No mention is made of drug quantity.

_Nichols in 1967 recommends_ the use of a paper point saturated with medicamerit. “The point should fit the canal fairly closely, so as to allow the maximum volume of drug to be applied and to provide close contact between it and the root dentin.”

_Grossman in 1965 advocates_ “pumping” the medicament into the root canal to allow it to come into contact with the tissue to be sterilized.

_Schilder in 1965_ on the other hand, recommends the use of smaller amounts of drugs and also suggests that medication is secondary to a thorough debridement of the canal. He recommends that the medication be placed only on a small pledge of cotton confined to the pulp chamber. Because of the volatile nature of these drugs, no attempt need be made to introduce them into the root canal. The empty canal may act as a reservoir for any exudate that may develop following instrumentation.

_Stewart et al 1969_ also stress the need for complete debridement, since it serves the same purpose as wound debridement in surgery. The more complete the removal of irritants, the more completes the repair. However, they seem to advocate the use of larger amounts of medication when they state that “by increasing the volume of the root canal, greater quantities of medication can be sealed in to destroy the remaining microorganisms.”

_Leavitt et al in 1967_ reported that formocresol applied to a pledget of cotton taped to the inside top cover of a blood agar Petri dish seeded with specific bacteria produced a zone of inhibition on the seeded media.

_Marshall et al in 1967_ developed a technique, utilizing extracted teeth, for in vitro culturing studies which effectively simulated the in vivo conditions of root canal infection.

By using a minimal effective dose of a nonspecific drug, it would seem possible to lessen the undesirable inflammatory reactions, the accompanying pain, and probable tissue damage.
Although much has been studied about the irritating and harmful effects of certain drugs applied topically or locally, to our knowledge no data have been published on attempts to quantitate an effective minimal dose for root canal drugs.

The effectiveness of formocresol as an antimicrobial agent was studied by combining the Petri dish method of Leavitt et al and the culturing method of Marshall and Savoie in 1967. Formocresol in small concentrations was found to be very effective, under the conditions described, in eliminating microorganisms.

Formocresol in Blood: The foundation of the argument against the use of formocresol in dentistry is the belief that, upon placement in the pulp chamber, unmetabolized formocresol (primarily formaldehyde) becomes systemically distributed. Free formaldehyde present in the circulation could react with macromolecules, thereby potentially causing mutagenic and/or cytotoxic changes in muscle, liver, kidney, heart, spleen, and lung tissue.

Conclusion

It is highly unlikely that formocresol, when judiciously used, is genotoxic or immunotoxic or poses a cancer risk to children who undergo one or more formocresol pulpotomy procedures. Definitive data to support this hypothesis are lacking, however, such evidence is needed before definitive conclusions can be reached.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES

Abscess on Periodontium—A Review

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ABSTRACT

Periodontal symptom is that the third most frequent dental emergencies, representing 7-14% of all dental emergencies. There square measure numerous aetiology tributary factors post medical aid symptom, impaction of foreign objects, the factor that altering tooth morphology etc. The diagnosis is done by analysis of signs and symptoms. The Treatment of periodontal abscess has been a challenging for many years. The main aim of this article is to review and evaluate the articles of Periodontal abscess.

Keywords: Periodontal abscess, Incision and drainage and antibiotics, gingival pain, forigen objects, Periodontal Abscess, Gingival abscess

Introduction

Abscess is localised collection of pus purulent material collected in cavity caused by destruction of tissues. There are three type of abscess:

1. Gingival abscess
2. Periodontal abscess
3. Pericoronal abscess

Odontogenic abscesses include a broad group of acute infection that originate from tooth or periodontium. Abscess are associated an array of symptoms, including purulent inflammation, in periodontal tissues which causes pain and swelling. An acute, destructive process of periodontium resulting in localised collection of pus communicating with the oral cavity through the gingival sulcus or periodontal sites & not arising from tooth pulp.

Gingival abscess: Acute inflammatory condition of the gingiva characterised by purulent exudates without attachment loss. Following traumatic insult: e.g., injury by a fish bone, tooth brush bristle, etc., implantation of virulent bacteria into the gingival connective tissue leads to excessive gingival inflammatory reaction.

A gingival abscess was also defined as a localized purulent infection that involves the marginal gingiva or interdental papilla.

Abscesses of the periodontium is defined as localized acute bacterial infections which are confined to the tissues of the periodontium. They are classified as abscess associated with periodontal tissues.

1. a gingival abscess is a localized purulent infection that involves marginal gingiva and interdental papilla
2. pericoronal abscesses surrounding the crown of a partially erupted tooth;
3. combined periodontal and endodontic abscess are the localized, circumscribed abscesses originating from either the dental pulp or the periodontal tissues surrounding the involved tooth root apex and/or the apical periodontium
4. periodontal abscesses which are localized purulent infections within the tissue which involves periodontal tissues leads to destruction tissue and bone loss. These are known as lateral periodontal abscess or Parietal abscess.

The, accurate diagnosis and the immediate treatment of the abscesses are the important steps in the management of patients presenting with such abscesses.

Classification

Periodontal relation abscess: When there is acute inflammation from the biofilm periodontal abscess occur. classification based on aetiological criteria
Non-Periodontitis connected abscess: once the acute infections originate from another native supply. eg. Foreign body impaction, alteration in root integrity

Classification based on the course of the disease

Acute periodontitis symptom: The abscess develops during a short amount of your time and lasts for a couple of days or every week.

An acute symptom typically presents as an abrupt onset of pain on biting and a deep throbbing pain during a tooth within which the patient has been tending to clench.

The gingiva becomes red, swollen and tender.

Acute periodontal abscess: This abscess develops in a short period of time and last for few days or a week. An acute abscess develops with a sudden onset of pain on throbbing pain in tooth in which the patient has been tending to clench The gingiva becomes red swollen and tender chronic Periodontal abscess. This condition that last for long time and often develops slowly In chronic stages, a nasty taste and spontaneous bleeding may occur.

The adjacent tooth is tender to bite on and is sometimes mobile. Pus may be present as also may be discharges from the gingival crevice or from a sinus in the mucosa overlying the affected root. Pain is usually of low intensity.

1. Classification based on number
2. Single abscess: Abscess confined to a single tooth.
3. Multiple abscesses: Abscess confined to more than one tooth.

Histopathology: It has been reported that the microorganism colonize the periodontal

Abscesses are primarily Gram negative anaerobic rods. Although they are not found in all cases of periodontal abscesses, high frequencies of Porphyromonas gingivalis, Prevotellaintermedia, Fusobacteriumnucleatum, Campylobacter rectus, and Capnocytophagasp spp have been reported. Periodontal bacteria found in culture studies are

1. Porphyromonas gingivalis-55-100% (Lewis et al 9)
2. Prevotellaintermedia- 25-100% (Newman and Sims 7)
3. Fusobacterium nucleatum -44-65% (Hafstrom et al 8)
4. Actinobacillus actinomycetemcomitans-25% (Hafstrom et al 8)
5. Camphylobacter rectus- 80% (Hafstrom et al 8)
6. Prevotella melaninogenica-22% (Newman and Sims 7)

Etiology

1. Changes in composition of microflora, bacterial virulence, or in host defence could also make pocket lumen insufficient to drain increased suppuration 9
2. Closure of margins of periodontal pocket may lead to extension of infection on the surrounding tissue due to pressure on suppuration inside the closed pocket. Fibrin secretion may lead to localised accumulation of pus may lead to closure of gingival margin to the tooth surface10.
3. The development of periodontal abscess in periodontitis may occur at different stages during the course of the infection as an exacerbation of an untreated periodontitis during periodontal therapy in refractory periodontitis or during periodontal maintenance. Also fibrin secretions leading to the local accumulation of pus, may favour the closure of gingival margin to the tooth surface.
4. Changes in compositions of the microflora, bacterial virulence or in host defences could also make the pocket lumen inefficient to drain the increased suppuration.
5. Treatment with systemic antibiotics without subgingival debridement in patients with advanced periodontitis may also cause abscess formation.
6. Abscess can formed due to inadequate scaling, which will allow calculus to remain in deepest pocket area while resolution of inflammation in coronal pocket area will occlude the normal drainage and entrapment of the sub gingival flora in deepest part of the pocket. Also calculus might get dislodged and pushed into the soft tissue after procedures like scaling

Non-periodontitis Related Abscess:

1. Impacted of foreign bodies such as tooth brush bristles, a piece of dental floss, orthodontic elastics
a dislodged cemental tear, food (such as fishbone) into the gingival tissues and so on can result in abscess formation. Periodontal abscess caused by foreign bodies related with oral hygiene aids, have been named “oral hygiene aids have been named “oral hygiene abscess”

2. Lateral perforation of root during endodontic therapy and trauma to the tooth

3. Local factors affecting morphology of roots such as cemental tear, external root resorption, invaginated tooth and cracked tooth may predispose to periodontal abscess formation

**Diagnosis**

The diagnosis of periodontal abscess usually based on the chief compliant and history of presenting illness. The relevant medical and dental history is mandatory for proper diagnosis of the case. Usually the severity of pain and distress will differentiate an acute from a chronic abscess. The dental history can provide information about periodontal treatments, endodontic therapy and previous abscess. The suspected area should be carefully probed for continuity of the lesion with the gingival margin serve as a clinical evidence that the abscess is periodontal. Other findings are ovoid swelling of gingiva, pain tooth mobility, tooth elevation, suppuration either spontaneous or on digital pressure and the presence of deep periodontal pockets. Radiographically, it appears as discrete area of radiolucency along the lateral aspect of root. However, lesion in the soft tissue wall of periodontal pocket are less likely to produce radiographic changes than those deep in the supporting tissues.

**Differential diagnosis:** The differential diagnosis of Periodontal abscess is clinically important to allow the dentist to more clearly understand the condition or circumstances to arrive to a conclusion from following diseases like (Ludwigs angina, space infections of orofacial regions) and plan the treatment.

**Treatment:** The principles of management of periodontal abscess are as

1. Local measures –
   a. Drainage
   b. Elimination of the cause

2. Systemic measures- Antibiotics in combinations with local measures

   1. Drainage through periodontal pocket: There are 8 steps in the drainage through periodontal pocket.
      a. Topical anaesthesia is prepared.
      b. The pocket wall is gently retracted with a probe/curette in an attempt to create an initial drainage through a pocket entrance.
      c. Gentle digital pressure is applied
      d. irrigation is done to clear the exudate of the pocket wall
      e. If the lesion is small and has good access, scaling and Root planning is done
      f. If the lesion is large, drainage cannot be established through scaling and root planning major clinical signs are established through antibiotic therapy
      g. In such patients systemic antibiotic with short and high dose regimens is recommended.

   b. Drainage through external incision

   If the lesion is large, pin –pointed, fluctuating, an external incision can be made to drain the abscess. The steps are as follows:

   A. Abscess is drained and isolated with guaze and sponge.
   B. Local anaesthesia and nerve block is prepared.
   C. Vertical incision is given through a more fluctuating area of abscess on No 11 or 15 Blade
   D. Tissue which is lateral to incision is separated using periosteal elevator/curette
   E. Light digital pressure is given with moist guaze pad
   F. In patients with marked swelling and redness, it is recommended to have systemic antibiotics as an intial treatment to avoid damage to healthy periodontium.
   G. Periodontal surgery.
      a. Surgical therapy of gingivectomy or flap procedures has been advocated mainly in abscess
      b. Surgical flaps have been proposed in cases in which calculus left subgingivally after treatment.
      c. The main objective of this therapy is to eliminate calculus and to obtain drainage at the same time.
d. A therapy with combination of flap with deep scaling and irrigation with chlorhexidine have also been proposed

D. Systemic antibiotic with or without local drainage

Antibiotics are preferred mode of treatment. However local drainage of abscess is mandatory to eliminate the etiological factors. The recommended antibiotic usually follows the culture and sensitivity test. The antibiotic usually given

1. Phenoxymethylpencillin 250-500 mg qid 7-10 days
2. Amoxycillin/Augmentin 250-500 tds 7-10 days
3. Metrodinazole 250 mg tds 7-10 days can be combined with amoxicillin. The use of metrodinazole is contraindicated in pregnant patients in children below 10 years.

E. Extraction of teeth

1. Extraction of teeth is a last resort to treat periodontal abscess. Certain guidelines should be followed before extraction of teeth.
   a. Horizontal mobility more than 1 mm
   b. Class II- III furcation involvement of a molar
   c. Probing depth >8mm
   d. Poor response to therapy
   e. More than 40% alveolar bone loss.

Conclusion

The Periodontal abscess typical clinical and histopathology feature. The most prevalent organism p gingivalis P. intermedia and fusobacterium. Different therapeutic alternatives have been proposed for the treatment of the periodontal abscess. Among these incision and drainage scaling and root planning are the sole therapy for the treatment of the periodontal abscess.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Periodontal Maintenance: A Necessity for Treatment Success

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ABSTRACT

The main aim regarding periodontal therapy, is to ensure an healthy oral environment, devoid of plaque, biofilm, by physical disruption and by adjunctive chemical means. This review examines the therapeutic goals necessary for periodontal maintenance, the protocol necessary for adequate maintenance, supportive periodontal therapy (by the clinician, by the patient), evidence based approach of maintenance care and also about the new approaches. This review concludes that even after proper treatment, long term stability is ensured only with good maintenance of oral hygiene, by avoiding risks i.e. smoking and with regular maintenance care programme.

Keywords: supportive periodontal care, maintenance care, maintenance protocol, periodontal maintenance.

Introduction

The main aim in regard to prophylaxis would be prevention of disease. Measures are usually taken for disease prevention(¹) either after completing periodontal therapy or dental implant therapy(²). Maintenance care is essential for the long-term success rate of periodontal treatment. Due to this a concept involving very specific requirements for ongoing periodontal care was designed and it was decided that professional maintenance was mandatory for long term stability post periodontal therapy(³)

Therapeutic Goals of Periodontal Maintenance:

i. The main and foremost goal is to minimise (or) prevent the recurrence of disease progression (³) in patients, who were previously treated for periodontitis, for peri-implantitis(²). "Compendium of Continuing Education in Dentistry (Jamesburg, N.J.: 1995 or any types of gingivitis.

ii. For either the prevention, or to reduce the incidence of tooth or implant loss, by monitoring the dentition & the prosthetic replacements of the natural teeth.

iii. For increasing the probability of locating & treating any other conditions in the oral cavity.

There are three components in the maintenance of periodontal tissue(⁴), after completion of periodontal therapy they are,

° Maintenance Care by the Patient: Maintenance of proper oral hygiene

Avoidance of tobacco smoke(⁵)

Management of systemic illness, such as diabetes, etc.,

° Maintenance Care by Dental Professional:

1. Prophylactic removal of supragingival deposits.

2. Elimination of factors which can lead to plaque-retention, such as any ill-fitting restorations, prosthesis etc.

3. In Supportive Periodontal Therapy, there are interventions which address the cause, the pathophysiologic mechanism (or) the sequelae of the recurring disease like presence of subgingival biofilm, inflammation, tooth mobility etc.
Follow up-care post treatment\(^{(4)}\), is usually planned after completion of initial periodontal therapy.

The destructiveness associated with periodontal diseases is highly preventable, but it is difficult to manage, and it requires regular and proper intervention by the dental professional. Follow-up care is especially difficult, if the patients are diagnosed with any underlying disease.

Supportive periodontal therapy (or) periodic recall for periodontal maintenance and recall for the maintenance of dental implants are all compressively known as procedures which are called as periodontal maintenance.

**The Maintenance Protocol:**

- Focus during assessment should be on any recent change (or) any new pathology.
- The patient should be given a brief re-assessment based on general health, medication, or other therapy and the dental history.
- With regard to the measures taken by the patient, the clinician should discuss his findings with the patient and this opportunity must be used to motivate the patient towards better oral hygiene practices. Behaviour change counselling should be done for smoking cessation\(^{(5)}\). At the end of the maintenance visit\(^{(6)}\), decision with regard to the interval of the recall visit is decide, if it should be altered or kept as before.
- Post completion of periodontal (or) implant therapy, maintenance should start at an interval of 3 months.
- The stability should be evaluated continuously and the frequency of the recall visit should be decided based on the individual. If the patient has established adequate level of plaque control in regard to the past measurements the interval can be prolonged.

**Supportive Periodontal Therapy:** It is suggested that patients with prior history of periodontal issues should have a periodontal maintenance at least 4 times/year, this is so that the progression of the disease is decreased. The maintenance schedule is usually individualised to the needs of each patient.

Pocket debridement procedure suppresses the subgingival microflora present, but the baseline levels returns within days (or) months. The reversal to the, pre-treatment levels generally occurs from 9 to 11 weeks, depending on the patient.

The factors which determine the time required for periodontal maintenance are:

- Number of teeth (or) Implant present
- Patient co-operation
- Oral hygiene efficacy & compliance
- Systemic health
- Instrumentation access
- History of disease (or) complication
- The distribution & depth of the sulci

The innermost time period, traditionally used for periodontal maintenance is about 45-60mins.

Plaque control is considered as an important factor, for the maintenance of dental implants and natural teeth

Effective method for maintenance of implant oral hygiene includes

- Interdental brushes
- Dental floss
- Dental tape
- Floss ribbons and
- Topical chemotherapeutic agents

**Treatment Sites for Periodontal Maintenance:** The effectiveness of periodontal management majorly depends on the understanding & co-operation that exists between the dentist, the patient and the periodontist.

If the patient, is a case of recurrent gingivitis (or) a case of slight chronic periodontitis they can be maintained by a general dentist.

If the patient gives a history of chronic periodontitis, with moderate attachment loss, maintenance of the periodontium is done alternated between the general dentist and the periodontics.

If the patient gives a history of severe periodontal attachment loss (or) an aggressive form of periodontitis, maintenance of the periodontium\(^{(6)}\) is done by the periodontist and the general dentist maintains other general aspects for the patient.

Supportive periodontal therapy is classified into two types,
Evidence Based Appraoch of Maintenance Care: There are 5 lines of evidence, they are:

- Accumulation of large amounts of bacteria, on teeth and implants should be avoided.
- The local etiological factors should be eliminated or controlled.
- An important step, is to remove any bacteria deposits on teeth and on implants.
- Stability for long-term after periodontal therapy, is possible only if the patient maintains good oral hygiene and is included in regular maintenance care program\(^{(6)}\).
- The factors that influence the severity and incidence for the recurrent periodontitis is the type & frequency of maintenance care. Good maintenance of oral hygiene\(^{(4)}\) is more important than proper and regular professional intervention.

Maintenance & Residual Pocket:

- Prophylactic measures\(^{(7)}\) should be done regularly in order to maintain the microbiological state achieved by the periodontal therapy.
- The recontamination of the already traded sites can be prevented.
- If the bacteria have regained access to the subgingival area (or) if they were never entirely removed from there, the procedure don’t have that much of effect on them.
- So in order to prevent the disease recurrence in residual pockets periodic interventions is done.
- Local application of an antibiotic, cannot be considered as an appropriate prophylactic procedure\(^{(8,9,10)}\), but it is considered as a good option for treating a contained infection.

New Approaches: New approaches are required to help the efficiency of maintenance care, it is less likely to cause damage, and it can be implemented easily and should be cost-effective. Also when viewed from a public health point, there is a notion that periodontal disease is a perceptible risk factor for CVS, stroke & premature birth. Due to which it becomes increasingly important to control and prevent the disease in a cost-effective manner.

Conclusion

Long term stability after periodontal therapy is possible with good maintenance of oral hygiene by the patient, avoid risks (such as smoking) and with regular maintenance care programme. There is conclusive evidence from clinical studies that systemic and regular monitoring of periodontal parameters is necessary to detect and intercept any new or recurrent disease. Individual variations to disease susceptibility will determine the frequency and level of professional input required

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REFERENCES


Rank/Rankl Factor in Periodontitis—A Review

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ABSTRACT

Periodontitis is a multifactorial disease which is defined as inflammation of the supporting tissues of the teeth. It causes progressively destructive changes leading to loss of alveolar bone and periodontal ligament. An extension of inflammation from gingiva into the alveolar bone and periodontal ligament. Periodontal disease is bacterial host interface disease. One such factor which is thought to be of host modulating is RANK/RANKL system. This review is about the periodontal panorama about the system which might be therapeutic modulation of periodontal disease.

Keywords: rankl, rank, Bone Resorption, Bone Remodelling, Osteoprotegrin.

Introduction

Periodontal disease is associated with various disease like chronic inflammatory disease cardiovascular disease, rheumatid arthritis etc. The host which modulates this disease is RANK/RANKL it is a protein, which belongs to the cytokine family. It mediated the immune system in the body. It belongs to the TNF family.[1]

RANKL/OPG balance is an important factor in regulating bone resorption in periodontal and periapical diseases.

Receptor activator of nuclear factor kappa-B ligand (RANKL), belongs to the tumor necrosis factor ligand superfamily member 11 (TNFSF11), the activation of TNF induces cytokine (TRANCE), osteoprotegerin ligand (OPGL), and osteoclast differentiation factor (ODF).

RANKL is a type II membrane glycoprotein and belongs to the tumor necrosis factor (TNF) superfamily.

Functions of Rank/Rankl:

Regulates osteoclast formation.

Involved in normal bone modelling and bone remodelling.

Involved in various pathological conditions with increased bone turn over.

Critical signalling pathway for cellular differentiation and development of epithelial tissues in various organs.

Mechanism of Action: Osteoclast and osteoblast and their precursors were thought to control bone metabolism. Recent discovery of RANK and its ligand are thought to be the factor control. RANKL and osteoprotegrin are the key protein which involved in activation, differentiation of osteoclast and osteoclast precursors.

RANKL is expressed in osteoblast, stromal cells, chondrocytes, and mesenchymal cells and also activated T & B cells express RANKL.
**RANK** is expressed in osteoblast, stromal cells, chondrocytes, monocytes, dendritic cells.

The decoy receptor **Osteoprotegrin** is expressed in fibroblast, periodontal ligament cells.

RANK expression is increased due to activity of RANKL, IL-1, oncostatinM, vitamin D3.

Decreased in the number of RANK molecules on the surface of osteoclast is induced by IL-4.

Osteoclast differentiation and activation are driven by the interaction of RANK with its ligand, RANKL. Osteoprotegrin (OPG) is a decoy receptor of RANKL that inhibits RANK-RANKL engagement in osteoclastogenesis and bone resorption with an inflammatory stimulus, the RANKL/OPG ratio increases in periodontal and periapical tissues and leads to stimulation of osteoclast activity and pathologic bone resorption.[4,5,11,12]

**Discussion**

The initial stages of infection activate the immune defences, including mechanical barrier and inflammatory response, bacterial invade the tissue macrophages and other cells present the antigen. T cells are regulators of bone turnover. The T cells activates the macrophages can activate indirectly osteoclasts and their precursors and expressing rankl. Lymphocytes present in periodontal diseases express RANKL and it activates osteoclast. The intracellular cascade that produces cytokine involved directly or indirectly in osteoclasts activation. When cytokines activated it act with the network of cells. These suggest that immune system plays a major role in bone resorption in periodontal disease.[6,7,8]

The current concept is that rank/rankl/opg pathway is one of the important pathogenesis of inflammation and to activate in bone resorption in periodontal disease; rankl activates bone resorption and opg has inhibited bone resorption. Studies done in rankl/opg, ratio augmented in serum/plasma of patients affected by periodontitis with decreasing opg. Many studies has found that rankl/opg level is in saliva and gingival crevicular fluids of patients affected by periodontitis compared with healthy controls. In another review done by bostanci reported an increased rankl/opg ratio and in that study rankl is increased, whereas opg is decreased in periodontitis compared to healthy control, that the ratio is increased in smokers and diabetics. There are no due studies that correlate rankl/opg oral fluids. Thus it cannot be used as biomarker.[9,10,13]
Conclusion

RANKL expression in periodontal tissues is a very complicated process that involves many factors. RANKL is identified in lymphocytes, stromal cells, and many other cell types in periodontal tissues which play an important role in direct or indirect regulatory roles. Cytokines such as IL-1β and TNF-α can upregulate RANKL expression in periodontal cells and increase osteoclast formation. Figure 1 summarizes the major cells and cytokines related to RANKL expression.

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REFERENCES


Stress and Periodontium—A Review

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ABSTRACT

Stress is an association of physiological and psychological reactions of a person confronted to a change of situation he cannot face. The relationship between stress and any disease is explained by hormonal modifications and behavioural changes induced by the stress. Research has suggested that stress and depression are two factors that play a role in the development and progression of periodontal disease. It is not clear, however, whether these factors lead to periodontal disease through physiological or behavioural changes, or by some combination of the two. The purpose of the present review article is to explore the associations between psychological factors, psycho immunologic variables, behaviour, and clinical measures of periodontal disease.

Keywords: Psychosocial factors, Depression, Life events, Glucocorticoids

Introduction

There is a strong relationship between periodontal disease and psychosomatic illness and they are well established in specific conditions like acute necrotising ulcerative gingivitis.[1,2] Studies well establish that there is a strong association between depression and periodontal disease. There are also fewer studies demonstrate the importance of oral infection and stress.[3-5] Evidence support the importance of stress on progression of periodontal disease and response to its treatment.[6] Studies also explain there is an interaction between immune system that alter the oral health behaviour.[7] Stress is said to influence the host defenses, exerting an immunosuppressive effect, increasing one’s vulnerability to disease.[8-10] Cytokines and other humoral mediators of inflammation are potent activators of the central stress response, and the glucocorticoids released via this mechanism might regulate the recruitment of immune cells into inflamed tissues, in order to cope with the psychological stress and depression. Few studies have demonstrated the importance of subjective factors in oral infections and stress.[11-13] There are numerous studies have impact on stress and periodontal disease however further studies are needed to establish the true phenomena.

Effect of stress on cortisol and salivary levels on chronic periodontitis: A Cross sectional study done in of sample size 111 patients to evaluate the physiological stress and salivary cortisol levels and its effect on chronic periodontitis.

One hundred and eleven dentate individuals, of age 40 years and above, were selected. The clinical examination included, the number of teeth present, plaque index, Probing Pocket Depth, and Clinical Attachment Level. Assessment of Psychological stress levels were done by a questionnaire and were correlated with salivary cortisol levels, which were estimated biochemically by using the Enzyme-Linked Immunosorbent Assay (ELISA) method. Statistical analysis was done by using the student ‘t’ test and Mann Whitney test. According to observation, chronic periodontitis showed a significant correlation with hypercortisolemia (P<0.0001), work tension (P<0.04), economic problems (P<0.0001), clinical stress syndrome (P<0.0001), plaque index (P<0.0001), and unsecured job (P=0.003). Stress may
be considered as an important risk factor for periodontal disease. Routine salivary cortisol assessment may be an economical and useful diagnostic marker to rule out stress in periodontitis patients[14].

**Molecular and endocrine mechanism of stress response:** Stress can result in the degeneration of the immune system, mediated primarily through the hypothalamic – pituitary – adrenal and sympathetic adrenal medullary axis. The stress-induced responses are transmitted to the hypothalamic/pituitary/adrenal (HPA) axis to promote the release of corticotropic-releasing hormone (CRH) from the hypothalamus and glucocorticoids from the adrenal cortex.

Stress perceived by the brain stimulates the hypothalamus to produce CRH, which is released into the hypophyseal portal system, activating the pituitary gland to release adrenocorticotropic hormone (ACTH), which in turn induces release of corticosteroids from the adrenal cortex.

Glucocorticoids also inhibit the cascade of the immune response by inhibiting macrophage-antigen presentation, lymphocyte proliferation, and lymphocyte differentiation to effector cell types such as helper lymphocytes, cytotoxic lymphocytes, natural killer cells, and antibody-forming B cells. Corticosteroids also inhibit production of cytokines including IL-1, IL-2, IL-3, and IL-6, tumor necrosis factor, interferon gamma, and granulocyte and monocyte colony stimulating factors. Glucocorticoids inhibit arachidonic acid-derived proinflammatory mediators such as prostaglandins and leukotrienes.

Glucocorticoids also induce endogenous anti-inflammatory proteins and lipocortins, which have the capability of inhibiting phospholipase A2, thereby inhibiting generation of eicosanoids. Hence, the stress-related stimulation of the HPA axis with the production of glucocorticoids such as cortisol has major suppressive actions on immune and inflammatory responses. This represents the major effector arm of the CNS-hormonal axis. There is also an afferent or feedback arm consisting of stimulation of the HPA axis by cytokines. Glucocorticosteroids, including cortisol, then depresses immunity including secretory IgA, IgG, and neutrophil functions, all of which may be important in protection against infection by periodontal organisms. Secretory IgA antibodies may protect by reducing initial colonization of periodontal pathogens. IgG antibodies may exert protection by opsonizing periodontal organisms for phagocytosis and killing by neutrophils. This then gives rise to increased susceptibility, which leads to the establishment of periodontal infection which, in turn, results in destructive periodontitis.

Periodontitis is brought about by tissue-destroying factors such as IL-1 and matrix metalloproteinases activated by the periodontal pathogens, as well as by the direct effects of pathogenic bacteria. The second major pathway to be activated is the sympathetic nervous system. Stress induced activation of the hypothalamic nervous system results in the release of highly active hormone such as catecholamines. These catecholamines released during stress, contributes to the development of hyperglycemia by directly stimulating glucose production and interfering with the tissue disposal of glucose.

Catecholamines are known to alter the blood flow. Peripheral vasoconstriction may affect important oxygen – dependent healing mechanisms, such as angiogenesis, collagen synthesis and epitheliazation. The release of Catecholamines results in hormonal secretion of norepinephrine from the adrenal medulla, which results in a range of effects that may act to modulate immune responses. Increased sympathetic stimulation can also act to decrease salivary secretions typically experienced as anxiety induced dry mouth. Stress that is associated with immune challenge has been called immune stress or inflammatory stress[15].

**Behaviour changes due to mental stress response:** It is hypothesized that the main effects of stress occur through behavioural changes which affect atisk health behaviours such as smoking, poor oral hygiene, and poor compliance with dental care. There is also a possibility that stress leads to other behavioural changes such as overeating, especially a high-fat diet, which then can lead to immunosuppression through increased cortisol production[16,17].

**Social psychology and stress response:** Clinical observations and epidemiological studies indicate that there is a relationship between experiences of negative life events and the development and progression of periodontal disease (Monteiro da Silva et al 1996, Moss et al. 1996, Genco et al 1998)[18].
The effect of adverse life circumstances is supported by a large body of research. Stressful lifecircumstances and life change events, such as bereavement or divorce, academic stress or change in employment status, affect levels and activity of killer cells and suppressor-cytotoxic T cells.

The impact of psychosociological factors will lead to chronic stress. This chronic stress will also have an great impact on systemic diseases in our body eg. Cardiovascular system and immune system. Smoking due to stress will lead to periodontal disease by altering the immune mechanism. Smokers are likely to develop periodontal disease 10 times more than the non smokers. Low parental social factor have been related to teen smoking.

Systemic inflammatory disease and its impact on stress: Rheumatic arthritis have a strong relation with stress. Risk factors include smoking poor oral hygiene stress and immunosuppressive disorder. Stress has been a major factor for necrotizing ulcerative gingivitis. Corticosteroid level are found high in urine in patients with acute necrotising ulcerative gingivitis. In one study by Moss et al found psychologically depressed human individuals who smoked has a high titre of Tannerella Forsythia were to found to have more severe and chronic periodontitis. The author explain that depression will reduce patient willingness to perform physical activities leading them to give less attention to their mouth which inturn leads to calculus formation. Holmes (1967) developed a scale to measure stress in terms of life changes. In this scale, the life events are ranked in order, from the most stressful (death of a spouse) to the least stressful (minor violations of the law).

<table>
<thead>
<tr>
<th>Event</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of spouse</td>
<td>100</td>
</tr>
<tr>
<td>Divorce</td>
<td>73</td>
</tr>
<tr>
<td>Marital separation</td>
<td>65</td>
</tr>
<tr>
<td>Jail term</td>
<td>63</td>
</tr>
<tr>
<td>Death of Close family</td>
<td></td>
</tr>
<tr>
<td>Members</td>
<td>63</td>
</tr>
<tr>
<td>Personal injury or illness</td>
<td>53</td>
</tr>
<tr>
<td>Marriage</td>
<td>50</td>
</tr>
<tr>
<td>Fired from job</td>
<td>47</td>
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<tr>
<td>Marital reconciliation</td>
<td>45</td>
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<tr>
<td>Retirement</td>
<td>45</td>
</tr>
<tr>
<td>Change in health of family</td>
<td></td>
</tr>
<tr>
<td>Members</td>
<td>44</td>
</tr>
</tbody>
</table>

Conclusion

Studies have shown that there is a strong relation between stress and periodontium. Further more systemic disease associated with periodontal disease such as diabetes, cardiovascular disease, preterm low birth weight. Further more studies need to come to prove the strong association between stress and periodontal disease.

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REFERENCES


Lipoxins—Resolution of Inflammation—A Review

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ABSTRACT

The lipoxins include lipoxin A and lipoxin B. The appearance of these molecules signals the resolution of inflammation. Lipoxins are lipoxygenase derived eicosanoids and are generated from arachidonic acid. They are highly potent, possessing biologic activity at very low concentration, and inhibit neutrophil recruitment, chemotaxis, and adhesion.

Keywords: lipoxin, anti-inflammatory, resolution of inflammation, anti-fibrotic, leukocytes, mesangial cells

Introduction

Inflammation: Inflammation is a pathophysiological response to infection or tissue damage. The agents causing inflammation may be Infective agents- like bacteria, viruses. Immunological agents- like cell mediated and antigen antibody reactions. Physical agents- like heat, cold, radiation, mechanical trauma. Chemical agents- like organic and inorganic poisons. Inert materials- such as foreign bodies.

Types of inflammation: Acute inflammation is of short duration and represents the early body reaction, resolves quickly and is usually followed by healing. Chronic inflammation is of longer duration and occurs either after the causative agent of acute inflammation persists for a long time or the stimulus is such that it induces chronic inflammation from beginning.

Mechanisms of neutrophil and macrophage driven resolution

Chemokine depletion mechanism

Neutrophil apoptosis

Lipoxins: The term lipoxins LXs is an acronym for lipoxygenase (LO) interaction products. These lipid mediators were first recognized to have dual anti-inflammatory and pro-resolution activities. 5S, 6R, 15S-trihydroxy-7,9,13-trans-11 cis-eicosatetraenoic acid and its positional isomer 5S,14R,15S-trihydroxy-6,10,12-trans-8-cis-eicosatetraenoic acid (LXB4) are the principal species formed in mammals. (Serhan et al., 1986a,b).

Pathways: There are two main lipoxygenase pathways. Lipoxygenation of arachidonic acid by 15-LO in epithelial cells and monocytes, 5-LO in neutrophils. The second major route of LX formation involves platelet/leukocyte or platelet/leukocyte microaggregate interactions that promote LX formation by transcellular conversion of the 5-LO epoxide product, LTA4 to LXA4 and LXB4 by the LX-synthetase activity of the 12-LO in platelets. In addition to the transcellular routes, another recognized source of LX biosynthesis involves a form of cellular ‘priming’ with the esterification of 15-HETE in inositol-containing phospholipids within the membranes of human neutrophils (Brezinski and Serhan, 1990). Discovery of this pathway suggests that during disease or host defence, precursors of LX biosynthesis might be stored within the membranes of the inflammatory cells and released after stimulation. Specific cytokines – Interleukin 4 (IL-4) and IL-13, putative negative regulators of inflammatory and immune responses,
promote transcellular LX generation through enhanced expression of 15-LO in monocytes and epithelial cells (Nassaret al., 1994; Munger et al., 1999).

**Metabolic Inactivation of LXs:** LXs are rapidly generated in response to stimuli, act locally and undergo rapid metabolic inactivation. Using monocytes or isolated enzymes, it has been possible to demonstrate that the major route of LXs degradation is via dehydrogenation at C-15 and possibly by w-oxidation at C-20 (Serhan et al., 1995; Clish et al., 2000). ATLs are converted in vitro to their 15-oxo-metabolite with a slower rate compared to native LXs, indicating that the hydrogenation step is highly specific (Serhan et al., 1995). ATLs, when generated in vivo, display longer biological half-life than native compounds and enhanced ability to evoke bioactions (Serhan et al., 1995; Maddox et al., 1997; Clish et al., 1999). Synthetic LX Analogues The rapid inactivation and short half-life of LXs in vivo have prompted the development of novel analogues designed to resist metabolism, maintain their structural integrity and bioavailability and their potential beneficial bioactions.

The discovery that 15-epi-LXA4 was equipotent in in vitro assays to LXA4, but was a poorer substrate for PGDH.

15-epi-LXA4 has enhanced metabolic stability over LXA4 in vivo, its pharmacokinetics remain poor, which, in addition to low chemical stability, creates challenges for development of analogues with better therapeutic potential.

A series of LX and ATL analogues were designed with specific modifications of the native structures of LXA4 and LXB4, such as the addition of methyl groups on C-15 and C-5 of LXA4 and LXB4, respectively (Serhan et al., 1995), and phenoxy or parafluorophenoxy groups at C-16 of both LXA4 and 15-epi ATL, protecting the molecules from the w-oxidation and dehydrogenation in vivo (Serhan et al., 1995; Maddox et al., 1997; Clish et al., 1999).

**Conclusion**

Resolution is now looked upon as a complex process where apoptosis of neutrophils and their subsequent clearance herald potent anti-inflammatory, tissue-restoring mechanisms. To fully appreciate the complexity of such processes and to design resolution-based therapeutic strategies, future work is needed to discern differences in the mechanisms of resolution in acute and chronic inflammatory disorders as well as decipher the tissue-specific resolution networks.

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**Source of Funding:** Nil

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Role of Complement System in Dysbiosis and Periodontal Inflammation—An Overview

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ABSTRACT

Compliment system is tradionally known as a cascade of anti microbial proteins in the blood. It is recognised as a key system for immune surveillance and homeostasis. It has a major link between the innate and the adaptative arms of the host immune response. They exist as pro enzymes and circulate as inactive forms. On activation, they become active, acquire enzymatic or esterase activity, react in particular sequence and cause damage to the neighbouring cells. This review discusses about the dysbiotic transformation of the periodontal pathogens that lead to destructive mechanism and loss of periodontal bone support.

Keywords: complement cascade, haemostasis, immunological surveillance toll like receptors, gingipains.

Introduction

Complement System a Key System of Immune Surveillance: Innate immune system is the resistance to infections that an individual possesses by virtue of his or her genetic and constitutional make up. It may be nonspecific, when it indicates a degree of resistance to infections in general, or specific where resistance to a particular pathogen is concerned1.

Complement Functions

- lysis of bacteria and infected cells
- opsonization to enhance phagocytosis
- phagocyte attraction and activation
- regulation of antibody responses
- clearance of immune complexes

Fig. 1: Stages of Complement System

Complement Components: In this, the complement proteins that exist as proenzymes undergo a chain reaction on activation. The nomenclature of complement components can broadly be described in three main headings

- Complement proteins
- Regulatory proteins
- Associated proteins

The Classical Pathway5: The complement cascade can be triggered by distinct mechanism.
A. Classical

B. Lectin or Alternative: All will converge with the third complement component (C3). The following mechanism takes place.

1. Recruitment and activation of inflammatory cells (via C3Ar and C5Ar)

2. Anaphylotoxins that activate specific G PROTEIN coupled receptors [CD88]

3. Microbial opsonisation and phagocytosis (opsonins)

4. Lysis of susceptible microbes.

These complement interactions can amplify innate immune and inflammatory responses through synergy with toll like receptors. And thereby they provide barriers against the spread of invading bacteria. The complement system and TLR sense pathogens through pattern recognition and trigger the activation of anti microbial and inflammatory responses, thereby initiating adaptive immune response. Therefore the pathogens by targeting complement/TLRs could impair innate immune response, dysregulate host defense. Thus complement system is a network of interacting fluid phase regulatory mechanisms and cell surface associated molecules that trigger, amplify, and regulate immune and inflammatory signalling pathways.

Fig. II: Pathways of Complement System in Pathogenesis

Role of Tolllike Receptors in Innate and Adaptive Immunity: Toll like receptors (TLRs) are germ-line encoded pattern recognition receptors expressed on cells of the innate immune system. They recognise structural components of various microorganisms called as pathogen –associated molecular patterns. Recognition of PAMPs by toll –like receptors will initiate signal transduction pathways, will lead tp generation of inflammatory cytokines and development of a major histocompatibility complex which instruct the development of antigen –specific acquired immunity. Engagement of TLRs on dendritic cells by pathogens play a major role in skewing responses toward Th1 or Th2 cells.
**Regulatory Proteins:** Regulatory proteins are mainly inhibitors or inactivators of the individual steps of complement activation. Since spontaneous activation of complement may occur and lead to auto cytolysis, the main aim of these proteins is to keep the process into control. 10-15 proteins chemically and functionally characterized, some are free in fluid phase to inactivate and some are bound to the cell membrane. Associated proteins Conglutinin – Conglutinin K is a non antibody naturally occurring β2 bovine serum protein. Immuno conglutinin – immuno conglutinin is an auto-antibody to fixed C3 and C4, found in sera of subjects frequently after microbial infections or following immunization with infecting agents. Cobra venum factor – cobra venum factor is a snake C3b in mammalian serum. It can act as C3 convertase. C splitting enzyme – these enzymes can activate C3 and split into fragments in a manner similar to C3 convertase of classical and alternate pathway.

**Complement System and its Role in Periodontal Pathogenesis:** In addition to constituting a “first line of defense", complement is today acknowledged as a factor promoting an adaptive immune response and a key to maintaining host–microbial homeostasis. By virtue of regulator proteins and different propensities to attach to host cells and microorganisms, complement proteins discriminate between healthy host tissue, cellular debris, apoptotic cells and foreign intruders, and tune its response accordingly (7–9). On one hand, complement eradicates invasive pathogens. On the other hand, continuous complement activation and modulation by, e.g. the subgingival biofilm, may enhance local tissue destruction and chronic inflammation, providing the biofilm with essential nutrients, ensuring biofilm persistence. Periodontitis is characterized by the presence of a hyper-activated phenotype of neutrophils with enhanced proinflammatory activity. As complement is a potent activator of neutrophils via complement receptor 3 (CR3) and the C5a receptor (C5aR), it is likely involved in the hyper activation of neutrophils.

Although bacteria populating the tooth associated biofilm essential for the initiation of periodontitis, it is actually the host inflammatory response causing Periodontitis, rather than direct bacterial action. So, it seems reasonable that periodontal disease could be prevented by interventions aiming to control inflammation and counteract microbial subversion of the host response. Activated complement fragments are abundantly found in the gingival crevicular fluid (GCF) of periodontal patients. Complement can be found in GCF at upto 70-80% of its concentration in serum. GCF from periodontitis patients displays complement-depended hemolytic activity, suggesting the presence of a functional complement system in gingival inflammatory exudates. Periodontitis requires a susceptible host. Susceptibility to periodontitis is determined by genetic factors that may predispose to hyper inflammatory responses or by environmental factors (diet and stress) and risk related behaviour (smoking) can modify the host immune response in a destructive response. 11, 12 Regardless of periodontal disease susceptibility, the control of host inflammatory response is considered central to treatment of periodontal disease. Therefore identifying key inflammatory pathways that mediate periodontal tissue destruction has vital implications.

The Periodontitis is induced by polymicrobial bacterial community, where in distinct roles that synergies to cause destructive inflammation. The colonization of associated pathogens trigger the host response leading to symbiotic to a dysbiotic microbiota. The pathogens over activate the host inflammatory response and cause resorption of supporting bone and thereby a positive feedback loop is enabled where the inflammatory tissue breakdown products are used as nutrients by dysbiotic microbiota, which further exacerbates inflammation. The key pathogen P. gingivalis especially induces the conversion from a symbiotic community structure to a dysbiotic, one capable of causing destructive inflammation and periodontal bone loss. Colonization of the periodontium by P.gingivalis impairs innate host defense by instigating a subversive C5Ar-TLR2 cross talk that lead to dysbiotic transformation of the periodontal microbiota. The dysbiotic community in turn causes C3 –dependent inflammatory bone loss, the hallmark of periodontitis resulting in inflammatory environment selects for inflammophilic bacteria that feed on inflammatory breakdown products, thereby promoting further bacterial growth and dysbiosis. 13,16

Complement split products are, in general, either absent or present at low concentrations in the gingival crevicular fluid of healthy individuals, but abundantly present in both the gingival crevicular fluid and serum of patients with periodontitis (82–90). Thus, C1q, factor B, factor Bb, C3, C3a, C3b, C3c, C3d, C4, C5, C5a, C5b and C9 have all been detected in diseased periodontal
tissue, on the surface of subgingival bacteria and in the gingival crevicular fluid from patients with established periodontitis14

**Evasion of Complement by Pathogenic Oral Bacteria:**
In general, bacteria can evade complement through three strategies: (i) proteolytic inactivation of complement components; (ii) recruitment of inhibitory regulators of complement; and (iii) hijacking of inhibitory regulators of complement. P. gingivalis inhibits the complement cascade by enzymatic breakdown of C3, mediated by a group of cysteine proteases called gingipains. Moreover, C5b is proteolytically degraded by P. gingivalis, which inhibits MAC formation. Prevotella intermedia possesses the ability to break down C3 via extracellular cystein proteases interpain A (InpA). Binding of P. gingivalis’ fimbriae to CR3 inhibits IL-12 production in macrophages and seems to reduce: (i) differentiation of naïve T cells into type 1 T-helper cells; (ii) production of interferon-c and tumor necrosis factor-a (TNF-a); and (iii) activation of natural killer cells. In periodontal pockets, TLR2, TLR4, TLR5 and TLR6 expression is increased enabling epithelial cell recognition of extracellular microbial structures, which induces production of IL-8 and matrix metalloproteinases by the epithelial cells.17

**Conclusion**

On the basis of evidence, locally applied complement inhibitors can potentially block periodontal inflammation and thereby provide protection as an adjunctive therapy to standard periodontal treatment. Being host modulation approach, complement inhibition is advantageous to antimicrobial approaches since it is host response that primarily inflicts damage upon periodontal tissues.

**Ethical Clearance:** Not required since it is a review article

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**REFERENCES**


Ectodermal Dysplasia—a 10-Year Prospective Study of Implant and Tooth Retained Full Mouth Fixed Restoration

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ABSTRACT

Ectodermal dysplasias are congenital disorders which presents with the complete anodontia, oligodontia, hypodontia with poorly developed alveolar ridges. The case reports the replacement of the missing teeth by fixed metal-ceramic bridge after the growth completion with the help of the endosseous implants and the remaining natural teeth with the implant – natural teeth rigid connection. The ridge expansion in the anterior maxilla and the sinus lift in posterior maxilla was done for the implant placement in the compromised alveolar bone. The prosthesis functioned successfully after the 10 year period. The radiographs after the 10 year period showed some marginal bone loss around the implants and the occlusal wear of the ceramic prosthesis.

Keywords: hypohidrotic ectodermal dysplasia, anodontia, oligodontia, hypodontia

Introduction

Ectodermal dysplasia (ED) is the congenital deficiency of the formation of the two or more ectodermally derived structures of the teeth, hair, nails and the sweat glands. The ectodermal dysplasia syndromes are associated with the disorders of the other mesenchymal structures along with the associated ectodermal structures. The ectodermal dysplasias are broadly classified into hidrotic and hypohidrotic or enhidrotic types depending on the presence or absence of the sweat glands.

The hypohidrotic ectodermal dysplasias are more common than the hidrotic ones. The hypohidrotic ED is commonly transmitted by X-linked transmission. The males with the transmitted X chromosome are affected by the severe form of the disorder. The females with single affected X chromosome are usually carriers of the disorder with the milder clinical features. The female carriers of the hypohidrotic ectodermal dysplasia have higher incidence of hypodontia of upper and lower incisor associated with the peg shaped teeth form, and the incidence of microdontia of the 2nd molars than the general population.¹

The hypohidrotic ectodermal dysplasia presents with the lack of the sweat glands leading to the hyperthermia of the body with deranged temperature control. The people affected by the disorder have the typical facial features of the frontal bossing of the forehead, saddle nose and the deficient formation of the maxilla. The lack of the supraorbital hair and eye lashes is seen along with deficient formation of the scalp hair. The facial hair in the male is deficient. Discoloration of the skin around the eyes is present. The deficiency of the maxilla causes the concave profile to the face.

Intraorally congenital missing of the primary and permanent teeth are seen. Hypodontia with the missing of 1 to 5 teeth and oligodontia with the missing of more than 5 teeth are the typical features of the ectodermal dysplasia. Hypodontia and oligodontia is seen in the form of the congenital missing of the primary and the permanent teeth associated with the deformed peg shaped teeth present. The alveolar bone is thin with the deficient formation due to the lack of the teeth. The deficient formation of the salivary glands leads to dry mouth. Commonly the permanent central incisors, 1st molars and the canines are present with the other teeth missing in maxilla whereas in the mandible canines, 1st premolar and 1st molar are present in order with other teeth missing. More commonly maxilla contains more number of teeth than mandible.²

The hidrotic ectodermal dysplasias are associated with presence of the sweat glands, The disorder is transmitted by the autosomal transmission with the equal
incidence in male and females. The disorder is associated with the abnormalities of the nails (hypertrophy, dystrophy) which is not seen in the hypohidrotic type.

The diagnosis of the ectodermal dysplasia is done by the clinical features. Biopsy of the skin is useful in diagnosis of hidrotic and hypohidrotic types. The mode of inheritance is diagnosed by the family history.

The dental management of the anodontia is by the replacement of the missing teeth in the earliest age of 2 years. The early replacement of the missing teeth will improve the esthetics, speech and masticatory function development. The removable dentures allow the growth of the jaws till the adolescence and then endosseous implant treatment with the teeth fixation is possible after the growth of the jaws is completed. However the use of one or two implants for the retention of the overdenture at the age of 6 years serves the function till the completion of growth. The endosseous implants can be successfully placed and provide support for prosthetic restoration in patients with ectodermal dysplasia. The ectodermal dysplasia does not interfere with the osseo integration of the endosseous implants.

The poorly developed alveolar bone provide the insufficient bone for the osseointegration of the end osseous implants. The vertical alveolar growth results in the submergence of the implants relative to the adjacent natural dentition when implants are placed adjacent to the erupting permanent natural dentition.

Case Report: A 18 year old girl from a village at Nellore district of Andhra Pradesh attended the department with the complaint of multiple missing teeth in year 2007. The patient had sparse hair which was unusually light brown colored. The patient had missing eye brows and eye lashes. The frontal bossing of the forehead with the deficient formation of the maxilla was present. The concave facial profile was present due to maxillary hypoplasia. Periorbital darkening of the skin was present. The patient complained of reduced sweating and the dry skin.

Intraorally oligodontia of the permanent teeth was present with the loss of more than 6 teeth. The upper and lower canines were present apart from upper left 2nd premolar and lower right 2nd molar. All the teeth present were deformed with the conical shape. All of the teeth were single rooted including the molar of the mandible and the roots were of normal length. The patient’s alveolar bone is thin due to the lack of the teeth.

The patient was diagnosed of hypohidrotic ectodermal dysplasia based on the clinical features of reduced sweating, absence of hair, and oligodontia of maxilla and mandible. The mode of transmission can be explained by X chromosomal transmission with the missing and hypoplasia of the teeth, deficient hair and the dry skin. The patient gave the history of consanguineous marriage of their parents. Both of the parents had hypodontia or oligodontia of the teeth but they did not show the other features of ectodermal dysplasia.

The patient was treated with the endosseous implants of the maxilla and mandible. In the maxilla two machined endosseous implants (ADIN, ISRAEL) were placed in the region of 16 and 22. The implant in the region of the 1st molar was placed after the indirect sinus lift using osteotomes as the height of the bone was 6mm in the region. The 10mm length and 4.2 mm diameter implant was placed after the sinus lift. The 3.8mm diameter and 10mm length implant was placed in the left lateral incisor region after osteotomy.

The implants were uncovered after waiting for 3-6 months in the year 2008 with delayed loading protocol and gingival formers were placed for soft tissue healing for 2 weeks. The implant and the natural teeth supported rigid metal- ceramic fixed bridge was planned for the patient till the 1st molar teeth with the shortend dental arch of the upper and lower jaws. The short arch reduced the length of the distal cantilever and unfavourable torque on the of the implants and natural teeth.

The remaining natural teeth were prepared for full veneer ceramic crowns to support the fixed teeth. Impressions were taken at abutment level with polyether impression material. The casts were mounted in semi adjustable articulators after the face bow transfer. The patient’s condylar guidance was transferred to the articulator. The abutments were machined in the laboratory to be parallel to the natural teeth preparations. Acrylic crowns and pontics were fixed at the proper vertical height. The Full ceramic fixed teeth were fabricated with the group function occlusion scheme in eccentric movements and
fixed in the patient’s mouth with zinc phosphate cement. The pontics 16, 26 and 36 were of cantilever type with implants in the anterior region.

The patient was recalled at regular intervals for the examination of the implants and the ceramic teeth. After 10 years in 2018 the patient was recalled and occlusal surfaces of the ceramic crowns and pontics were found with attrition and the metal was exposed in the posterior region of the jaw mostly on the left side of the jaw. Radiographic examination was done in the year 2018 after the satisfactory function of the prosthesis for 10 years. The marginal bone loss of 1-2mm was seen in the implants at 16 and 42 region of the right side and 32 region of lower jaw. The marginal bone loss of 2-3mm was observed at the 22 region of the upper jaw. The patient was satisfied with the prosthesis and the retention of the prosthesis in the mouth was not disturbed. The patient did not complain of the pain. The patient’s occlusion is undisturbed with the maintenance of the original group function eccentric occlusion.

**Discussion**

Diagnosis of the hypohidrotic ectodermal dysplasia is done by the presence of the classic clinical features of absence of sweat glands, oligodontia (6 or more missing teeth), the hypoplasia of the teeth that are present with the peg shape absence of the hair on the scalp. Since both of the parents had the dental features of the ED and they being close relatives the X chromosomal transmission can be explained for the transmission in the patient.

The replacement of the teeth at the early age can be done by removable dentures with or without implant support. The early replacement of the teeth leads to better speech and social development of the child. Albert D Guckes et al reported by clinical studies that permanent replacement of the teeth by the implant treatment is deferred till the completion of the growth as the implants are submerged or drifted with the growth of the jaws. However the mandibular implants are not submerged or drifted as the mandible grows at the ramus region and can successfully be used as overdenture abutments of mandible with the periodic relining.

The ectodermal dysplasias are associated intraorally with the deficient formation of bone, narrow ridge along with the anodontia or oligodontia. The absence of the teeth with the lack of the occlusal stimulation leads to reduced bone density. The teeth which are present are usually of hypoplastic with the irregular shape. Gerald keams et al and Y Wangs et al reported by their clinical studies that the ectodermal dysplasia does not interfere with the osseointegration of dental implants and their function under masticatory loads. The female patient of 18 years of age completed the growth of the jaws. The poorly developed alveolar bone created problems in the implant placement. The maxillary anterior implant was placed after the ridge expansion by osteotomes as the alveolar ridge was not fully developed, The maxillary molar implant was placed with the indirect sinus lift with the help of the osteotomes.

Summers R B reported the osteotome technique for implant placement in narrow and shallow ridges with additional advantage of condensation of the bone around the implants with more density of the bone. He reported the maxillary sinus lift with osteotomes and immediate implant placement in patients with the moderately deficient alveolar bone as successful method of implant similar to the regular treatment. Successful clinical results with the sinus lift procedure of maxilla with the immediate implant placement were reported by Giovanni B Bruschi et al. And Scipioni at al. The successful functioning of the prosthesis after 10 years intraorally in the present case is in conformity with the earlier clinical reports.

Osseo densification as the newer method of increasing the primary stability, bone density and implant surface to bone contact was proposed by Huwais.S in 2013 and 2014. The osseo densification improved the primary stability and bone expansion in narrow ridges by the elastic nature of the bone. With the newer densau burs the alveolar bone was autografted around the implant in dense layer improving the primary and secondary stability instead of substraction of the bone during osteotomy with the regular burs.

Patients natural teeth of the normal length of roots with hypoplastic crowns were splinted with the implants with the ceramic fixed teeth by implant-tooth connection with the rigid connection between the tooth and implant. Lang NP et al reported the better prognosis of teeth-teeth connection and implant-implant connection than the tooth – implant connection. This is explained by the differential movement of the tooth and the implant.
The movement of the periodontal ligament of the natural teeth is about 10 to 100 times more than the bone-implant junction under horizontal forces. The Osseo integrated implants with the direct attachment to the bone without the periodontal ligament moves only due to the elasticity of the alveolar bone compared to the periodontal ligament.

The tooth-implant retained denture of the patient functioned for the past 10 years with the marginal bone loss of the upper implants bilaterally. Similar results were reported by Naeetie at al with the tooth-implant rigid connection of favorable long term stability with the minimal complications of tooth intrusion but more marginal bone loss compared to the non-rigid tooth-implant connection. The lesser marginal bone loss and increased intrusion of the natural teeth were reported with non-rigid tooth-implant connection.

The teeth 16, 26 and 36 were cantilevered pontics with abutment situated anteriorly. The length of the cantilever with the single molar pontic is less than half of the antero posterior length of the implant and teeth connected resistance arm length. The length of the pontic in relation to the resistance arm is within acceptable limits of torque. The pontics and retainers presented with the attrition of occlusal surfaces by the exposure of the metal coping done by ceramic nickel chromium. The wear of the occlusal surface is controlled by the duration of the prosthesis usage, hardness, opposing tooth surface and masticatory habits of the individual.

Conclusions

1. Osteointegrated implants are successful treatment option in ectodermal dysplasia patients as the normal patients.
2. The ridge expansion and the sinus lift procedures can be utilized successfully in the ectodermal dysplasia affected children for placing implants in the jaws with deficient alveolar bone formation.

3. Implant – Tooth rigid connection can utilized successfully in ectodermal dysplasia affected individuals for rehabilitation by the fixed restoration of the missing teeth.

Ethical Clearance: Not required since it is a case report

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Cast Partial Denture—A Case Report

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ABSTRACT

Multiple missing teeth situation always claim careful attention and meticulous treatment planning. It becomes more challenging when unilateral or bilateral distal extension situation exists. Successful treatment can be done with some contemporary and conventional treatment planning. This clinical report describes about the treatment planned for a 35 years old patient with a partially edentulous upper and lower jaw. The prime consideration was given to aesthetics and masticatory function.

Keywords: Cast Partial, Masticatory function, Removable Partial Denture, surveying, retainers

Introduction

Restoration of partially edentulous arches is challenging for a clinician where the clinician has to give due consideration in satisfying patient requirement. Removable partial denture is considered to improve both aesthetic and masticatory function. Masticatory performance and bite force are the objective measurement in evaluating masticatory function while designing a removable cast partial denture¹. Situations, when financial, systemic or local conditions preclude the use of fixed Prosthodontics conventional treatment planning can be done. In such cases a well - designed cast partial denture (CPD) can be an excellent treatment alternative².

Prosthodontic rehabilitation of distal extension partially edentulous situations remains challenging. The support of is derived from edentulous ridge and terminal abutment teeth. The terminal abutments act as fulcrum while functional movements of CPD as well as retentive clasps exert force on abutment teeth which may jeopardize the periodontium of these teeth³.

Case Report: A 35-year-old female reported to the Department of Prosthodontics, Sree Balaji dental college and hospital with the chief complaint of multiple missing teeth in maxillary arch and inability to chew food properly. Medical history was not significant. On oral examination, teeth missing in maxillary arch were 13,15,16,17 and 22,23,26 and 37 and 46,47 in mandibular arch.

After radiographic examination and diagnostic model study, interocclusal distance was found to be adequate. Treatment was carefully planned by taking into consideration patient’s aesthetic need and economical condition. Treatment plan included cast partial denture in the maxillary arch and mandibular arch.

Procedure

A detailed examination revealed oral hygiene was satisfactory. The diagnostic casts were made and mounted in the semi adjustable articulator. Diagnostic models were analyzed and surveyed. Mock up mouth preparations were done on the diagnostic models and the desired preparations were executed on the teeth intraorally in the patient’s mouth.

After evaluating, framework design was RPI system on 15, cingulum rest on 13 embrasure clasps on 24,25 and simple circle on 27,36,38,44,47 and closed horse shoe as maxillary major connector and lingual bar as mandibular major connector. Mouth preparations was done in the patient’s mouth and final impressions was
made with monophase polyvinyl siloxane impression material (Aquasil Lv Ultra, Smart Wetting Impression Material, Dentsply, Detrey Gmbh, Konstanz, Germany) using a light cure special tray. The casts were poured in die stone (Ultrarock, Kalabhai Karson Pvt Ltd, Mumbai, India). Master cast surveying procedure was carried out to block the undercuts and refractory casts were made using phosphate bonded investment material\(^1\). Wax pattern for maxilla and mandible were contoured using preformed wax patterns. The refractory model with the wax pattern was invested and casting procedure was carried out. The casted cast partial denture was finished and polished in the conventional manner. The metal framework was tried in the patients’ mouth for proper seating. The occlusal rim was made and bite registration was done. Teeth setting was done and wax trial was carried out in patient’s mouth. After satisfactory consent from the patient, processing was done and the cast partial dentures were delivered to the patient.

**Discussion**

There are several treatment options for the rehabilitation of partial edentulism. Depending on the given diagnostic factors and patient’s perspective, best treatment plan should be selected for the patient. The procedure explained in the rehabilitation of this patient is a way of restoration of partially edentulous arches with increased masticatory efficiency and appearance. The decision to use cast partial denture design should be carefully considered. Clasp-type removable partial dentures should be used whenever practical because of their lower cost, ease of fabrication and maintenance, and the predictability of results. The impact strength, compressive strength of the alloys with acrylic resins is better than the non-metallic acrylic denture\(^1\).

Areas of concern in a Kennedy partial denture designing that need to be self-cleansing are surfaces of framework near the proximal surfaces of abutment, area under the major connector and interproximal areas. During the course of follow up, the cast partial denture was evaluated at these three places to check the efficiency of both self-cleansing ability and patient care\(^2\). Cast partial denture is less subjected to breakage and has effective transmission of thermal changes\(^6,7\).

Krall and others investigated to state that the presence of removable partial denture is an important fact for nutritional intake and the replacement of missing teeth could help people maintain a healthy diet\(^6\). Other investigators have reported that partial tooth loss results in altered food acceptability, just as edentulism is associated with poor diet and compromised nutrition and tooth loss may cause dietary change.
Success of the prosthodontic treatment relies on the proper selection of denture type to provide adequate retention, stability, and aesthetics. Challenging situations like unilateral or bilateral distal extension can be dealt successfully with conventional treatment planning (cast partial denture). Technique followed in the treatment of this patient is a simple but yet effective treatment plan for providing an optimum satisfactory treatment for an individual.

Ethical Clearance: Not required since it is a case report

REFERENCES


Clinical Remount in Complete Denture

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ABSTRACT

Proper occlusal relationships are a part of successful prosthetic treatment for edentulous patients. Fabrication of complete dentures involves clinical and laboratory procedures that should be performed precisely for achieving success with fabricated dentures. These occlusal errors can be corrected, (1) in a patient’s mouth or (2) by recording new centric relation and remounting dentures on an articulator. The second method is more viable because the denture base moves over the oral mucosa which is unable to identify premature contacts in centric occlusion and tooth guided eccentric excursions. This article depicts the modest and effective clinical chairside remounting procedure.

Keywords: Occlusal errors, Occlusal adjustments, Interocclusal record, Patient remount, Clinical remount, Customized Mounting Platforms

Introduction

During the try-in stage, the established occlusion is subject to change because of inaccuracies in mounting procedures, distortion of the record bases, unfastened mounting rings, or processing errors. Minor faults can be corrected by selective grinding with dentures in the patient’s mouth if a split cast remounting procedure is immediately used after the dentures are processed.¹⁻⁷ However, a general survey on dental practitioners revealed that less than 5% of dentists use the split cast procedure to repair the errors of processing.⁸ Besides, the displaceable oral soft tissues and saliva also interferes with the selective adjustive procedure. For these reasons, clinical remount is preferred by a few practitioners.⁹ The clinical remount is an essential step in the fabrication of complete dentures and it is used to ascertain favourable occlusion.⁹⁻¹⁸

Clinical Remount Procedures: As described by Charles M. Heartwell and Arthur O. Rahn², a clinical remount is carried out by orienting the mandibular denture to the maxillary denture using an interocclusal record with the jaws in centric relation.

Place two thicknesses (approximately 1 1/2 mm) of passive-type wax on the occlusal surfaces of the mandibular teeth. Soften with a flame from an alcohol torch or immerse in the water at 130°F.
Carry to the mouth and have the patient close into the wax when the jaws are in centric relation. The closure must be short of tooth-to-tooth contact. The wax record is not acceptable if the teeth penetrate to make contact. Chill with cold air and remove it.

Do not return the wax record to the mouth, as it may be distorted by the patient. Trim the wax so that only mild indentations remain, and expose the facial side so that the seating of the maxillary denture can be visually checked.

After properly orienting the mandibular denture to the maxillary denture using the interocclusal record, secure it with sticky wax. Seat the mandibular cast in the denture and attach it to the mandibular member of the articulator with plaster.

To check what has been recorded to the patient’s centric occlusion, make another wax interocclusal record. Replace the dentures on the articulator. With the condylar elements freed, place the teeth in the indentations in the wax record. The condylar elements should rest against the stops.

Repeat the procedure until two consecutive records are accepted. When the accuracy of the articulator mountings is verified, occlusal disharmony when the jaws are in centric relation or eccentric relation can be corrected by selective grinding procedures.

According to George A. Zarb and Charles L. Bolender, a clinical remount involves remounting of dentures on the articulator using accurate interocclusal records made in the patient’s mouth which is important in correcting the occlusion.

On a maxillary denture, the posterior teeth are slightly lubricated with petroleum jelly and the denture is firmly seated in the mouth. Two pieces of wax wafer (e.g. Aluwax) is immersed in a water bath of 130°F (54°C) for 30 seconds. Both the temperature and the time are critical in achieving a uniformly softened wax.

The mandibular denture is then seated with the index figures bilaterally positioned on the buccal flanges. The mandible is guided into centric relation by placing the thumbs on the anteroinferior portion of the chin in such a way that some guidance is directed towards the condyles. The patient is guided in a hinge movement, closing lightly into the wax.

The mandibular denture is carefully removed from the mouth and placed in ice water to chill the wax. The dentures are removed from the ice water and dried. The imprint of the opposing teeth should be crisp and about 1mm deep, with no penetration of the interocclusal wax record by opposing teeth. The Aluwax is thoroughly chilled before the dentures are returned to the patient’s mouth and the patient is guided into centric relation, as previously described.

The record is acceptable if there is no tilting or torquing of the dentures from initial contact to complete closure. If the record does not satisfy these criteria, the procedure must be repeated.

After the dentures and wax are chilled and dried, the mandibular denture is positioned on the remount cast. The maxillary denture teeth are carefully positioned in the wax index and secured with a drop of sticky wax in the canine and second molar regions bilaterally. The condylar controls must be locked into centric position. Plaster is used to secure the mandibular denture to the lower member of the articulator.

The Centric Relation Record should be verified for accuracy before any tooth adjustments. Aluwax is used and the centric recording is repeated. After chilling and drying of the wax record, the dentures are returned to the articulator. With the articulator locked in centric relation, the maxillary teeth should fit properly into the new wax record. If all the teeth drop simultaneously into the wax record, the mounting is correct. If the opposing teeth do not fit exactly into the indentations in the new record, either the original mounting was incorrect, or the patient gave an incorrect relation when making the second record. To evaluate this, return the dentures with the chilled wax record to the mouth and check the accuracy, as previously described.

The procedure as mentioned above can also be performed by using Impression Plaster or Bite Registration Paste, instead of Aluwax, as given by Carl O. Boucher.

In 2012, Chauhan MD et al published an article regarding a simplified chair-side remount technique using customized mounting platforms (CMP). In this article, the following advantages of a simplified remounting procedure using the customized mounting platforms were mentioned: 1) remount casts are not fabricated
separately for remounting complete dentures; 2) the mandibular denture can be remounted quickly with a new centric relation record, in case of incorrect centric relation record; 3) blocking out undercuts from the tissue surface of denture is not necessary; 4) mounting can be performed at chair-side with minimal mess; 5) the putty impression material can be conserved as a record to be used in successive appointments if needed.

This clinical remount technique utilizes maxillary and mandibular CMPs that are fabricated over mounting plates of the articulator.1

**Fabrication of CMPs:** Boxing wax is applied around the outer edge of the maxillary and mandibular mounting plates to form diverging housing for holding the dental plaster. Reduce the boxing wax to a diameter of 6.5cm at the opening. Trim the height of maxillary boxing wax to 2.5cm and mandibular boxing wax to 2cm.

Pour dental plaster to fill both the divergent cylinders, allow the dental plaster to set and remove the boxing wax. Carve a horse-shoe shaped groove on the flat surfaces of both the divergent cylinders thus formed.

Mix self-cure acrylic resin into two spools and place over the grooves of both maxillary and mandibular divergent cylinders to form U-shaped positive replica of edentulous ridges. Make sure the vertical ridge height is 5 to 6 mm.

Make buccal and lingual undercuts over these acrylic edentulous ridges with fissure bur that will provide a port for the putty impression material during mounting of the dentures. The finishing and polishing of both the CMPs are done.

**Clinical remount of the dentures:** Warm Aluwax is used to make a centric relation inter-occlusal record to confirm the closure without contact of the denture teeth or bases.

Attach the maxillary and mandibular CMPs in the articulator. Place the putty impression material in the form of a U-shaped roll over the mandibular acrylic resin edentulous ridge on the CMP and position mandibular denture on it.

Secure the maxillary denture over mandibular denture with the help of the centric interocclusal record in aluwax and place the putty material in the region of the alveolar ridge and close the upper member of the articulator into the putty material.

After the putty impression material has set, open the articulator and remove the interocclusal record. The putty material serves as remount casts.

Place the articulating paper over the dentures and close it. Adjust the occlusion.

**Discussion**

The remount procedure of the finished dentures is a constituent part of prosthetic patient treatment in the practice of complete dentures. Correct occlusal relationships are a part of the success in prosthetic treatment for edentulous patients with complete dentures.

The errors in occlusion should be corrected on the articulator rather than in the patient’s mouth. It is not good to correct occlusal errors in the patient’s mouth due to the movability of dentures on the denture foundation and often inadequate willingness of patients to cooperate, result in incorrect representation of occlusal relationships in maximum intercuspation and excursive mandibular tooth guided movements.20

As per a review made by Babu RR, Nayar SV21, the T-Scan occlusal analysis system (Tekscan), a Microsoft compliant system, records occlusal contact sequence in 0.01s increments. A piezoelectric foil sensor is placed inside patients mouth and the recorded data is viewed and analysed on the software. The T-Scan identifies the time magnitude and the distribution of the occlusal contacts. Lyons MF et al22 evaluated that patient can feel more widespread contact sensation at the end, the reason being that the establishment of true and measurable bilateral simultaneous occlusal contact is achievable using the T-Scan.

As described by Rudd M Morrow, Kenneth D Rudd, John E Rhoads23, tooth occlusion in the clinical remounting procedure is reconstructed in the articulator and an attempt is made to correct both the clinical and laboratory inaccuracies in the centric relation and establishes the occlusion that ensures even pressure in all areas of the arch.

According to the Clinical Evaluation made by Al Quran F24 in 2005, out of one hundred complete denture
patients, the first group (50 patients) received complete denture with a clinical remount procedure performed and the second group (50 patients) received complete denture without a clinical remount. A four-point, nine scale Patient Denture Satisfaction questionnaire was used to evaluate the patient’s satisfaction with their dentures. The author found that the total patient satisfaction score, with a maximum of 36 points, was higher in the clinical remount group (P=.007). Differences were statistically significant in favour of the clinical remount group for general satisfaction, fit of the mandibular denture, mastication ability, and maxillary and mandibular denture comfort. When a clinical remount procedure was used, results showed a remarkable improvement in the comfort of upper dentures and the fit and comfort of the lower dentures.

**Conclusion**

Within the limitations of this review article, following conclusions were drawn:

1. The clinical remount for complete dentures is recommended on denture insertion to reduce clinically observed areas of discomfort and reduce the number of recall appointments.25

2. Therefore, it is highly recommended that clinicians incorporate this procedure into their routine for fabricating complete dentures as it minimizes patient dissatisfaction.24

3. The T-Scan system identifies the time and force characteristics of occlusal contacts, and hence, establishing true and measurable bilateral simultaneous occlusal contacts is a clinically attainable reality by using this system.21

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**REFERENCES**


Psychological Benefits with Denture Characterisation in Edentulous Patients—A Review

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ABSTRACT

With the increase in active and healthy elderly individuals, the demand for highly aesthetic prosthetic treatment is also increasing. Achieving a healthy-looking smile for a patient, through the reconstruction of missing teeth and surrounding soft tissue using aesthetic prosthetic material, is one of the most important duties of dentists. Denture characterisation is very effective for enhancing removable denture with more natural and pleasing appearance. This review article describes various efforts that were made for characterisation of denture base and teeth in a removable prosthesis.

Keywords: Complete denture, Characterisation, Aesthetics

Introduction

For the aesthetic appearance of an artificial denture, characterisation of the denture plays a significant role which is achieved by modification of the form and colour of the denture base and teeth to produce a more lifelike appearance.¹

The denture base (denture base modification) and the denture teeth (denture teeth characterisation) are the two components involved in characterisation of the complete denture.²

Denture base characterisation: Creating accurate denture base contours and matching the denture base colours to the patient’s oral tissues are the factors involved in denture base characterisation.

Wax characterisation of the denture base: The even, pink, gleaming surface of an average acrylic denture quickly reveals its false. Therefore, the surface of the denture base can be modified by replicating gingival recession, frenalum, gingival stippling and rugae pattern, to give an appearance similar to that of the natural tissues, in the trial denture base.

Gingival stippling: In 1974, Rosenthal RL, Kemper JT described blow wax technique for stippling dentures. The use of non-concentric burs for stippling dentures was given by Gonzalez-Casefont Am et al. in 2002. Stippling is also introduced in the wax using synthetic sponge made from low density polyurethane foam, as described by Nayar and Craik in 2007.³⁻⁵

Palatal rugae: A simple method of adding palatal rugae to a complete denture was given by Gitto et al. in 1999, which involves the use of tin foils to reproduce the pattern from the cast to the wax up or using it over the processed complete denture as a template to add autopolymerising resin on existing denture. Fernandez et al. in 2015 gave a technique that involve addition of rugae pattern by impressing the cut putty impression over softened wax.⁶⁻⁷ Patterns of rugae, incisive papilla and mid palatine raphae can be added using softened wax on a wax dropper. Alternatively, pre-formed wax pattern can be used which are available in different thickness.⁸

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Colour characterisation of denture base: When the acrylic resins were first used in 1940s, there was no background of experience or adequate research information on oral pigmentation available to the manufacturers of acrylic resins for dentistry. They were content with a light pink, the characteristic colour of the normal gingiva. Any deviation from this light pink was considered pathologic.

In 1944, Dummett began a study of pigment variations in the healthy oral tissues of the Native Americans. This clinical study and others followed in 1960, helped to establish and publicize the fact that physiologic pigmentation of the gingiva is a normal finding in many people of all races and nationalities. Gerhard and Sawyer in 1966 noted the critical comments of a large percentage of Native and Latin American patients at the dental clinic of Loyola University of Chicago regarding pink denture base resins. They found that a conventional denture base resin produced a special shade for Loyola University and modified with the pure chalk in a burnt umber colour was more acceptable to patients with heavily pigmented oral tissues.

Any prosthesis constructed for oral cavity must simulate the colour of the surrounding natural tissue for an acceptable aesthetic result. The colour effect of any denture base must be evaluated in its ultimate environment, the mouth of the wearer.


In 1995 Joseph J Berte and Carl A Hansen came up with custom tinted denture base characterisation by visible light cure lamination, in which urethane di methacrylate and tinting powder lamination, chemically bonded to a methyl methacrylate denture base, produces a natural distribution of the tints. The characterisation is protected by a hard, clear layer of urethane, this lamination is achieved either in the laboratory, bore processing the denture or after the denture have been fabricated.

Pattanaik et al., in 2011, described the method of internal characterisation of the denture base by using tissue paper to carry and retain acrylic stains which are incorporated in the denture base at the time of packing stage. Also they described the method of characterisation of a denture base in 2013 using auto-polymerized pour type denture base resin and acrylic stain using a modified laboratory procedure for the augmentation of lip support which was given by Shimizu et al.

Denture teeth characterisation: Selection of anterior teeth with respect to the size, form and colour and arrangement of anterior teeth to suit the patient’s need and characterising the denture teeth are the factors involved in denture teeth characterisation.

Selection of teeth: Williams in 1914 laid down the first simple rules of dental aesthetics. He introduced the square, ovoid and tapering concept in choosing the form of teeth, an ovoid face required ovoid teeth, and a tapered face required tapered teeth.

Sears in 1952 summed up nearly total concept of aesthetic dental prosthesis, that when the laterals are nearly as broad as the other front teeth, it is said to have a strong or masculine appearance. When the laterals are narrower than average, it is feminine or delicate.

The dentinogenic concept as described by Fisher and Frush, using sex, personality and patient age applied to anterior tooth size. They have related sex to size differential between central and lateral incisors with less differential in men than in women. They described how dentogenic interprets the personality factor. The attention towards the personality factor allows a realistic approach to the problem posed by the undeniable of using artificial substances to create an illusion of reality in the smile. Also it paves the path for the further sex and age refinements which are necessary for dentogenic restoration. The personality factor has been shown to be one that can be employed specifically for the predetermination of aesthetic results and can help to eliminate the unsatisfactory trial and error procedure for obtaining acceptable aesthetic results. Advanced age also causes the teeth to appear small due to narrowing mesiodistal width resulting from interproximal wear.

A great deal of attention has been placed on the theory of matching teeth to face form. Frush and Fisher stated that rugged aggressive men tend to have squared
teeth with broader central incisors. Younger more delicate women are more likely to have tapering or ovoid teeth with rounded incisal edges. Hardy, 1960, preferred teeth with labial convexity, both gingivo-incisally and mesio-distally. He felt that they reflect light differently than a flat tooth.

Krajicek in 1956 and Payne in 1975 suggested that, the use of custom molded teeth enables the dentist to use replacements made from natural teeth. These teeth give a more natural appearance than the teeth obtained from the commercial manufacturers.

Arrangement of teeth: Hardy discussed the factor of family resemblances and aid in working out the aesthetic problems. More specifically, the profile of the face, arch form and the smile line of the patient are guides to initial placement of anterior teeth. The inclination of the maxillary and mandibular anterior teeth are generally parallel to the profile of the patient’s face due to the pressure of the lips on these teeth during development. The arrangement and arch form of the anterior teeth have a definite relationship to the arch form of the residual ridge. Martone in 1967, stated that the key to aesthetics lies in asymmetry. Asymmetry in tooth arrangement should have slight modification in the position of incisors such as overlapping, rotation, small diastemas, and incisal variations. They may change the light reflection just enough to produce the artistic dental composition desirable for the patient.

The concept of separateness as described by Sharry is most important, it helps in achieving the realism we are striving for. At the wax up stage, the interproximal surfaces of the anterior teeth are routinely cleaned with dental floss, so that each tooth is seen as a separate and distinct entity in the complete denture. The concept of divine or golden proportion have also been described and provide useful guidelines for the selection and positioning of anterior teeth.

Staining of the denture teeth: Tooth shades and stains can be used to replicate textures and features like attrition facets, cervical stains, crack lines and mamelons. The method for staining teeth can be done before teeth arrangement or after processing of the dentures. Composite resin stain kits are available to add stains to the teeth to individualise the denture. Thomas J Donohue in 1983 described the facial characterisation of anterior artificial teeth by creating striations, grooves and fracture lines using various abrasive stone wheel of various diameter and inches.

Conclusion

In a questionnaire survey on denture aesthetics and denture base characterisation done by Matsuda k-I, et al. in 2016, of all participants, 65% were concerned about their denture appearance and over 50% were concerned about their denture gum appearance and 70% of participants were interested in denture base characterisation.

The treatment with characterised complete denture prosthesis can produce a more lifelike appearance compared with conventional denture that produces artificial look in edentulous patients, also aids the patients in developing proper speech, enhanced aesthetics and dramatic social and psychological benefits.

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REFERENCES


Electronic Dental Anesthesia—The Painless and Prick Less Way to Surgical Procedures

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ABSTRACT

Pain control is an important part of dentistry. Although most of them can cope with local anesthetic injections, a few are needle-phobic, and giving them an injection presents a challenge to the dentist. For other, the paresthesia which may linger for hours after the completion of the dental procedure is more objectionable than the injection. In the past decade, there has been renewed interest in the applications of electronic pain control in dentistry and several electronic dental anesthesia machines are currently being advertised and used. This communication is to bring certain developments regarding the electronic dental anesthesia.

Keywords: Electronic dental anesthesia, Needle free anesthesia, Pain free anesthesia, Funny stickers.

Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Providing anesthetic injections is always associated to the pain of the needed prick. The privilege of inventing general anesthesia goes to Dr. William T G Morton, a dentist from Boston in 1864. But this technique has been cumbersome, time consuming & carries a risk of morbidity and even mortality. Hence, was considered unsuitable for minor dental procedures. This then lead to the development of local anesthesia, which was first demonstrated by Karl Collar of Vienna in the year 1884. Today, Local Anesthesia (LA) is one of the most commonly employed drugs in dentistry, and probably the most important ones too [1,2].

In dentistry, local pain management is a critical component of patient care. When efforts to achieve proper anesthesia becomes unsuccessful, the resulting stress in both patients and the clinician grows to significant levels. Traditional local anesthesia obtained by dental injections has several drawbacks such as anxiety, psychological factors, local and systemic toxic reactions, paresthesia caused by laceration of regional nerve fibers and acidic pH of LA causing local irritation. The application and induction of LA has always been a difficult task and this demands an alternate method that is more convenient and effective. An alternative was found to LA by the application of TENS in dentistry. In 1967, use of transcutaneous electrical nerve stimulation (TENS) was introduced in dentistry. This became an alternative to overcome the drawbacks of LA, during pain management, by a non-invasive and safe manner [1,2,3].

In recent years, modifications have been made to make TENS useful in the dental setting.

Malamed et al. use the term electronic dental anesthesia or EDA when referring to the applications of
TENS to dentistry [4]. The explanation of the mechanism by which TENS produces anesthesia is based on several theories describing mechanism of pain transmission. \[1,5\]

**Development of EDA**\[1,2,5\]

**Electric Fish:*** The use of electricity for anesthesia dates back to 100 years as seen in the drawings in Egyptian temples which suggest use of the Electric fish/Nile Catfish (termed Malopterus electricus) for medical purposes. Another fish referred to as Torpedo marmorata (torpedo ray or electric ray) has also been used for similar applications; it emits 40 to 50 V with a frequency of 200 to 1000 Hz and an impulse train of 100 to several thousand. In 46 AD, piscine electrotherapy was developed by Scribonius Largus specifically for the relief of pain. In the middle Ages, Redi, Perault, Richer, Borrelli, and Lorenzini also noted numbness with the use of torpedo fish.

**Electric Device:*** As the electricity was associated with anesthesia, other attempts were made to apply it to use. In 17th century Von Guerich constructed an electrostatic generator. Kleist and Musschen brook of Leyden developed a method of storing a charge in a vessel – The Leyden Jar. In 1744, Kratzenstein used electricity in medicine. In 1759, electricity was used to relieve pain for sciatica, hysteria, headache, kidney stone, gout, cold feet, pleuritic pain, and angina pectoris. An important contribution of Benjamin Franklin was development of theory and terminology of positive and negative charge and idea of balance charge. These devices which stored electricity were bulky and impractical for use.

**Battery Powered Machines:** Later electric batteries replaced the electrostatic generators and Leyden jar. They helped in creating smaller devices for the above purpose. In 1800s, acupuncture the Chinese method of therapy was used by Jean Baptiste Sarlandiere and Fabre-Palaprat along with the application of current to the body. And this became accepted as “electropuncture”.

**Gate-Control Theory:** With the proposal of the Gate Control Theory by Melzack and Wall in 1965, a rational basis for electroanalgesia was elucidated. The large fibers were more sensitive towards the electric current and were the ones responsible to present pain. In 1967, Wall and Sweet further stated that electrical stimulation could block pain. The chronic pain was managed by partial cordotomy, but this was major surgery and had high risk of failure. This had the advantage of pain relief without side effects of chordotomy and also had control over the amount of current needed. TENS was born when Shealy attempted to demonstrate the feel of stimulations to the candidates and now is being regularly used for trigeminal neuralgias \[1,7,5\].

**How Does it Work??**

It is a therapy that uses low voltage electrical current for dental pain relief. The exact mechanism has not fully been discovered. But studies reveal that it does reduce pain. It may be because the electrical impulses scramble all the pain signals that are sent to the brain by the nerves. Or yet another theory states that, the way these electric signals interact with the nerves will help the body to produce endorphins- body’s natural pain killer. That is either it blocks pain impulses peripherally or excites the pathway to brain for activity of endogenous analgesic system like opiate like peptides (enkephalin and endorphins). The two important leaps were, the patients were relieved off their pain without the side effects of chordotomy. The amount of current required control pain could be kept under control. This entire process works on the basis of the widely known Ohm’s law \[1,2\].

TENS delivers a low-frequency electrical stimulus (via electrodes) to an area of the body in which swelling (edema) has occurred (e.g., the knee). The electrical stimulation produces skeletal muscle contraction, causing a pumping of the fluid out of the area. This helps to speed recovery from injury. With electrodes applied intraorally and the current delivered at a higher frequency, pain control was achieved \[4\].

**The Components:** When a conducting path is provided between two points of different electrical potential, a current passes from one point to the other. This flow will depend on Ohm's law \(A = V/f\) which states that the current intensity in a circuit \(A\) is directly proportional to the force across the circuit \(V\) and inversely proportional to the resistance of the circuit \(f\). The components include the **Body Circuitry** where in the body poses a combination of series and parallel circuits. With a TENS unit, the electrode delivers the current to the skin or mucosa. While using dental electro analgesia, it is very important to realize that each tissue has a different resistance to electric stimulation. The **Wave forms** used are...
1. A balanced, symmetrical, biphasic, exponentially decaying wave form

2. A balanced asymmetric square wave form

3. A 16,000 Hz semi-square wave form.

The range of Frequency can be used to demonstrate the signals. Depending on the frequency, the stimulation provides distraction from the dental procedure and stimulates the placebo response as well as the release of various endogenous opioids and autacoids.

Equipment

Controls: The machine comes with a variety of controls. Most machines come with 2 complete circuits or channels, each with amplitude and frequency controls.

Electrodes: The ease of placement of electrodes and the ease of working around them is an important factor in determining whether a practitioner will stay with this technique long enough to produce a clinical success. Intra oral electrodes come in 3 forms

- Sponges
- A conductive fabric
- Adhesive material.

Probes for LA: Some machines have a hand held probe that can be used in place of LA. All types of injections can be done pain free, if a careful slow injection technique is used and electrodes are placed within a few millimeters of where the needle will be inserted.

Technique: The process involves placement of 2 small sponges inside the patient’s mouth or on the face. These are attached to a control box that the patient uses to select the depth of the anesthesia. The whole unit is powered by battery. After turning the machine on, the sensation felt would be a pulsating itch, also described as a mild tingle or twitch. It takes about 2 minutes once the machine is turned on.

The advantages of TENS include a needle free approach without shot, no injection and a quick, numb-free recovery period, without any slurry speech associated. There can be control over the amount of anesthesia administered and also lesser risk of allergies. Being non-invasive it can be used to achieve anaesthesia in needle-phobic patients. Patients may also be able to self-administer TENS treatment and learn to titrate dosages accordingly to manage their painful condition. This results in positive acceptance by the patients.

It is to be avoided in patients with Cardiac pace makers as the Pace makers get triggered by a 2Hz TENS signal and give heart rate of 130 beats per min stimulating cardiac plexus and carotid body can cause severe hypotension that can lead to cardiac arrest. It is contraindicated in pregnant women. It can cause possible damage to eyes. Transthoracic and transabdominal electrodes (seldom used in dentistry, but when used), can cause dysrhythmias. TENS devices have shown to increase the blood flow in the extremities. Therefore, can lead to aneurysm, stroke and transient ischemic patients should not receive TENS. Pulsing of TENS could also trigger an epileptic event. It is contraindicated in any pain of unknown etiology, as it can mask the warning signs of a serious underlying disorder. [7]

Application of TENS

Analgesic effects of TENS: Relief of acute pain like Postoperative pain, Labour pain, Dysmenorrheal pain, Musculoskeletal pain, Bone fractures, Dental procedures.

Relief of chronic pain like Low back, Arthritis, Stump and phantom, Postherpetic neuralgia, Trigeminal neuralgia, Causalgia, Peripheral nerve injuries, Angina pectoris, Facial pain, Metastatic bone pain.

Non-analgesic effects of TENS like Antiemetic effects and healing aid: Postoperative nausea associated with opioid medication

Nausea associated with chemotherapy or Morning sickness or Motion/travel sickness

Improving blood flow; Reduction in ischaemia due to reconstructive surgery

Reduction of symptoms associated with Raynaud’s disease and diabetic neuropathy

Improved healing of wounds and ulcers

Indications in Dentistry [1,2,3,8,9,10,11,12]: The application of TENS in dentistry is wide. Starting from extractions, endodontics, acute pulpitis in which LA and nitrous oxygen sedation have not given adequate pain control, they have had some success using TENS.

In Pedodontics TENS has shown satisfactory success rate on patients as young as 3 years old. In
Myofunctional pain dysfunction, if pain is muscular in origin or is inflammation of the joint, there is a good success rate, as high as, 80% in some cases. In Periodontal treatment routine procedures like scaling, root planning, curettage, pocket probing can be done with a minimum of discomfort using TENS. In Operative dentistry TENS works best with teeth anterior to molars. It enables multiple quadrants to be worked on at a time. Electric stimulation hastens the regeneration of damaged tissues as in case of Trigeminal neuralgia. It has been found to be an effective, easy to use therapy with minimal side effects in patients suffering from trigeminal neuralgia not responding to conventional treatment. Low frequency TENS used in treating TMJ pain by contracting and relaxing muscles in a precise sequence and at a scientifically determined rate so they are able to eliminate toxins and muscle tension— as an electric-stimulated self-massage. In addition to relaxing the muscles TENS stimulates the release of endorphins, hormones that can block pain and improve mood. Application of TENS increases the salivary flow rate in healthy individuals as well as in xerostomic patients. Hargitai et al in 2005 found increased salivary flow in two-thirds of healthy adult subjects after application of TENS on the skin overlying the parotid glands. Their results also suggested that for TENS to be effective, baseline saliva flow should be present.

Certain other useful applications of TENS have been: an excellent analgesia during various procedures like rubber dam placement, cavity preparation, pulp capping and other endodontic procedures, prosthetic tooth preparations, oral prophylaxis as well as extractions. It is also used to reduce the discomfort from injection of local anaesthesia and to alleviate periodontal pain associated with orthodontic separation.

**Discussion**

TENS or the EDA has found multiple applications in dentistry. It may not be better than the local anaesthesia but has been found comparable [8]. Various studies have suggested its use for anaesthesia been preferred more by the patients who would prefer to prevent needles and also the benefits of immediate recovery. A pilot study using Ultracalm Electronic dental anesthetic unit was conducted on a small group and suggested 14 out of 20 subjects preferred EDA and found it to be a more comfortable approach for dental procedures. [8] The studies on pediatric patients suggest the same [8,9,13,14].

**Vibrajet**: It is a small battery operated attachment that snaps onto the standard dental syringe. It delivers a high frequency vibration to the needle that is strong enough for patient to feel.

**Dental Vibe**: Another system that uses vibration diversion based on the pain gate theory. It is a cordless, rechargeable, hand held device that delivers soothing, pulsed, percussive micro oscillations to the site where an injection is being administered.

**Accupal**: It is a cordless device that uses both vibration and pressure to pre-condition the oral mucosa. It provides pressure and vibrates the injection site, at 360 degrees proximal to the needle penetration, which shuts the “pain gate” according to the manufacturer. Another anesthesia delivery system which is a must to mention is CCLAD- i.e. computer-controlled local anesthetic delivery vehicles to regulate the delivery and rate of flow of local anesthetics at the injection site, lessening potential discomfort associated with injections. Here the undesired extraoral soft tissue anesthesia can also be prevented.

It incorporates the composites of the computer technology to control the rate of flow of the anesthetic solution through the needle. It has techniques like A-MSA, P-ASA, STA. These are two types.

I. Wand/compudent system - This system enables the operator to accurately manipulate the needle placement with fingertip accuracy and deliver the LA with a foot activated control

II. Comfort control syringe -It differs from compudent system in that there is no foot pedal

**Conclusion**

TENS is considered any time better in eliminating the fear of pain due to dental injection and has the advantage of being non-invasive and safe to handle. The equipment that exists is a viable, preferred alternative to local anesthesia in many operative and periodontal procedures.

It can’t altogether replace but is a good alternative to LA in some situations. It provides with multiple benefits if patient selection is well done and safely handled.
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**REFERENCES**


Laboratory Remounting of Complete Denture: A Systematic Review

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ABSTRACT

Statement of Problem: Simpler methods have been tried to correct processing errors in the fabrication of complete denture but the importance of inclusion of laboratory remounting procedure is uncertain.

Purpose: The purpose of the systematic review was to assess the relevance of laboratory remounting procedure on the complete denture.

Materials and Method: One electronic database (PubMed) was searched through in July 2019. The terms “laboratory remounting” AND “occlusion” were chosen. The titles and abstracts were screened and the studies which performed laboratory remount were selected.

Results: After duplicate removal, the database search showed 10 studies. Out of which 5 were retrieved for full-text assessment. 5 randomized control clinical studies were included and 1 review study.

Conclusion: A laboratory procedure is advised to reduce occlusal disharmony and provide comfort to patients and reducing recall appointments.

Keywords: Remounting, Occlusion, Selective grinding, Dentures

Introduction

Complete dentures are prosthetic replacements for missing teeth and surrounding structures which are made to restore the missing functions and aesthetics. Properly constructed dentures offer tissue comfort, good function, and aesthetics, harmoniously to the patient. Correct occlusion provides comfort, functional movements of the mandible while maintaining the muscular tonicity. Errors in any one procedure of denture processing disrupt the entire occlusion in the denture.

The failure to achieve proper occlusion of teeth in complete denture happens due to many reasons including improper jaw relation, improper posterior teeth placement, incorrect curing method and changes due to polymerization shrinkage and water sorption. When the occlusal adjustments are not corrected, it causes discomfort, unfavorable jaw movements and ultimately loss of alveolar bone. The bone undergoes often remodeling to relieve the soft tissues from the pressure of occlusal disharmony and ultimately resorption. These errors occurring in the processing of the denture can be timely corrected by laboratory remounting.

Laboratory remounting is the repositioning of the polymerized denture on the articulator and correcting the occlusion through the process of selective grinding (reducing the high contacts while maintaining the proper form of the tooth) in the centric and eccentric occlusion to assist any changes occurred after the processing of denture and deflasking using split cast mounting technique¹.

Often, both the laboratory and clinical remounting procedures have been taught to the students in dental
schools but these procedures are not followed in the daily clinical situation. Reasons for lack of remounting procedure implementation could be either due to the investment of extra time and manwork or ill-belief that denture will “settle in” within some time or dentists being unaware of the errors encountered while implementing remount procedure.

Our aim is to inculcate laboratory remount procedure into the routine fabrication procedures of complete denture which is often skipped during the fabrication process.

Method

The Preferred Reporting Items for Systemic Review (PRISMA) protocol was followed as much as possible. Numerous online databases were searched systematically to find trials of laboratory remounting of complete denture prosthesis. The search method included the use of keywords and Medical Subject Headings (MeSH) using the terms “laboratory remounting” AND “occlusion” in PubMed during 1st-2nd July of 2019. An evaluation of the search results was done in the first selection process. The abstracts of potentially relevant studies were checked and finally, some articles which included authors, objectives, treatment groups, follow-up, outcomes, and significant results were selected.

Results

The online databases search resulted in a total of 10 studies. After the titles were reviewed in the first selection criteria, 5 potentially relevant articles studies remained. Out of which, 4 studies were included for which the titles appeared relevant and 6 were excluded and the reasons were the inclusion of clinical remounting procedure, remount procedure being used in removable partial denture and survey studies. The online database search was followed by a manual search through the references of the included studies, one review articles were selected through the process. The 4 studies were a randomized controlled trial.

Discussion

Qualitative lab procedures were found to show minimal occlusal changes but could not completely remove the occlusal disharmony. In 1972, a survey of British practitioners and dental students rarely used the remounting procedure in their clinical practice, only 6.5% of them used the remounting procedures to correct the occlusal discrepancy. On the contrary, Levin conducted a survey within US and Canadian dental school, where they taught the students the use of laboratory remounting procedure, clinical remounting and the use of disclosing paste to check the pressure development in the underlying soft tissues.

In 2008, Shigli did a study to find whether the correction in occlusion was in co-relation with patient comfort and the number of visits after insertion. He found laboratory remounting with clinical remounting and selective grinding improved patient comfort level compared with the patient who didn’t receive either or both of the remounting procedure. The control group, received both laboratory and clinical remount procedures along with occlusal corrections; Group LRO subjects received only laboratory remount with occlusal corrections; and Group OOC subjects underwent routine procedures in complete denture construction without remount corrections and only occlusal corrections where required, intraorally. A pilot study was conducted to identify the feasibility of a close-ended questionnaire designed by the investigator and containing 5 questions regarding the comfort, pain, masticatory ability, swallowing, and occlusal contacts of maxillary and mandibular complete dentures. The evaluation was performed following the subject’s use of the dentures for 7 days. All 30 subjects were examined for tissue irritation at this time. The evaluation was conducted by a single examiner who was unaware of the groups to which the subjects belonged. An analysis of statistical difference between the treatment groups for the number.
of postinsertion visits, comfort, pain during mastication, swallowing, and areas of tissue irritation during use of complete dentures was assessed using the chi-square test and Kruskal-Wallis test (alpha = .05).

It is seen that denture base changes in contour when kept stored in water due to water sorption phenomenon. Campbell summarized that denture retention increases due to water sorption property. Skinner and Cooper expressed water sorption compensate the shrinkage occurring the acrylic resin base. On the contrary, Woelfel and Paffenbarger said that linear changes which show up after processing are greater than its rehabilitation. McCartney demonstrated that there is 25% of the average midpalatal base distortion is seen when the resin is boiled in the curing cycle. Also, 50% of the occlusion disharmony is seen dentures with short-cure processing. Complete definitive polishing of the occlusal surfaces is avoided at this step because the dentist usually remounts the denture at the time of insertion.

If in case, the laboratory remount procedure is skipped or missed, it can be corrected through clinical remount and selective grinding. But laboratory remount always remains the foremost option. The occlusion disharmony created by processing is usually corrected by remounting the master cast with the denture base in place, without removing it and equalize the occlusion on the articulator.

Conclusion

The choice is not whether to remount but when to remount the denture.

Any complex procedure requires patience and practice to get the desired results. Remounting of dentures is one of such similar case, where the inclusion of this step saves up a lot of chairside time and provides comfort to the patient by providing short time period appointment and denture with occlusal harmony.

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REFERENCE

Management of Flabby and Compressible Ridge in Maxilla Using Double Tray Impression Technique—A Case Report

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ABSTRACT

Construction of complete dentures and its performance in function depend on accurate impression of the denture bearing and limiting areas. Complete denture fabrication in clinically compromised situations such as flabby ridges is a challenging task for the clinician. In this case report, a newer technique was proposed of impression making of the flabby ridge using a double tray to ensure an accurate and easy impression of these tissues.

Keywords: Flabby Ridges, Double Impression Technique, SpecialImpression, Compressible Tissue

Introduction

Flabby ridge is predominantly seen in the upper anterior region and is commonly associated with features of combination syndrome, as mentioned by Kelly¹. However in this case in addition to anterior flabbyridge, posterior compressible tissues are seen in slopes of hard palate. Flabby ridge can be defined as a mobile soft tissue which is located on the superficial aspect of the alveolar ridge². In the presence of displaceable ridge, fabrication of a stable denture becomes an arduous challenge. Flabby ridges get easily displaced under occlusal forces owing to poor support, resulting in compromised denture retention as a consequence of loss of peripheral seal². According to MacEntee, support for the complete dentures is significantly compromised if the flabby ridge has more than 2 mm displacement under pressure³,⁴. Retention, support and stability of complete dentures is compromised by flabby ridges unless the tissue is appropriately managed and manipulated by special impression techniques. Multiple techniques for the management of flabby ridges have been proposed ⁵.

In another study by Osborne, two different impression materials using two separate custom trays were utilized⁶ typically these “flabby ridges” are composed of mucosal hyperplasia and loosely arranged fibrous connective as well as more dense collagenised connective tissues. In the soft tissue, varying amounts of metaplastic cartilage and/or bone have been reported.

Management of a flabby ridge is mainly by three approaches:

1. surgical removal of fibrous tissue prior to conventional prosthodontics,
2. implant retained prosthesis
   i. fixed,
   ii. removable,
3. conventional prosthodontics without surgical intervention ⁸,⁹

A poor ridge is better than no ridge, which could be a sequel to surgical excision of the flabby tissues. The objective of complete denture prosthodontics is restoring aesthetics, comfort and function by replacement of missing dental and alveolar structures using a stable prosthesis. Preferably, the residual ridge is overlaid with 1.5–2 mm thickness of the masticatory mucosa for adequate soft tissue support for the denture ¹⁰. This case report presents a modified double tray impression technique for flabby ridges.

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**Case Report:** A 67 year old female patient reported to the department of prosthodontics and crown and bridge, sree balaji dental college and hospital, with a chief complain of ill-fitting maxillary complete denture for the past 7 months. The patient reported that she had recently been provided with a maxillary complete denture, which she described as ‘loose’. On intra-oral examination, an edentulous maxillary arch with displaceable anterior flabby ridge and highly compressible tissue in the posterior region was observed. (Fig.1) Following discussion with the patient regarding the available treatment options, it was planned to provide the patient with a new conventional complete denture by special impression using a dual tray technique.

1. A primary impression was made of both the maxillary and the mandible edentulous arches using irreversible hydrocolloid impression material Alginate (Zelgan, DENTSPLY) using edentulous stock trays. so that the tissues can be recorded with minimum distortion.

2. A maxillary cast was poured and the flabby ridge area was marked, (Dental plaster, Type II) followed by fabrication of custom tray spaced (3 mm), first tray using auto polymerizing resin with (DPI RR cold cure resin) A special try is fabricated over the wax spacer and locating resin lock is located in the centre of palate during fabrication (Fig. 2). This helped to accurately locate the second part of special tray using a stop, thereby allowing for a pre-planned even thickness of impression material.

3. The tray was tried in the patient mouth and the flanges were adjusted to be 2 mm shorter than the depth of sulcus using a slow-speed motor and carbide acrylic-trimming bur. (Fig.3)

4. Special tray along with double spacer wax over flabby area. (Fig.4) A pick up tray is fabricated after applying petroleum jelly to all the surfaces, covering the first part of the special tray fabricated out using light cure polymerizing resin (Delta Poly Tray). (Fig.5)

5. Multiple holes are made in the pickup tray in the flabby area. Light body elastomeric impression materials [PVS (Aquasil, DENTSPLY)] is placed on the area covering flabby ridges and medium body/mono phase elastomeric impression material medium body [PVS(Aquasil DENTSPLY)] is placed in rest of the hard palate and master impression are made. (Fig.6)

6. The impression was evaluated carefully for defects and any excess material on the periphery was removed. (Fig.6)

![Fig. 1: Intra Oral View](image1)

![Fig. 2: Primary Cast](image2)

![Fig. 3: Fabrication of special tray using auto polymerizing resin Special tray with the locating lock region](image3)

![Fig. 4: Fabrication of special tray using light cure resin 3 mm wax spacer over the flabby with spacer](image4)
Flabby ridges provide poor support for the denture, and it could be argued that the tissue should be removed surgically to improve the stability of the denture and to minimize alveolar ridge resorption. However, in a situation with extreme atrophy of the maxillary alveolar ridge, flabby ridges should not be totally removed because the vestibular area would be eliminated. Indeed the resilient ridge may provide some retention for the denture. To overcome this a prosthetic approach of modification in recording such extremely resilient alveolar ridge is a conservative approach.

A particular problem is encountered if a flabby ridges are present within an otherwise ‘normal denture’ bearing area in denture, if the flabby tissue is compressed during impression making. Clearly, an impression technique required which will compress non flabby tissue to obtain support and at the same time, will not displace the flabby tissue.

Various techniques have been recommended and there is controversy as to whether a mucocompressive technique which compresses the mobile tissue aiming to achieve maximum support from it or whether a mucostatic technique with the aim of achieving maximum retention should be employed. Flabby ridges when recorded using a conventional method are compressed during impression. The elastic recoil of flabby fibrous soft tissue during function results in instability and loss of denture retention and dislodgement.

Several impression techniques and methods have been described in the literature for recording flabby tissue during impression making. However, there is no evidence to support that one particular impression technique will provide a stable and retentive denture on flabby ridges as compared to others. Managing a patient with flabby maxillary ridge can be a challenging problem. Standard mucocompressive impression techniques are likely to result in an unretentive and unstable denture as the denture will be constructed on a model of the flabby tissue in a distorted state.

In the conventional prosthodontics approaches, managing a patient having a flabby maxillary ridge with standard mucocompressive impression techniques is likely to be terminated in an unretentive and unstable complete denture. The use of selective pressure or minimally displacing impression technique should facilitate overcoming some of these limitations. An abused oral tissue due to ill-fitting dentures is another clinical condition commonly encountered by the prosthodontist. This case report details with modified double tray impression technique by fabricating a special tray in order to control the pressure during impression making thereby providing better retention and stability to the denture.

**Conclusion**

Fibrous or flabby ridges in complete denture fabrication are a challenge to deal with. But with modified impression making techniques one can overcome this problem and prevent it from hindering in the success of denture fabrication, thereby providing adequate retention, stability, support and patient satisfaction with the functioning of the denture.

**Ethical Clearance:** Not required since it is a case report

**Source of Funding:** Nil

**Conflict of Interest:** Nil
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Tooth Supported Over Denture—A Case Report

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ABSTRACT
Prosthodontic rehabilitation of a patient with few teeth remaining is always challenging for a dentist. Overdenture is a complete or partial denture prosthesis supported partly by soft tissues and partly retained by natural teeth and is a viable option when compared with conventional complete denture. The concept of conventional tooth-retained overdentures is a simple and cost effective treatment than the implant overdentures. When few firm teeth are present in compromised dentition, they can be retained and used as abutments for overdenture fabrication. This helps to improve the retention and stability of the final prosthesis significantly. The following case report discusses the use of resilient stud attachments to retain maxillary and mandibular overdentures.

Keywords: Hybrid dentures, overdentures, precision attachment, Tooth supported overdenture

Introduction
Complete dentures using one or more modified natural teeth for stability, support and retention. The diagnosis, treatment plan and clinical procedures for this type of denture involve knowledge and skill in several areas in dentistry. A tooth supported complete denture/overdenture is a dental prosthesis that replaces the lost or missing natural dentition and associated structures of the maxilla and mandible and receives partial support and stability from one or more modified natural teeth. The overdenture accomplishes three tremendously important goals, first is it maintains teeth as part of the residual ridge, second is decrease in rate of resorption, third is increase in the patient’s manipulative skills in handling the denture. A study by Crum and Rooney compares bone loss between patients with conventional dentures and patients with overlay dentures. By retaining the mandibular canines in the use of overdenture, the resorption of the alveolar bone surrounding these teeth was reduced by eight times. Retention and stability of overdentures can be improved by attachments or magnets. Attachments for overdentures are classified as studs, bars, magnets, telescopic which can be rigid or resilient. Stud attachments (Rhein 83 srl, Bologna, Italy) consist of matrix (a sphere with a flat head) available in preformed plastic patterns which cast to copings on abutments and patrix (Elastic rubbers) made of nylon and Teflon available in different colours corresponding to different retention degrees, both in normal and micro sizes.

Case Report: A 69 Year old female patient reported to the department of prosthodontics crown and bridge, with a chief complaint of missing teeth in upper and lower front and back region. Past history revealed extraction of maxillary and mandibular teeth except 13, 23, 33, 43 and 44 due to periodontal disease. Extraoral examination showed no abnormalities, and acceptable esthetic profile. Intraoral examination showed high and well-rounded completely edentulous maxillary and mandibular ridge. After clinical and radiographic examination, the diagnostic casts were studied which showed sufficient interocclusal space to accommodate the stud attachments. Treatment plan included extraction of teeth with poor prognosis, endodontic treatment for the retained teeth followed by fabrication of attachment of retained overdentures. 13, 23, 33, 43, 44 were treated endodontically. After abutment preparation, Abutment...
teeth were prepared for short copings followed by preparation of post space preparation were made with addition silicone (Zhermack, elite HD+). Copings were checked for the fit and pick-up impressions were made with an addition silicone (Zhermack, elite HD+) and light body (Zhermack, elite HD+). Wax patterns were prepared for metal denture bases and casted in cobalt chromium with prefabricated housings for patrix in the region of abutments. Primary impression was made with irreversible hydrocolloid impression material. Impressions were poured and special trays were fabricated with self-cure acrylic resin. Border moulding was done for both the arches with low fusing compound (DPI Pinnacle tracing sticks). Final impression was made with regular body elastomeric impression material (Aquasil Ultra, Dentsply Sirona). Master casts were prepared and occlusal blocks were fabricated. Maxillomandibular relations recorded and transferred to semi-adjustable articulator with the help of face-bow. Teeth settings was done and try in was made in patient’s mouth for phonetics, vertical and centric relation and finally esthetics. Vertical dimension was verified and centric and eccentric contacts were checked. Abutment teeth were cemented with the copings and dentures were delivered. Post insertion instructions were given and patient was recalled after 1 week, 1, 3, 6 and 12 months interval to evaluate the abutments.
When a patient presents with few remaining teeth, not ideally located to support fixed partial denture or removable partial denture, attachment retained overdenture could be a better option. Other options of treatment could be magnetic retained overdentures or Telescopic overdenture or implant supported overdenture. Bar attachments compared to stud attachments require more amount of interocclusal space, unaesthetic due to the bulkier denture base and anterior teeth arrangement will be difficult. Various Stud attachments are available which are selected based on vertical space available, crown/root ratio, type of coping, number of teeth support, amount and quality of bone support, location of abutments, type of opposing dentition, angulation of the root to the occlusal plane. Rheins stud attachments were used in this case due to their simplicity in design, ease in maintenance and minimum leverage. Resilient attachments permit vertical movement during mastication reducing stress transfer to the abutments (stress breaking function) and direct the forces to the residual ridge acting as stress redirectors. Precision attachments provide enhanced retention for the prosthesis. They may be rigid or resilient. Resilient attachments with built-in stress-breaking action compensate for the multidirectional loading forces acting on the overdenture prosthesis. Stud attachments are one of the oldest attachment systems in use.

They can be divided into two groups:

- Extraradicular, in which male component projects from the implant
- Intraradicular, in which the male component is a part of denture base.

Ball attachment, Locaters, O-ring attachments, Extracoronal Resilient Attachment (ERA) attachments are the most commonly used in implant supported overdenture. ERA attachments are rigid attachments and are best suitable for parallel implants. Ball attachments are considered as the simplest type of attachments for clinical application with implant-supported overdentures. But, the main drawback of this system is that the O-rings gradually loose retention, and must be replaced periodically.

Robert J. Krum conducted a study to determine the amount of vertical residual bone loss in the anterior part of the maxillae and mandible in two groups of patients: One with complete maxillary dentures and mandibular overdentures and the other group with complete maxillary and mandibular conventional dentures. It was concluded that patients treated with complete maxillary dentures and mandibular overdentures demonstrated less vertical alveolar bone reduction than patients with complete maxillary and mandibular conventional dentures. The metal denture is less subject to breakage, denture supporting tissues respond more favourably to metal base which may be related to greater ease in maintaining cleanliness of metal base and to effective transmission of thermal changes through the metal base. Patient was satisfied with the dentures at follow-up.

**Conclusion**

A comprehensive evaluation, multi-disciplinary approach and a sequential treatment plan are important for a long-term successful outcome. To provide a successful treatment, the clinician should have a thorough knowledge of various attachments available, their
use in various clinical situations, their advantages and disadvantages. The patient’s physiological dimension is maintained through the preservation of teeth and bone. Tooth supported complete dentures are a valid approach to preventive prosthodontics10.

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**Conflict of Interest:** Nil

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Correction of Class II Skeletal Malocclusion with an Infra-Zygomatic Crest Bone Screw Approach

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ABSTRACT

Introduction: This case report describes the treatment of a Class II skeletal malocclusion with a prognathic maxilla and retrognathic mandible with severely proclined maxillary incisors and lingually blocked mandibular right lateral incisor with entire maxillary arch distalization and use of infra-zygomatic crest bone screws devoid of extraction of premolars.

Method: Treatment involved strap-up of a pre-adjusted edgewise appliance, MBT technique (0.022 X 0.028 - inch slot). A non-extraction approach was recommended despite the case warranted premolar extractions. Infra-zygomatic bone screws of length 14mm and diameter 2mm was used for the distalization of the entire maxillary arch. The case was assessed at start of orthodontic treatment (T1) and end of orthodontic treatment (T2).

Results: At T2, the severe pre-maxillary prognathism and mandibular anterior crowding with lingually locked right lateral incisor was corrected with the canines and molars finished in Class I relationship. Normal overbite and overjet with a pleasing soft tissue profile was satisfactorily achieved.

Conclusion: Infra-zygomatic bone screws can be effectively used as absolute skeletal anchorage to correct Class II skeletal discrepancy with maxillary prognathism and severe proclination of maxillary incisors devoid of premolar extractions.

Keywords: infra-zygomatic bone screw, skeletal Class II discrepancy, maxillary arch distalization, skeletal anchorage

Introduction

Treatment of Class II skeletal discrepancy patients pose a challenge to the orthodontists. However, this has become a thing of the past with the advent of Temporary Anchorage Devices (TADs) used as skeletal anchorage.

Mini-implants are placed in many anatomic sites with the popular implant sites being the buccal cortical plate in the maxilla and mandible, palate, retromolar area in the mandible and lingual aspect of the maxillary alveolar process. The advent of orthodontic bone screws has widened the horizon of orthodontic treatment wherein borderline surgical cases and extraction cases can now be treated non-surgically and with a non

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extraction approach. Entire maxillary arch retraction is now possible with the use of infra-zygomatic bone screws in contrast to routine inter-radicular TADs which are not very effective as they lie in the path of tooth movement and would have to be repositioned quite often.

The infra-zygomatic crest (IZC), a common site for insertion of Temporary Anchorage Devices (TADs), is a crest of bone originating intraorally from the buccal plate of the alveolar process connecting to the zygoma, lateral to the roots of the first and second maxillary molars. The inferior portion of it is subdivided into the IZC 6 and IZC 7 areas, respectively, whereas superiorly it extends 2cm or more upto the zygomatic-maxillary suture. Uribe6 and Melsen7 preferred the intraoral anatomical ridge of IZC for routine placement of TADs.

Mandibular buccal shelf (MBS) located bilaterally in the posterior part of the mandibular body, anterior to the oblique line of the mandibular ramus and buccal to the roots of the first and second molars has also been proposed as a suitable extra-alveolar mini-screw insertion site to help retract the mandibular dentition distally.8

This case report highlights the treatment of an adolescent male patient with a skeletal Class II discrepancy with severe prognathism of the pre-maxillary segment and severe proclination of maxillary anteriors, treated effectively with the judicious use of infra-zygomatic bone screws.

**Diagnosis and Etiology:** A 13-year-old male presented with severe forward placement of the maxillary incisors and severely crowded mandibular incisors with a lingually locked mandibular right lateral incisor.

**Clinical assessment (Fig. 1)**

**Extraoral assessment:** The patient had a brachycephalic head with an euryprosopic face, convex profile, posterior divergence, incompetent lips, deep mentolabial sulcus, acute nasolabial angle, clinical low mandibular plane angle with no signs of temporomandibular joint dysfunction.

**Intraoral assessment:** Oral hygiene was satisfactory. The maxillary arch was V-shaped with severely proclined maxillary central incisors. The mandibular arch was U-shaped with severe crowding of mandibular incisors with 42 lingually locked. Increased deep bite with
occlusal trauma to the palatal rugae area was another evident finding. The mandibular dental midline was shifted to the right due to the lingually blocked 42. On both sides, the molar relation and canine relation was end-on and in occlusion increased overjet and deep bite was observed.

Radiographic assessment (Fig. 2).

The pre-treatment panoramic radiograph confirmed the presence of all permanent teeth with normal alveolar bone crest levels. Analysis of the pre-treatment lateral cephalometric radiograph revealed a Class II skeletal pattern, with a prognathic maxilla and retrognathic mandible, with a low mandibular plane angle and severely proclined maxillary incisors and moderately proclined mandibular incisors.

Treatment objectives: The main treatment objectives were to improve soft tissue profile, smile aesthetics and the existent lip incompetency. Since the premaxillary prognathism was starkly evident rather than the retrognathism of the mandible, greater emphasis was laid for the correction of the former in conjunction with correction of severe maxillary anterior proclination and lingually locked mandibular right lateral incisor. Despite Careys’ analysis and Upper arch analysis forebode a severe tooth-size archform discrepancy necessitating extractions, a non-extraction decision was taken to treat the case. Infra-zygomatic bone screws were recommended for entire maxillary arch distalization.

Treatment alternatives: Orthopedic treatment with a functional appliance and headgear could have been advocated as a first phase of treatment for the Class II skeletal discrepancy with a prognathic maxilla and retrognathic mandible. However, we chose to correct the severe maxillary and mandibular dento-alveolar problem with a non-extraction approach initially and then subsequent to complete alignment of the maxillary anterior teeth we chose to distalize the entire maxillary segment back. As the patient was still in the circumpubertal growth spurt as evidenced by the assessment of the cervical vertebral maturational stages on the lateral cephalogram, we surmised that normal growth would take care of the retrognathism of the mandible in the remaining years of the patients’ available pubertal growth spurt. To distalize the entire maxillary segment back extra-radicular infra-zygomatic bone screws were advocated.

Treatment progress: Preadjusted edgewise brackets (MBT prescription, 0.022 x 0.028-inch slot) (3M Unitek, Monrovia, CA, USA) were bonded. Aligning and levelling was done with 0.014-inch Nickel Titanium (NiTi) archwires (aw), followed sequentially with 0.016-inch NiTi, 0.016x0.022-inch NiTi, 0.016x0.022 stainless steel (SS), & 0.017x0.025-inch SS aw. Infrazygomatic bone screws (Bioray, Orthosystems,
Mumbai, India) of length 14mm and diameter 2mm were placed in Infra-zygomatic Crest of the maxillary second molar region (IZC 7) bilaterally and the entire maxillary arch was distalized using a power chain from the IZC bone screws to the crimpable hook crimped onto the 0.017x0.025-inch SS aw with a force magnitude of 300-350g. To ensure effective distalization, extraction of the maxillary third molars bilaterally was advised.

An additional MBT bracket was also placed on the lingual aspect of the lingually blocked mandibular right lateral incisor and a 0.014-inchNiTi aw was passed lingually through that bracket to help move the tooth into the mandibular arch after creation of space with an open coil spring on a plain 0.018-inch SS aw, followed sequentially by the same sequence of wires as mentioned above. The case was eventually finished with 0.019 x 0.025-inch SS aw.

Results

The patient showed remarkable improvement in the correction of the prognathism of the premaxillary segment and severe proclination of the maxillary anteriors by the combined use of IZC bone screws and fixed appliance therapy. The lingually locked 42 was aligned and levelled with a non-extraction approach too with the fixed appliance therapy. A Class I canine and molar relation with normal overbite and overjet with a pleasing soft tissue profile was achieved at the end of treatment.

Discussion

The key factor for successful mini-screw placement is primary stability. Many authors have reported the versatility of the buccal cortical plate of maxilla and mandible as effective placement sites. The important factors for placement in the buccal cortex of the maxillary and mandibular cortex are, sinus morphology, nerve location, buccolingual bone depth, inter-radicular distance, and soft tissue anatomy.

Borderline surgical and extraction cases can now be effectively treated non-surgically and with a non-extraction approach thanks to the advent and judicious use of absolute anchorage produced by micro-implants and extra-radicular bone screws. The inter-radicular micro-implants and the extra-radicular infra-zygomatic and mandibular buccal shelf screws are both used for the purpose of skeletal anchorage.

In the case reported the patient showed remarkable improvement in his facial esthetics. Despite the maxillary incisors being severely labially proclined by 12mm, a non-extraction approach was decided to tip them palatally first and then move the entire maxillary dental arch distally thereby avoiding extractions of maxillary first premolars. To facilitate the distalization of the entire maxillary arch, infra-zygomatic bone screws were advocated as they were extra-radicular in nature and would not interfere with the distal movement of the maxillary teeth.

The preferred TAD site of IZC 6 is anterior to the anatomic ridge and buccal to the mesiobuccal root of maxillary first molar, whereas for IZC 7 it is distal to anatomic ridge and buccal to mesiobuccal root of maxillary second molar. The cortical bone thickness is about 1.1-1.3mm and the attached gingiva is 1.0mm in the maxillary first molar region. IZC 7 site is usually the preferred site for TADs as the alveolar bone is thicker on the buccal surface of the second molars. In contenttion with this tenet we preferred to place the IZC screw in the IZC 7 TAD site (Fig.3). The knowledge of the above was also taken into consideration in the selection of the screw length which was 14 mm in length and 2mm in diameter such that the screw threads would engage cortical bone securely and ensure primary stability. The angulation of the screw was kept at 55-70 degrees inferior to the horizontal plane as suggested by Liou to ensure maximal buccal bone engagement. To prevent soft tissue irritation, they were placed in attached gingiva with a clearance of 1.5mm from the base of the TAD platform to the soft tissue as advocated by Shih Yh et al and Chang MJ et al.

Fig. 3: Mid treatment panoramic radiograph with IZC bone screws in situ & MBT prescription 0.022x0.028-inch slot with 0.017x0.025-inch SS aw with IZC bone screws in situ
The entire maxillary arch was observed to have been distalized by 3mm. The increased overjet of about 12mm was corrected to an ideal overjet of about 3mm and the increased maxillary incisor exposure of 7mm was also reduced to 3mm post treatment due to the retrusive and intrusive effect produced by the power chain attached to IZC. The severely crowded mandibular arch with the lingually blocked mandibular right lateral incisor was also effectively aligned and levelled without sacrificing the first premolar on the right lower quadrant. Maxillary and mandibular dental midlines were harmoniously coincident post treatment. Soft tissue harmony and balance was adequately achieved in both the frontal and profile views with a much desired consonant smile arc (Fig.4). Post treatment panoramic radiograph showed normal alveolar bone crest levels and post treatment lateral cephalometric analysis validated the results clinically achieved (Fig.5).

Fig. 4: Post treatment extraoral and intraoral

Fig. 5: Post treatment lateral cephalometric and panoramic radiograph
Fixed lingual retainers were given for both maxillary and mandibular dental arches to prevent relapse.

**Conclusion**

IZC bone screws can be a viable alternative for correction of a Class II skeletal discrepancy with a prognathic maxilla avoiding the need for premolar extractions.

**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**REFERENCES**


Skeletal Maxillary Bilateral Posterior Crossbite Correction with Decortication and Bone Autograft Augmentation

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ABSTRACT

Background: Intentional injury to the periodontium by either corticotomy, piezocision or micro-osteoperforations triggers increased alveolar bone remodelling due to the regional acceleratory phenomena leading to accelerated tooth movement. Periodontal augmentation with bone graft provides structural integrity to the periodontium minimising occurrence of tell-tale relapse. Selective decortication and bone autograft augmentation were the procedures advocated for the accelerated correction of the skeletal maxillary bilateral posterior crossbite and open bite malocclusion in the case reported.

A 18 - year-old female patient presented with a mild skeletal Class III malocclusion with increased bi-maxillary dento-alveolar protrusion, anterior open bite, forward tongue posture and imbricated and rotated mandibular incisors with maxillary bilateral posterior crossbite. A nonextraction treatment plan was recommended.

Method: A week subsequent to strapping of pre-adjusted edgewise appliance, MBT prescription (0.022 x 0.028-inch slot) and Hyrax device, full thickness mucoperiosteal flaps were reflected in the maxillary buccal regions. Decortication was done with surgical perforations and augmented with bone autograft taken from the symphyseal region of the patient. Two weeks later activation of the Hyrax device was done twice daily with the other orthodontic adjustments performed fortnightly untill completion of treatment.

Results: Rapid correction of the skeletal maxillary bilateral posterior crossbite was achieved in 2.5 months and the complete malocclusion was treated in 7 months.

Conclusion: The accelerated correction of the malocclusion could be attributed to the regional acceleratory phenomenon triggered by the intentional surgical insult effected by the decortication procedure and the stable result thus observed was attributed to the periodontal augmentation by the bone autograft.

Keywords: skeletal maxillary bilateral posterior crossbite; anterior open bite; bone autograft

Introduction

Accelerating orthodontic tooth movement with shortened treatment duration has caught the attention of adult and late adolescent patients who now desire accelerated osteogenic orthodontics with its other attendant distinct advantages like improved post treatment stability, differential and enhanced envelope of tooth movement.¹ Since osteotomy was more destructive it has been replaced by corticotomy as the preferred surgical method to accelerate tooth movement.²
Wilcko et al³ attributed the rapid orthodontic tooth movement to the demineralization-remineralization of the alveolar bone subsequent to corticotomy procedure resembling the phenomena of Regional Acceleratory Phenomenon (RAP) which in actuality is a cascade of physiologic healing events following surgical wounding of cortical bone.⁴,⁵

Selective decortication is subsequently augmented with bone graft which could either be an autograft, xenograft or alloplast. This periodontal alveolar augmentation with bone graft corrects the bone dehiscences, root fenestrations and provides volume to the thinned alveolar cortices so that the teeth could be moved into a stable environment to mitigate post treatment relapse.⁶

Hence, selective decortication of the buccal aspect of the maxillary cortical bone in conjunction with bone autograft augmentation was suggested for the correction of the malocclusion in the case reported.

**Case Report**: A female patient aged 18 years presented with anterior open bite with forward placement of maxillary and mandibular anteriors with bilateral maxillary posterior cross bite.

Clinical and radiographic assessment (Fig 1):

**Extra-oral assessment**: The patient had a mesoprosopic face, straight profile, incompetent lips, clinical high mandibular plane angle with no signs of temporomandibular joint dysfunction.

**Intra-oral assessment**: Maxillary arch was U-shaped, asymmetrical with proclined maxillary incisors. Mandibular arch was U-shaped, asymmetrical with proclined, mildly rotated and imbricated mandibular incisors.

In occlusion, increased overjet, anterior open bite and maxillary bilateral posterior cross bite was observed with coincident maxillary and mandibular dental midline with class III molar and canine relation on right and left sides with lowdown forward tongue posture.
The pre-treatment panoramic radiograph confirmed the presence of all permanent teeth with mesio-angular impaction of 48 and normal alveolar bone levels. Analysis of the pre-treatment lateral cephalometric radiograph revealed a skeletal Class III pattern with an orthognathic maxilla and prognathic mandible with a high mandibular plane angle and severely proclined maxillary and mandibular incisors. (Table 1).

Table 1: Lateral cephalometric analysis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Antero-Posterior</th>
<th>Vertical</th>
<th>Soft Tissue</th>
<th>Dental Analysis</th>
</tr>
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<tr>
<td>Standard</td>
<td>Pre Treatment</td>
<td>Post Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNA</td>
<td>82 ± 2°</td>
<td>85</td>
<td>87</td>
<td>4mm</td>
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<tr>
<td>SNB</td>
<td>80 ± 2°</td>
<td>83</td>
<td>84</td>
<td>22°</td>
</tr>
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<td>ANB</td>
<td>2 ± 2°</td>
<td>2</td>
<td>3</td>
<td>25°</td>
</tr>
<tr>
<td>SN-FH</td>
<td>7°</td>
<td>7</td>
<td>7</td>
<td>131°</td>
</tr>
<tr>
<td>Wits Appraisal</td>
<td>AO &amp; BO coincide</td>
<td>BO is ahead of AO by 5mm</td>
<td>AO &amp; BO coincide</td>
<td></td>
</tr>
<tr>
<td>Go Gn-SN</td>
<td>32 ± 2°</td>
<td>34</td>
<td>34</td>
<td></td>
</tr>
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<td>SN-OP</td>
<td>14 ± 2°</td>
<td>19</td>
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<td>LAFH</td>
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<td>72</td>
<td>70</td>
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<td>Maxillary height</td>
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<td>Mandibular height</td>
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<td>115</td>
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<tr>
<td>Overbite</td>
<td>3.2 ± 0.7mm</td>
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Aims and objectives

1. Achieve lip competence.
2. Correction of anterior open bite.
3. Correction of maxillary bilateral posterior crossbite.
4. Correction of protruded maxillary and mandibular teeth.
5. Correction of imbricated and rotated mandibular teeth.
6. Correction of class III canine and molar relation.

Corticotomy procedure with bone augmentation was advised as the anterior open bite and maxillary bilateral posterior crossbite were the pertinent clinical findings to be addressed in a short period of time. Since the patient had a straight profile, a non-extraction approach was advocated. The proclined maxillary and mandibular incisors were of less concern for the patient in comparison to that of anterior open bite. A week prior to the surgical procedure, MBT prescription Pre Adjusted Edgewise Appliance (PEA) Therapy (0.022 x 0.028-inch slot), (3M Unitek, Monrovia, CA, USA) with upper and lower 0.014-inch nickel titanium archwires was strapped up along with Hyrax device (rapid palatal
expansion device) in situ. (Fig.2). The patient underwent decortication of the buccal aspect of the maxillary alveolar bone and subsequent grafting with autograft with bone harvested from the symphyseal region.

Fig. 2: Orthodontic strap up with PEA (MBT 0.022 x0.028-inch slot) and Hyrax device

**Surgical procedure:** Autograft harvested from the symphyseal region was mixed with nova bone putty and platelet rich plasma and kept ready to be augmented subsequent to the decortication procedure. (Fig.3). Buccal sulcular incisions were done and full thickness mucoperiosteal flaps were elevated in the posterior maxillary alveolar regions on the buccal aspect. Perforations were made with surgical bur selectively on the buccal aspect of maxillary cortical bone from the regions 14 to 17 and 24 to 27 with a slight dip into the alveolar spongiosa to create the bleeding points and the freshly decorticated sites were then augmented with the prepared bone autograft and covered with a guided tissue regeneration membrane. (Fig.4). The flaps were then returned to their original position and sutured with interrupted non resorbable sutures. A periodontal dressing was subsequently given.

Amoxycillin 500mg and anti-inflammatory drugs t.i.d/week were prescribed. An antiseptic mouthwash was advised. Two weeks later the sutures were removed and the non-steroidal anti-inflammatory drugs were asked to be discontinued.

Fig. 3: Bone autograft harvested from symphyseal region.
Orthodontic Procedure: Orthodontic treatment was commenced 2 weeks after suture removal as premature suture removal can result in gingival recession, opening of interproximal embrasures and flap displacement. The Hyrax device was activated daily with 2 quarter turns with the other orthodontic adjustments done at 2 weekly intervals until completion of treatment. Initial aligning and levelling was done with upper and lower 0.014-inch nickel titanium archwires, upgraded to 0.016-inch nickel-titanium archwires and subsequently to 0.016 x 0.022-inch and then to 0.017 x 0.025 nickel titanium wires and finally finished with 0.019 x 0.025-inch stainless steel archwires.

Results

The skeletal maxillary bilateral posterior cross bite was corrected within 2.5 months with normal interdigitation of the posterior teeth in occlusion due to RAP. Correction of the anterior open bite was adequately achieved with lip competency and good soft tissue facial esthetics. (Fig.5).
Discussion

Orthodontic tooth movement occurs as a result of remodelling of bone brought about in the presence of inflammatory mediators such as TNF-alpha, IL-1, IL-8 and via induction of osteoclasts via RANK-RANKL pathway.7-10

Bone remodelling can also be speeded up by mechanical stimulation of the periodontal ligament, of which vibration and lasers show most promise effected mainly by osteoclastogenesis brought about by induction of signalling molecules such as c-fos, nitric oxide and Mitogen Activated Protein Kinase and RANK/RANKL pathway. 11

Non-surgical interventions too can accelerate orthodontic tooth movement by stimulating bone remodelling.12-15 However, in the case reported we have used the reliable surgical procedure of corticotomy. The use of alloplast and xenograft in accelerated osteogenic orthodontics has been widely reported in literature with predictable results.16-17 However, as autograft has been regarded as the gold standard in bone grafting procedures we have used the autograft harvested from the patients symphyseal region for the augmentation procedure.

The maxillary bilateral posterior crossbite was satisfactorily corrected with the maxillary posterior teeth being moved into an increased bone volume provided by the bone autograft. The alveolus as such is now considered as an operative orthopedic entity from a “whole bone perspective” irrespective of circum-maxillary sutures or periodontal ligament. Anterior open bite and rotated and imbricated mandibular incisors was also adequately corrected and a Class I canine and molar relation was achieved in about 7 months. Maxillary inter-premolar and inter-molar widths were increased dramatically post expansion with the hyrax device. There was no increase in the mandibular plane angle and anterior facial height post treatment, a finding most desirable because any increase in the same would have been disastrous for the facial esthetics of the patient who already had a mild leptoprosopic face pre-treatment. Lower lip to E-plane approached normal values post treatment. Closure of anterior open bite was also enhanced with retroclination of maxillary and mandibular incisors showing a remarkable improvement in her soft tissue profile and smile esthetics. Parallelism of the roots was well maintained. (Table 1). RAP

triggered by the corticotomy procedure created an osteopenic condition that probably led to the rapid correction of the malocclusion. Bone augmentation with an autograft increased the volume of the buccal bone which facilitated the teeth in palatal crossbite to be moved into an increased volume of bone provided by the bone autograft, a thing deemed impossible without attendant fenestrations and dehiscence of bone sans bone graft. The periodontal alveolar augmentation with the bone autograft undoubtedly increased the bone volume of the thin buccal maxillary cortices which are at increased risk for relapse subsequent to orthodontic tooth movement during the expansion procedure as has been widely reported in literature. 18. This bone augmentation also facilitates arch development and maximizes metabolic response during orthodontic treatment.19

The patient was seen every 2 weeks to take advantage of the RAP phenomenon throughout the phases of aligning, levelling, crossbite and open bite correction.

In the case reported no root resorption was observed as the bone density was reduced due to osteopenia and the bone matrix transportation that occurred facilitated the correction of the maxillary bilateral posterior crossbite. No pain nor loss of tooth vitality was observed in the case treated in concordance with what has been reported in literature. 20-21

Fixed lingual retainers were given for both maxillary and mandibular dental arches. Selective decortication facilitated the correction of the malocclusion in one third the treatment time required for conventional orthodontics and the alveolar augmentation with the bone autograft stabilized the correction achieved with less tendency for relapse and minimal risk of attendant complications.

Conclusion

The selective decortication procedure speeded up the correction of the maxillary bilateral posterior crossbite and open bite malocclusion in one third to one fourth the treatment required for conventional correction of the malocclusion and the augmented bone autograft provided excellent bone volume for the much needed post treatment stability results in such cases.

Ethical Clearance: Not required since it is a case report

Source of Funding: Nil

Conflict of Interest: Nil
REFERENCES


Class II Skeletal Jaw Discrepancy Correction with Herbst Appliance

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ABSTRACT

Introduction: This case report describes the treatment of a skeletal Class II malocclusion with an orthognathic maxilla and retrognathic mandible with severely proclined maxillary incisors, imbricated mandibular incisors, deep bite, convex profile and horizontal mandibular growth pattern treated with the Herbst appliance.

Method: Visual treatment objective was initially done to confirm the effectiveness of the use of a functional appliance. Treatment involved the use of a fixed functional appliance namely, Herbst appliance to advance the mandible forwards. The case was assessed at T1 and T2 of the initial orthopedic phase of treatment.

Results: At T2, the retrognathism of the mandible was adequately addressed and the facial convexity reduced dramatically. The molars attained a Class I relation and the facial soft tissue profile improved drastically with elimination of lower lip trap.

Conclusion: Functional retrusion of the mandible can be effectively treated in the pubertal period of growth spurt with the judicious use of a fixed functional bite jumping appliance such as the Herbst.

Keywords: pubertal growth spurt; skeletal Class II jaw discrepancy; retrognathic mandible; Herbst appliance

Introduction

Class II skeletal jaw discrepancy since time immemorial has posed an enigma to the practising orthodontists. Removable functional appliances like activator, bionator, Frankel functional regulator, Twin-block, etc., were viewed with skepticism as they did not produce the continuous alteration in the mandibular position in the neuromuscular environment deemed necessary to cause sufficient remodeling of the condyle and increase in mandibular size.

Herbst appliance was first introduced in 1905 but was lost in oblivion until it was resurrected in 1979 by Hans Pancherz. It was indicated in the permanent dentition just or after the peak in pubertal growth spurt but not in mixed dentition as this stage was prone for relapse due to unstable cuspal interdigitation. A stable cuspal interdigitation was deemed necessary for long term stability results. It was also reported that during therapy, sagittal condylar growth occurred along with marked changes in the morphology of the mandible with a high-pull headgear-like effect on the maxillary complex.

Many types of Herbst appliance were introduced to the orthodontic fraternity in the form of banded, bonded,
acrylic splint and cast silver splinted Herbst. 3-6 Herbst with headgear therapy was also used to treat severe Class II malocclusions with prognathic maxilla and retrognathic mandible. 7

The short–and long-term effects of Herbst appliance on the dentofacial complex, masticatory system and occlusion was effectively analysed in a series of articles by Pancherz H. 8-14

This case report highlights the treatment of an adolescent female patient with a skeletal Class II discrepancy with orthognathic maxilla and retrognathic mandible with severe proclination of maxillary anteriors, imbrication of mandibular anteriors and deep bite in the circumpubertal period of growth treated effectively with the Herbst, a fixed functional bite-jumping appliance.

**Diagnosis and Etiology:** A 13-year-old female presented with severe forward placement of the maxillary incisors and crowded mandibular incisors with a lower lip trap.

Clinical assessment (Fig. 1)

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**Extraoral assessment:** The patient had an euryprosopic face with a brachycephalic head, convex profile, posterior divergence, deep mentolabial sulcus, acute nasolabial angle, incompetent lips, decreased lower anterior facial height and clinical low mandibular plane angle with no signs of temporomandibular joint dysfunction.

**Intraoral assessment:** Oral hygiene was satisfactory. The maxillary arch was average shaped with severely proclined maxillary anteriors. The mandibular arch was average shaped with imbrication of mandibular incisors. The dental midlines were coincident with each other and the facial midline with a Class II molar and canine relation on both sides. In occlusion increased overjet and deep bite was observed.

Radiographic assessment(Fig.2). Analysis of the pre-treatment lateral cephalometric radiograph revealed a Class II skeletal pattern, with an orthognathic maxilla and retrognathic mandible, a low mandibular plane angle and severely proclined maxillary incisors and moderately proclined mandibular incisors.

**Fig. 1: Pre-treatment extraoral and intraoral**

**Fig. 2: Pre-treatment lateral cephalometric radiograph**
**Treatment objectives:** The main treatment objectives were to improve the convex soft tissue profile and jaw base relationship with advancement of the mandible forwards, reduce overbite and overjet, achieve a Class I canine and molar relation, correct the imbrication of mandibular anteriors, eliminate lower lip trap and improve lip competency.

Orthodontic treatment comprised a phase I growth modification therapy using Herbst appliance. Since the skeletal Class II discrepancy was characterized with a retrognathic mandible with the patient in the circumpubertal growth spurt, greater emphasis was laid on the correction of her functional retrusion.

**Treatment alternatives:** An initial orthopedic phase of treatment with a functional appliance was the treatment of choice. Removable functional appliances like activator, bionator, Frankel Functional Regulator and Twin-block appliance could have been used to correct the retrognathism of the mandible, but since these functional appliances are of a removable nature, patient cooperation was questionable. Fixed functional appliance was advocated to ensure good patient cooperation and favourable treatment results. Although various types of fixed functional appliances are available in the market, Herbst appliance was chosen as the treatment of choice for the correction of the class II skeletal discrepancy with retrognathic mandible. Assessment of the cervical vertebral maturational stages of cervical vertebrae C2 through C4 on the lateral cephalogram depicted an ideal circumpubertal growth period to correct the skeletal Class II jaw discrepancy.

**Treatment progress:** A clinical visualized treatment objective was done and was found to be positive. A construction bite was taken in a Class I molar relation. Maxillary and mandibular first molars and first premolars were banded and an upper and lower impression was taken. These bands were then transferred to the impressions and working models were made. The construction bite then facilitated the mounting of the upper and lower casts onto the articulator. Fabrication of the wire framework was done on these models. A 0.9mm stainless steel wire was used to form the wire framework on the maxillary and mandibular casts. The wire was adapted on the palatal gingival aspect of the maxillary first permanent molars and premolars bilaterally with an interconnecting transpalatal arch with a similar fabrication done for the mandibular cast with a lingual sectional extension touching the lingual surfaces of the mandibular anteriors thereby fortifying the desired total anchorage of the appliance. The wire framework was then soldered to the respective molar and premolar bands. The plunger was then screwed tight with hex head screws with a wrench to prevent the telescoping parts from slipping off the pivots. The amount of bite jumping is determined by the length of the tube. In order to prevent the plunger from slipping out of the tube when the mouth is opened wide, the length of it is kept at maximum. Too long a length would injure the buccal mucosa distal to the maxillary permanent first molar. The Herbst is versatile in that it not only permits vertical opening but also lateral movements of the mandible. (Fig.3). Reactivation of mandibular advancement can be achieved with advancers available in five lengths from 1mm to 5mm crimped onto the plunger.

![Fig. 3: Herbst appliance in situ](image-url)
Results

An appreciable amount of sagittal and vertical growth was achieved in the 6 months of treatment period. A combined mandibular skeletal and maxillary and mandibular dental changes was responsible for the improvement in occlusal position. The Wits appraisal improved to normal values. An increase in mandibular length with mesial movement of mandibular molars and posterior movement of the maxillary molars was responsible for the correction of Class II molar relation and the overjet correction was mainly due to a posterior movement of upper incisors with an increase in mandibular length and proclination of lower incisors. A Class I molar and canine relation was achieved with a reduction in overjet and overbite by 5mm and 3mm respectively. Soft tissue profile improved dramatically with elimination of the lip trap. (Fig.4)

Discussion

Worldwide, Class II malocclusion is highly prevalent and in the orthodontic offices its treatment is one of the most frequent. As the patient was in the pubertal growth period and a potential candidate for functional appliance treatment, a fixed functional appliance was advocated. The fixed Herbst appliance in contrast to the other removable functional appliances like activator, bionator or Frankel II was advocated as it had several advantages such as: (1) active treatment is short (6 to 8 months), (2) works 24 hours a day, (3) doesn’t require patient compliance. A phase I growth modulation therapy with the Herbst was advised to reduce the facial convexity and improve the skeletal jaw discrepancy by advancing the mandible forward and correcting the buccal segment and incisor relationships to a Class I. The sagittal changes achieved were a result of a combination of skeletal and dentoalveolar changes. The mandible was advanced by 5mm as was evidenced by the Co-Gn measurement and the increase in SNB angle to 2°, post treatment. The Class II molar relation was corrected as a result of mesial movement of mandibular molars and distal movement of maxillary molars. Lower anterior facial height increased by 2 mm with a slight increase in mandibular plane angle. (Fig. 5), (Table 1).
Superimposition of the pre and post treatment changes were evidence of the treatment changes achieved with the Herbst (Fig.6). The long-term effect of Herbst appliance treatment on the vertical jaw base relationship, expressed by the mandibular plane angle (ML/NSL) was evaluated by Ruf S and Pancherz H and it was found that it was unaffected by Herbst therapy, but post treatment a continuous decrease took place with male subjects showing a larger angular decrease than female subjects with no statistically significant difference among normodivergent, hypodivergent and hyperdivergent subjects. A favourable soft tissue environment was created with elimination of the lip trap. Flores-Mir C et al in a systematic review of treatment of Class II division 1 malocclusion with splint-type Herbst appliances were of the opinion that in the attainment of final occlusal results, dental changes were as important as skeletal changes and to support these conclusions long-term, prospective, double-blinded, randomized clinical trials were suggested as mandatory.

Fig. 5: Post treatment lateral cephalometric radiograph

Fig. 6: Superimposition
Table 1: Lateral cephalometric analysis

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<tr>
<th>SKELETAL ANTERO-POSTERIOR PARAMETERS</th>
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<td>2°</td>
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<td>4</td>
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<tr>
<td>SN-FH</td>
<td>7°</td>
<td>7</td>
<td>7</td>
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<tr>
<td>WITS APPRAISAL</td>
<td>AO coincides with BO</td>
<td>AO ahead of BO by 4mm</td>
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<td>CONVEXITY AT POINT A</td>
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<td>MANDIBULAR HEIGHT</td>
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<td>MAXILLARY EXPOSURE</td>
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<td>U1-NA (ANGULAR)</td>
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<td>L1-NB (LINEAR)</td>
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<tr>
<td>L1-NB (ANGULAR)</td>
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<td>3.2 ± 0.4mm</td>
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<td>OVERBITE</td>
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<td>0mm</td>
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<tr>
<td>SOFT TISSUE POINT B</td>
<td>-5.3 ± 1.5mm</td>
<td>-10mm</td>
<td>-7mm</td>
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In the case treated bilateral Class II molar relation was corrected to Class I as it was a symmetric Class II Herbst treatment. Bock NC et al. assessed retrospectively the short-term stability and effectiveness of Class II subdivision Herbst nonextraction treatment and concluded that symmetric Class II Herbst treatment was successfully similar to Class II subdivision Herbst treatment with however, a slight Class III molar tendency in the original Class I side in the subdivision patients. Sanders et al. evaluated a group of Class II subdivision malocclusions with cone-beam computed tomography and concluded that along with a skeletal etiology it was due to an asymmetric mandible that was shorter and more posteriorly positioned on the Class II side.

The treatment limitations of Herbst appliance is that in nongrowing patients the skeletal changes are minimal with the treatment effects confined to the dentoalveolar area with an increasing risk for development of a dual bite with TMJ dysfunction symptoms. However, favourable changes in condylar and glenoid fossa remodeling with a double contour of the glenoid fossa has been widely reported.
In Herbst therapy, forward position of the chin is due to summation of 3 factors, namely, condylar remodeling, glenoid fossa remodeling and positional changes of the condyle within the fossa and that the TMJ and chin changes are more sagitally orientated. The Herbst appliance could also be an alternative to orthognathic surgery in borderline skeletal Class II cases as it is has also been reported to be more effective at the end of the growth period in Class II patients.

Conclusion

Herbst appliance, a fixed functional orthopedic appliance used in the pubertal growth spurt period for the female adolescent patient was found effective in the correction of the skeletal Class II jaw discrepancy characterized with a retrognathic mandible.

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Effect of Acetaminophen and Ibuprofen in Orthodontic Tooth Movement—A Review

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ABSTRACT

Orthodontic force application causes an inflammatory event in the periodontium resulting in bone resorption and subsequent orthodontic tooth movement (OTM). The release of inflammatory mediators like prostaglandins E2 and Interleukin-1β act as potent stimulators of bone resorption. Application of heavy force results in pain and to relieve the same non-steroidal anti-inflammatory drugs (NSAIDs) are prescribed. These NSAIDs negate the inflammatory reactions by interfering with the synthesis of prostaglandins(PG), thus inhibiting orthodontic tooth movement. The purpose of this mini-review of literature was to highlight the effects of the two commonly used drugs, namely acetaminophen and ibuprofen on their pain relieving ability and effect on OTM. It was concluded that acetaminophen was a potent analgesic that could be used to relieve the discomfort associated with orthodontic treatment as its effect was at the central nervous system level and not at the cell membrane level as also since it inhibited the PG synthesis very slightly its inhibitory effect on OTM was not a matter of concern. On the other hand, Ibuprofen served as a mild analgesic as also inhibited OTM with its anti-inflammatory effect.

Keywords: Acetaminophen; ibuprofen; prostaglandins; orthodontic tooth movement

Introduction

The essence of orthodontic therapy is the attainment of a stable functional occlusion and to achieve this goal there is a need to move the teeth though alveolar bone via application of mechanical forces. This applied mechanical force elicits an inflammatory reaction in the periodontal ligament and alveolar bone housing the tooth. The cells of nervous, immune and endocrine systems aid in the activation and response of the periodontal ligament and alveolar bone cells during orthodontic tooth movement.¹ Prostaglandins (PGs) are membrane phospholipids generated in response to physical stimulators or localized irritants.²,³ Grieve et al ⁴ also reported the presence of PGs and Interleukin-1β, the 2 potent mediators of bone resorption in the gingival crevicular fluid as early as seven days after application of an orthodontic force. These inflammatory mediators play an important role in orthodontic tooth movement in response to an applied orthodontic force.⁵

Patients undergoing orthodontic therapy either during placement of separators or initial archwire placements and during periodic orthodontic adjustments often complain of pain and discomfort. This is especially seen in the first 24 hours after the application of orthodontic force but decreases to pre-placement levels in about 7days.⁶ The periodontal pain that ensues was construed to be a combination of pressure, ischemia, inflammation and edema.⁷ BurstoneC ⁸ identified an immediate pain response subsequent to placement of an arch wire related to initial compression of the periodontal ligament and a delayed pain response that occurred a few
hours later attributed to hyperalgesia of the periodontal ligament. Patients are often prescribed analgesics to control pain caused by the orthodontic appliance in the first few days after appliance placement.\textsuperscript{9}

The most commonly prescribed drugs are the non-steroidal anti-inflammatory drugs (NSAIDs), whose anti-inflammatory effects are a direct result of the inhibition of the biosynthesis of prostaglandins when they act over the cyclooxygenase pathway involved in catabolism of arachidonic acid, present in the phospholipidic membrane of the cells.\textsuperscript{10} The drugs used routinely in orthodontic therapy to relieve pain and discomfort are acetaminophen and Ibuprofen. Hence, the purpose of this mini-review of literature was to ascertain the effects of these two drugs on pain relief and orthodontic tooth movement.

\textbf{Para-aminophenol derivatives:} In 1887, Phenacetin was introduced and was used extensively as an analgesic-antipyretic, but was later banned due to analgesic abuse nephropathy. Acetaminophen (Paracetamol, N-acetyl-p-aminophenol, Tylenol, etc.) is the active metabolite of Phenacetin. Paracetamol (acetaminophen), the de-ethylated active metabolite of phenacetin, was introduced in the last century but came into common use only in 1950.

Acetaminophen belongs to the family of para-aminophenols. It exerts an analgesic effect by raising the pain threshold in response to stimuli. It is available as an over the counter drug as also in numerous combinations with narcotic and non-narcotic analgesics (like aspirin and other salicylates), barbiturates, caffeine, antihistamines, etc. It is an effective alternative to aspirin as an analgesic–antipyretic agent. It is weak in its action as an anti-inflammatory drug but is well tolerated with low incidence of gastro-intestinal side effects.

\textbf{Mechanism of action:} The weak anti-inflammatory effects of acetaminophen have been tied to its decreased ability to inhibit COX in the presence of high concentrations of peroxides which are usually found at the sites of inflammation. A dose of 1000 mg results in approximately 50\% inhibition of both COX-1 and COX-2 in whole blood assays ex vivo in healthy volunteers. The central analgesic action of paracetamol is due to its inhibitory effect on COX-3 enzyme in the brain and is known to raise the pain threshold similar to that of aspirin. It however has weak peripheral anti-inflammatory component due to poor inhibition of PG synthesis in peripheral tissues. The analgesic action of aspirin and paracetamol is additive.

Acetaminophen is suitable for analgesic or antipyretic use and is particularly valuable for peptic ulcer patients in whom aspirin is contraindicated, as also in aspirin hypersensitivity or children with a febrile illness. The conventional oral dose of acetaminophen is 325-650 mg every 4-6 hours with the total daily doses to not exceed 4000 mg (2000 mg/day for chronic alcoholics). A dose of 10 mg/kg may also be used. Acetaminophen is usually well tolerated at recommended therapeutic doses. Single or repeated therapeutic doses of acetaminophen have been shown to have no adverse effects on the cardiovascular and respiratory systems, platelets, or coagulation.

Generally, NSAIDs, due to their potential for slowing tooth movement are not recommended for use during orthodontic treatment. Acetaminophen has minimal effects on prostaglandin synthesis. Paracetamol is thought to reduce pain centrally rather than peripherally by inhibition of COX-3 in the brain and the spinal cord. Hypothetically, because acetaminophen is inactive as an anti-inflammatory agent in peripheral tissues, it should have no adverse effect on PG biosynthesis and subsequent bone resorption associated with orthodontic tooth movement, unlike the other NSAIDs. Roche JJ et al.\textsuperscript{11} in their study on New Zealand white rabbits undergoing orthodontic treatment, concluded that acetaminophen had no effect on the rate of tooth movement. Arias OR et al.\textsuperscript{12} conducted a study on Wistar albino rats to study the effects of acetaminophen on orthodontic tooth movement. They concluded that acetaminophen did not significantly reduce the numbers of resorption lacunae and osteoclasts in the pressure area of the incisors moved as a result of orthodontic treatment as also it did not alter osseous regeneration or dental movement as its effect was at the central nervous system level and did not affect the peripheral secretion of PGs and in comparison to ibuprofen and acetylsalicylic acid did not affect OTM and was the analgesic drug of choice for treating pain associated with orthodontic treatment. Kehoe MJ et al.\textsuperscript{13} concluded that acetaminophen was the drug of choice for the relief of minor discomfort associated with OTM after a series of animal experiments was done to study the effect of ibuprofen, acetaminophen and misoprostol on PGE synthesis and OTM. Acetaminophen, a proven analgesic lacks the anti-inflammatory properties of
NSAIDs and does not affect the rate of orthodontic tooth movement making it the drug of choice for the relief of orthodontic pain.

**Propionic acid derivatives (Ibuprofen):** Ibuprofen, an alternative to aspirin, was introduced in 1969. It is the most commonly used NSAIDs and the first member of the propionic acid class of NSAIDs to come into general use and be available as an over the counter drug.

**Mechanism of action:** Propionic acid derivatives are nonselective COX inhibitors which have effects and side effects common to other traditional NSAIDs. Propionic acid derivatives, in particular naproxen, has demonstrated prominent inhibitory effects on leukocyte function. Data suggests that naproxen acts as an efficient analgesic and aids in relieving morning stiffness. Ibuprofen is well absorbed orally and is highly bound to plasma proteins (90-99%), but its displacement interactions are not clinically significant. Use of ibuprofen does not require alteration of dose of oral anticoagulants and oral hypoglycemics.

Ibuprofen has been rated as the safest conventional NSAID by the spontaneous adverse drug reactions reporting system in U.K. Ibuprofen (400mg) has been found to be equally or more efficient than a combination of aspirin (650 mg) + codeine (60mg) in relieving dental surgery pain. Concurrent treatment with ibuprofen and low dose aspirin has been found to prevent irreversible COX inhibition. Thus it may antagonize the anti-platelet and cardioprotective effect of low dose aspirin. Intravenous ibuprofen is administered at a dose of 100-800 mg over 30 minutes every 4-6 hours to relieve pain and fever.

Discomfort and pain after initial separator or arch wire placement during activation visits are commonly experienced among orthodontic patients. Blockage of prostaglandin synthesis in peripheral tissue influences the mechanism for preoperative anti-inflammatory effect. Administration of NSAIDs before the procedure, aids in inhibiting the prostaglandin synthesis and concurrently decreases the inflammatory response.

It has been also reported that the efficacy of preoperative analgesic consumption of ibuprofen taken one hour before archwire or band placement decreased the pain level in patients from two hours after bonding until nighttime and that it significantly decreased pain caused by mastication within two hours compared to when ibuprofen was administered postoperative. Ibuprofen significantly inhibited the production of prostaglandin E (PGE) in the periodontal ligament and subsequently decreased the rate of tooth movement.

JB Walker et al 14 evaluated the impairment of OTM caused by NSAIDs with data sourced from biomedical literature and concluded that NSAIDs can impair OTM and that acetaminophen was an appropriate alternative to NSAIDs for pain associated with orthodontic treatment.

In a study by Ngan P et al 15 it was reported that Ibuprofen was a preferred analgesic in the treatment of discomfort because of post orthodontic adjustments. In comparison to a placebo pre-operative administration of ibuprofen suppressed post-operative pain. 16 It has also been reported that Ibuprofen stimulates the release of beta-endorphin, a natural endogenous analgesic. 17, 18

Shetty et al 19 suggested that NSAIDs like ibuprofen had an inhibitory effect on the release of prostaglandins during initial tooth movement and thereby may cause an impediment in the rate of tooth movement as also was a less potent analgesic than acetaminophen whose effect on PG synthesis was insignificant.

Gonzales et al 20 studied the effect of acetaminophen, aspirin, meloxicam, celecoxib and prednisolone and their effects on tooth movement and root resorption on rats and concluded that depending on dose thresholds celecoxib and prednisolone may interfere with the arachidonic acid cascade thus interfering with tooth movement though with reduced propensity for root resorption. 20

Bartzela et al 21 did a systematic review of literature on the effects of dietary supplements and medications on the rate of experimental tooth movement. They reported that increased tooth movement occurred with therapeutic administration of eicosanoids whereas their blocking led to a decrease. NSAIDs decreased tooth movement, but paracetamol (acetaminophen), a non-NSAID analgesic had no effect. Parathyroid hormone, thyroxin and corticosteroid hormones increased tooth movement whereas estrogens reduced tooth movement. Dietary calcium seemed to reduce tooth movement whereas Vitamin D3 stimulated it and bisphosphonates had a strong inhibitory effect on tooth movement. They concluded that information on the consumption of the above medications was essential in discussing the treatment planning with the patients as these medications might have a profound influence on the rate of OTM.
Conclusions

- The drugs that inhibit the liberation of PGs are a viable option to control pain and inflammation during orthodontic treatment.
- Acetaminophen does not alter osseous regeneration or orthodontic tooth movement because it acts at the central nervous system level and does not affect the peripheral secretion of PGs.
- Ibuprofen inhibits PGs at the peripheral level thus affecting osteoclastic activity and resultant deceleration of orthodontic tooth movement.
- Acetaminophen is the suggested drug of choice rather than ibuprofen to relieve pain and discomfort during the course of orthodontic therapy.

Ethical Clearance: Not required since it is a review article
Source of Funding: Nil
Conflict of Interest: Nil

REFERENCES
Insulin Like Growth Factor-1—A Skeletal Maturity Indicator—A Review

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ABSTRACT

In orthodontic treatment planning decisions assessment of growth status plays a vital role and that the adolescent growth spurt is considered an ideal time to mete out growth modification therapy. Various radiologic and non-radiologic skeletal maturity indicators have been in use with its attendant advantages and disadvantages. Insulin like Growth Factor-1 (IGF-1) is one such non-radiologic biomarker that could be used to estimate the amount of available growth present to help treat jaw discrepancies in the circumpubertal period of growth as the mean levels of it has been reported to be high during cicumpubertal growth. Internationally peer reviewed and valid indexed reference articles pertaining to IGF-1 and its predictive usefulness in estimating the peak pubertal growth spurt used alone or in combination with the other radiologic skeletal maturity indicators was segregated and diligently perused. Information gleaned from the literature review revealed that IGF-1 was indeed effective in assessing the circumpubertal growth spurt. It had a high correlation with the cervical stages C3 and C4 as seen on lateral cephalograms as also with the stages pertaining to peak pubertal growth as seen on handwrist radiographs and middle phalanx 3 (MP3) on periapical x-rays. IGF-1 was an effective and alternative biomarker for estimation of peak pubertal growth spurt used alone or in combination with the other radiologic biomarkers.

Keywords: Insulin like growth factor-1; growth hormone; pubertal growth spurt; skeletal maturation

Introduction

Chronologic age, dental age, physical characteristics and peak height velocity, are highly unreliable methods to predict pubertal growth spurt.¹ The other pertinent methods of assessing skeletal maturity and peak mandibular bone growth are hand wrist radiograph, assessment of degree of cervical vertebral maturation on lateral cephalograms and recording of MP3 stages on periapical X-ray films.² These radiographic methods are however highly subjective techniques, involving radiation exposure. A quest for a non-radiologic biomarker was a long felt need. Insulin-like growth factor-1 (IGF-1) is one of the main mediators of growth hormone in promoting skeletal and muscular growth.³ The circulating IGF-1 increases with increase in growth hormone (GH) at puberty. IGF-1, a polypeptide hormone and a mediator of GH is produced both locally and systemically and its increase in level has been correlated with the pubertal growth spurt.⁴ A study on newborn rats has shown that the condyle is more responsive and sensitive to IGF-1 than the femoral head.⁵ Brabant G et al.⁶ had reported explicitly the reference ranges of serum IGF-1 levels in male and female subjects according to chronological age. Hence, this review of literature would throw light on the contention that IGF-1 is a widely used skeletal maturity indicator in the assessment of skeletal maturity.

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Assessment of IGF-1 as a biochemical marker has been widely reported in literature right from its discovery by Salmon Daughaday in 1957. Its mean peak levels have been compared with the other radiologic skeletal maturity indicators such as handwrist radiograph, Middle phalanx of the third finger and cervical vertebral maturational stages as seen on lateral cephalograms. This review of literature helps one to understand the importance of the use of IGF-1 as a biologic skeletal maturity indicator.

Masoud M et al 11 (1985) reported in a longitudinal study that the mean Insulin-like Growth Factor-1 (IGF-1) levels in rabbits progressively increased from 2 weeks of age to their peak readings at 12 weeks in males and 14 weeks in females, followed by a progressive decline to pre-pubertal levels and that for each of the growth parameters measured in individual animals between 8 and 16 weeks of age a positive correlation coefficient was found between serum IGF-1 and growth increments.

Juul A et al12 (1994) conducted a cross-sectional study of 1030 healthy Caucasian population with 877 children and adolescents and 153 adults between 0-80 years of age and divided them into three groups. Height, weight, body mass index and pubertal developmental stage was recorded according to Tanner method. Blood samples were drawn from antecubital vein, centrifuged and the serum stored at -20° C for up to 4 months before analysis. The authors related IGF 1 levels to age, sex, sexual development and body mass index (BMI). They reported that the mean serum IGF 1 concentration increased slowly in prepubertal children with a steep increase during puberty followed by a decline post puberty upto 25 years and that in normal prepubertal children serum IGF-1 levels was not influenced with BMI.

Juul A et al13 (1995) reported that IGF-1 is bound to specific Insulin like growth factor binding proteins (IGFBPs) especially IGFBP-3 which is also regulated by GH and whose levels increase with age in children, with maximal levels observed in puberty.

Woods KA et al 14 (1996) described a child with a homozygous defect of the IGF-I gene that was associated with growth failure before and after birth, indicating that IGF-1 is critical for prenatal as well as postnatal growth and that the patient’s neurologic development was also abnormal suggesting the role of IGF-1 in the development of the central nervous system.

Okazaki K et al 15(1999) investigated the involvement of IGF-1 in osteophyte formation and concluded that IGF-1 regulated the initiation and development of osteophyte formation in an autocrine and/or paracrine fashion.

Butler AA et al 16 (2001) in his review of literature stated IGF-1, IGF-2 and IGF-1 receptor were critically important for normal growth and development of an organism. Gene-deletion of these elements has demonstrated that IGF-1 is important for both prenatal and postnatal development, whereas IGF-2 is important during prenatal stages only and that local tissue IGF-1 production was unaffected and may compensate for the lack of the liver IGF-1 suggesting the role of endocrine vs. autocrine/paracrine function of IGF-1.

Visnapuu V et al17 (2001) investigated the distribution of growth hormone (GH) and insulin-like growth factor 1 (IGF-1) receptors in temperomandibular joint (condyle) and compared the findings with that of long bone epiphyseal plates in rats. The localization of the receptors was examined in vivo by immunohistochemical methods in 1 to 21 day old rats. They reported that GH receptors were detected in various components of the TMJ but not in the fibrous articular surface or in the cartilage layers of the condyle whereas IGF-1 receptors were found in the fibrous articular surface of the condyle and in the superior and posteriorsuperior regions of the condylar cartilage. Early post-natal growth and development of mandibular condylar cartilage is IGF-1 dependent but not GH dependent.

Mohan S et al 18 (2003) evaluated the relative contribution of the GH/IGF axis to the development of peak bone mineral density (BMD), and measured the skeletal changes in IGF-I knockout (KO), IGF-II KO, and GH-deficient lit/lit mice and their corresponding control mice at day 23 (prepubertal), 31 (pubertal), and 56 (postpubertal) in the entire femur by dual energy x-ray absorptiometry and in the mid-diaphysis by peripheral quantitative computed tomography. The data demonstrated that: 1) mice deficient in IGF-I exhibited a greater impairment in bone accretion than mice deficient in IGF-II or GH; 2) GH/IGF-I, but not IGF-II, is critical for puberty-induced bone growth; and 3) IGF-1 effects on bone accretion during prepuberty are mediated predominantly via mechanisms independent of GH, whereas during puberty they are mediated via both GH-dependent and GH-independent mechanisms.
from the onset of puberty. The authors measured mean blood spot IGF-I levels in a cross-sectional study of 83 patients (44 females, 39 males) on recall to begin orthodontic treatment, in active treatment, or in post treatment follow-up. The results showed that mean blood spot IGF-I levels were significantly higher in the late pubertal stages than in the prepubertal, early pubertal, and post pubertal stages. Linear correlation showed that IGF-I levels had a significant positive correlation with cervical skeletal maturity from the prepubertal to the late pubertal stages, and a significant negative correlation from the late pubertal to the post pubertal stages. In the post pubertal stage, IGF-I levels had a negative linear correlation with increasing time since the onset of puberty and with chronological age. The authors concluded that blood spot IGF-I could be used as a skeletal maturity indicator and might be useful in detecting residual mandibular growth in young adults.

Masoud M et al 20 (2008) hypothesized that IGF-1 levels would also correlate with cervical skeletal maturity and would be highest at the cervical stages that correspond to the greatest amount of facial growth. The authors measured mean blood spot IGF-I levels in a cross-sectional study of 83 patients (44 females, 39 males) on recall to begin orthodontic treatment, in active treatment, or in post treatment follow-up. The results showed that mean blood spot IGF-I levels were significantly higher in the late pubertal stages than in the prepubertal, early pubertal, and post pubertal stages. Linear correlation showed that IGF-I levels had a significant positive correlation with cervical skeletal maturity from the prepubertal to the late pubertal stages, and a significant negative correlation from the late pubertal to the post pubertal stages. In the post pubertal stage, IGF-I levels had a negative linear correlation with increasing time since the onset of puberty and with chronological age. The authors concluded that blood spot IGF-I could be used as a skeletal maturity indicator and might be useful in detecting residual mandibular growth in young adults.

Masoud MI et al 22 (2012) hypothesized that IGF-I levels could be used as a skeletal maturity indicator. IGF-I levels were estimated from blood samples using chemiluminescence immunoassay (CLIA) method. CVM was evaluated using a six-stage method of evaluating cervical vertebrae. 53.3% of subjects at CS-3, 66.7% subjects at CS-4, and 6.7% subjects at CS-5 showed IGF-I levels in peak range. They concluded that serum IGF-I levels in females correlated well with skeletal maturity determined by CVM and MP3 stages and increased sharply during early pubertal stages followed by a decrease in late puberty. They also hypothesized that serum IGF-I testing can be undertaken as a preliminary screening test in patients in whom the orthodontist predicts the possibility of using myofunctional appliance but in whom the chronologic age is not suggestive for a growth modification therapy.

Masoud MI et al 22 (2012) in his study developed the use of a biologic marker, (IGF-1), as an indicator for the timing and intensity of mandibular growth. This was done by measuring annual changes in mandibular length and studying how they relate to blood spot IGF-1 measurements & cervical stages. They concluded blood spot IGF-1 testing is a promising tool for predicting the timing and intensity of mandibular growth spurt without the restrictions involved in the radiographic techniques for assessing skeletal maturity.

Ishaq RAR et al 23 (2012) conducted a study on 120 Egyptian subjects (60 females and 60 males) in circumpubertal age group and compared the IGF-I levels at different CVM stages. They observed the highest mean IGF-I levels in stage 3 of cervical maturation in females and in stage four in males.

Jain S et al 24 (2013) aimed to associate serum IGF-1 levels with cervical maturation stages (CS) 3, 4, and 5 on lateral cephalograms of 45 male subjects to find out peak serum IGF-1 levels among the three stages. Serum IGF-1 levels were estimated from blood samples using chemiluminescence immunoassay (CLIA) method. CS was evaluated using a six-stage method of evaluating the cervical vertebrae. 53.3% of subjects at CS-3, 66.7% subjects at CS-4, and 6.7% subjects at CS-5 showed IGF-I levels in peak range. They concluded that serum IGF-I levels could be used as an additional tool to optimize orthodontic treatment timing.

Gupta S et al 21 (2012) investigated the validity of Insulin like Growth Factor -1(IGF-1) as a skeletal maturity indicator by comparing serum IGF-1 levels with the stages in cervical vertebral maturation (CVM) and in the middle phalanx of the third finger (MP3). The study population was selected by using simple random sampling technique and consisted of 30 female subjects in the age range of 8—23 years who had blood sample, lateral cephalometric and MP3 radiographs taken on the same day. Serum IGF-1 estimation was carried out on the blood samples using chemiluminescence immunoassay (CLIA) method. CVM was evaluated using method by Baccetti et al and MP3 staging was done using Rajagopal & Kansal method. Their results showed that serum IGF-1 levels in females correlated well with skeletal maturity determined by CVM and MP3 stages and increased sharply during early pubertal stages followed by a decrease in late puberty. They also hypothesized that serum IGF-I testing can be undertaken as a preliminary screening test in patients in whom the orthodontist predicts the possibility of using myofunctional appliance but in whom the chronologic age is not suggestive for a growth modification therapy.

Gupta S et al 25 (2015) did a cross sectional study to assess serum insulin-like growth factor-1 (IGF-1) levels in 60 subjects, 30 males and 30 females in the age range of 8—23 years, at various cervical vertebral maturation (CVM) stages and concluded that IGF-1 values in CS5 in males had higher mean values than females, whereas in CS3 in females had higher mean values than in males indicating earlier onset of pubertal spurt in females and more delayed and longer pubertal spurt in males.
Jain S et al \textsuperscript{24}(2017) did a study to determine the relationship between IGF-1 levels, IGFBP-3 levels with CVM staging to track the pre pubertal and pubertal growth spurts in female patients in North Indian population and concluded that IGF-1 and IGFBP-3 both could serve as a potential biochemical indicator for assessment of skeletal maturity.

Tripathi et al\textsuperscript{27} (2017) assessed the levels of serum IGF-1 and serum osteocalcin and compared them with cervical vertebral maturation index (CVMI) stages. They concluded that serum IGF-1 showed peak levels at CVMI stage 4 and stage 3 in males and females, respectively, with statistically significant interstage differences except stages 3 and 4 in females and that osteocalcin followed IGF-1 across all CVMI stages but showed insignificant interstage differences.

### Conclusions

- IGF-1 could be used as a potential skeletal maturity indicator without the hazard of additional radiographic exposure.
- In comparison to prepubertal, early pubertal, and postpubertal stages, late pubertal stages exhibit higher mean IGF-1 blood spot levels.
- Mandibular condyle is sensitive and more responsive to IGF-1.

### Ethical Clearance:
Not required since it is a review article

### Source of Funding:
Nil

### Conflict of Interest:
Nil

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A Comparative Evaluation of Shear Bond Strength of Orthodontic Brackets Bonded to Porcelain Fused Metal Crowns Treated with Different Surface Conditioning Techniques—An Invitro Study

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ABSTRACT

With the increase in adult orthodontic treatment comes the need to find a reliable method for bonding orthodontic brackets onto metal or ceramic crowns and fixed partial dentures. In this study, shear bond strength and surface roughness tests by scanning electron microscope study were used to examine the effect of 5 different surface conditioning methods: 37% phosphoric acid gel, 9% Hydrofluoric acid, sandblasting + 9% Hydrofluoric acid, Sandblasting + Silane, Fine diamond bur roughening + silane for bonding metal brackets to ceramic surfaces of feldspathic porcelain. A total of 60 human maxillary premolar teeth extracted for therapeutic purposes from patients seeking orthodontic treatment were collected, and 50 ceramic crowns were fabricated onto the premolar teeth following crown preparation. 10 natural teeth were used as controls, they were acid etched in conventional manner using 37% phosphoric acid. Metal brackets were bonded using a light-curing composite. The samples were stored in distilled water at physiological temperature (37°C) for 1 day, and thermocycled 500 times between 5°C and 55°C. Shear bond tests were performed with a universal testing device, and the results were statistically analysed. Ceramic surfaces conditioned with sandblasting followed by application of Silane produced maximum bond strength of 12.34 ± 0.95 MPa comparable or even better than the control group 11.03 ± 1.63 MPa followed by 9% Hydrofluoric acid 11.48 ± 0.98 MPa & Fine Diamond Bur roughening + Silane 9.28 ± 1.11 MPa. Ceramic surfaces conditioned with 37% Ortho Phosphoric acid produced least SBS of 5.51 ± 0.88 MPa and hence not suitable for bonding Orthodontic brackets in a clinical scenario. Statistical tests showed significant difference between and within the groups in shear bond strength and P value also was highly significant, i.e. ***p<0.001. The SEM photomicrographs of all the six different surface preparations revealed different surface morphologies & were corroborative of SBS values. Even though 9% Hydrofluoric acid and Fine diamond bur roughening produced clinically acceptable SBS values, because of their technique sensitivity and side effects, they have to be used with great care and caution. sand blasting followed by the application of Silane coupling agent was found to be the best porcelain surface conditioning method.

Keywords: Bond Strength; Metal Brackets; Ceramic Surfaces; PFM's: Surface-Conditioning; Sand Blasting.

Introduction

The introduction of acid etch bonding technique by Buonocore1,2 in 1955, brought the concept of bonding various resins to enamel with applications in all fields of dentistry, including orthodontics. With the development of reliable and reproducible bonding techniques to enamel surfaces, cemented bands were replaced by bonded brackets on incisor, cuspid and bicuspid teeth. Newman3 1965 was the first person who used epoxy resin for bonding stainless steel brackets to enamel.

By the late 1970s bonding of orthodontic brackets had become an accepted clinical technique in routine fixed appliance treatment. Conventional adhesive system uses three different agents- an enamel conditioner, a primer solution and an adhesive resin in the process of bonding orthodontic brackets to the tooth.
With the increased number of adults seeking orthodontic treatment, clinicians often have to bond orthodontic brackets to teeth that have different types of restorations, including amalgam, gold, composite and porcelain. Banding is an alternative but is considered aesthetically unacceptable, particularly with anterior teeth. The application of direct bonds to fixed bridgework is preferable to banding.

Various methods have been tried to improve the bonding of orthodontic brackets to porcelain surfaces by pre-treating porcelain surface by mechanical or chemical means, or by a combination of both. Silane is an agent which chemically adheres with porcelain surface but if used alone doesn’t have enough cohesive force. In micromechanical attachments use of hydrofluoric acid, orthophosphoric acid increase surface area of porcelain and help to retain flowable composite.

Materials and Method

The present study was conducted in the Department of Orthodontics and Dento-facial Orthopedics, Sibar Institute of Dental Sciences, Takkellapdu, Guntur and Department of Organic Coatings & Polymers, Indian Institute of Chemical Technology, Habsiguda, Secunderabad.

Sixty human maxillary premolar teeth extracted for therapeutic purposes from patients seeking orthodontic treatment in the Department of Orthodontics and Dento-facial Orthopedics, Sibar institute of dental sciences were collected & stored in normal saline after treating them with hydrogen peroxide for one week.

Inclusion & Exclusion Criteria for Teeth Selection:

Teeth with no signs of caries
Teeth free of restorations
Teeth with no cracks on the crown as a result of the pressure of the extraction forceps.
Teeth with no cement remnants as a result of previous orthodontic treatment.
Teeth with fluorosis, hypoplasia or abnormalities of crown morphology, which may have affected bracket bonding, were excluded.

Fifty Porcelain Fused Metal Crowns were fabricated over the extracted maxillary premolar teeth after crown preparation for the study purpose, and ten extracted maxillary premolar teeth were acid etched in conventional manner using 37% phosphoric acid for 30 seconds. Composite bonding was done which acted as controls to compare the bond strength with Porcelain Fused Metal crowns.

Method

Bonding procedure: The teeth collected were grouped into six groups of ten each (Group I to Group VI).

And Following six protocols were executed for surface preparation.

Fig. 1: Porcelain Fused Metal Crowns were fabricated over the extracted maxillary premolar teeth & Mounted on Acrylic Blocks

Group 1: Orthodontic brackets were bonded to enamel surfaces on ten teeth in Group I which acted as control group, teeth were acid etched with 37% phosphoric acid gel for 30 seconds, thoroughly washed, and air dried using 3-in-1 syringe, followed by application of primer & bonding agent (Transbond XT 3M, light cured composite resin).
Group II: Porcelain Fused Metal Crowns were etched with 37% phosphoric acid gel for 30 seconds, thoroughly washed, and air dried using 3-in-1 syringe, followed by application of primer & bonding agent.

Group III: Porcelain Fused Metal Crowns were etched with 9% Hydrofluoric acid for 90 seconds.

Group IV: Porcelain Fused Metal Crowns were air abraded using 30 µm aluminum oxide particles from 10 mm distance with 250 Kpa pressure for 2-3 seconds using sandblaster machine, & etched with 9% Hydrofluoric acid for 90 seconds.

Group V: Porcelain Fused Metal Crowns were air abraded using 30 µm aluminum oxide particles from 10 mm distance with 250 Kpa pressure for 2-3 seconds using sandblaster machine, followed by two coats of silane coupling agent application and air dried.

Group VI: Orthodontic brackets were bonded on ten Porcelain Fused Metal crowns belonging to Group VI, which were roughened using Fine diamond bur 30µm.

Subsequent to bonding, the samples were stored in distilled water at physiological temperature (37°C) for 1 day, and thermocycled 500 times between 5°C and 55°C with a dwelling time of 30 seconds using a computerised thermocycling device (Nova Inc., Konya, Turkey) prior to shear bond strength testing.

Shear Bond Strength Testing In order to maintain a consistent debonding force in a controlled direction, teeth were mounted on to an acrylic jig (self cure clear acrylic by DPI). Jig was fabricated using 1.2 cm diameter Low Density Poly Ethylene (LDPE) block.

In this jig facial surface of the porcelain crown was kept exactly parallel to the debonding force or perpendicular to the floor. The force to debond was recorded with a universal testing machine (Autograph Model AGS 10 ANG, Shimadzu, Japan). A crosshead speed of 1mm/min was used. Debonded surfaces were observed under a scanning electron microscope for the types of failures after the debonding procedure.

Following debonding the surfaces under the debonded brackets were coated with gold and palladium solution to prepare the specimens for viewing under scanning electron microscope model Hitachi- S520, Japan; Oxford Link ISIS-300 UK at 500x and 1500x magnifications.

Fig. 2: Specimen Mounted on Universal Testing Machine

Results

The data was normally distributed and the results were tabulated for Minimum, Maximum, Range, Mean, Standard Deviation and Standard Error for all the groups of the study.

Parametric tests for comparison of six groups with respect to shear bond strength by one way ANOVA test and Pair wise comparison of six groups with respect to shear bond strength by Newman-Keuls multiple comparison post hoc procedure were done.

Both the tests showed significant difference between and within the groups in shear bond strength and P value also was highly significant, i.e. ***p<0.001.

Scanning Electron Microscope Results: The SEM photomicrographs of all the six different surface preparations revealed different surface morphologies.

For the porcelain-fused-metal crowns treated with 30 µm Al2O3 and Fine diamond bur 30 µm, loss of the glazed surface and mild roughening were seen. Uniform peeling or an erosive appearance with shallow penetration and undercuts was observed when compared with chemical etching. Hydrofluoric acid etching demonstrated mild roughening of the surface and orthophosphoric acid etching produced minimal change and did not appear to alter the glazed porcelain surfaces.
Table 1: Summary statistics according to group

<table>
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<th>Minimum</th>
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<th>Mean</th>
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<td>3.27</td>
<td>7.96</td>
<td>1.07</td>
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<td>3.94</td>
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Table 2: ANOVA

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<th>Sum of squares</th>
<th>Mean sum of squares</th>
<th>F-value</th>
<th>p-value</th>
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<td>Within groups</td>
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<td>1.2746</td>
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<td>59</td>
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***p<0.001

Table 3: Newman-Keuls

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<tr>
<th>Groups</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Group IV</th>
<th>Group V</th>
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<td>11.4770</td>
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<td>Group II</td>
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<td>-</td>
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<td>Group III</td>
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<tr>
<td>Group IV</td>
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<td>0.0001***</td>
<td>0.0002***</td>
<td>-</td>
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<tr>
<td>Group V</td>
<td>0.0316*</td>
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<td>0.0001***</td>
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<td>0.0121*</td>
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*p<0.05, **p<0.01 and ***p<0.001

**Discussion**

**Group I - 37% Phosphoric acid:** Orthodontic brackets bonded to enamel surfaces on ten natural teeth (maxillary 1st premolars) in Group I which acted as control group, were acid etched with 37% phosphoric acid gel for 30 seconds gave clinically acceptable and significant bond strength of 11.03 ± 1.63 MPa.

**Group II - 37% Phosphoric acid:** Porcelain surface preparation using 37 % Phosphoric acid gave significantly low SBS of 5.51 ± 0.88 MPa. These results were not in acceptable range for the orthodontic bonding.

**Group III - 37% Hydrofluoric acid:** Preparation with Hydrofluoric acid (HFA) produced significantly high bond strength of 11.48 ± 0.98 MPa, which was similar to the reports of previous studies. Surface conditioning with HFA successfully increased the adhesion of the composite resin to the porcelain surfaces by producing physical or topographical changes in the porcelain surface.

This was an expected result as HFA facilitates micromechanical retention between porcelain and composite resin. When the two acids, HFA and Phosphoric acid were compared, higher bond values were obtained in the HF acid treated group. However, HFA should be used with great care as it is capable of causing severe trauma to soft tissues and tooth substance (Hayakawa et al., 1992).

**Group IV – Sand blasting + Hydrofluoric acid:** In the mechanical preparation we used sandblasting in combination with 9% hydrofluoric acid etching and bracket bonding with composite material.
Surface preparation with 30 µm Al₂O₃ particles produced a uniform peeling appearance of the porcelain with deeper penetration and more undercuts compared to roughening; which increased potential mechanical retention. Hydrofluoric acid further acted by dissolving the crystalline and glassy phase of the ceramic (But this combination also seemed to cause irreversible alteration to the porcelain surface)

**Group V – Sand blasting + Silane:** Gave the maximum SBS value in this study, which is 12.34 ± 0.95 MPa.

These results were comparable to the previous studies done by Kocadereli *et al.* and Schmage *et al.* In contrast, Zachrisson reported earlier to these studies that silane application to sandblasted porcelain did not provide clinically acceptable bond strengths and suggested abandoning this technique.

In a study carried out by Tamer Türk *et al.* stated that samples coated with silane, but not exposed to chemical or mechanical roughening, were considered as the control group but demonstrated bond failures during thermocycling.

Barbosa *et al.* (1995) reported the premature loss of brackets bonded to glazed ceramic surfaces coated with silane after 7 days of water immersion. They explained that this premature loss was due to the high solubility of silane in water.

**Group VI – Fine Diamond Bur roughening + Silane**

Gave an SBS of 9.28 ± 1.11 MPa.

- These results were comparable to the previous studies done by Kocadereli *et al.* and Schmage *et al.* In contrast, Zachrisson reported earlier to these studies that silane application to sandblasted porcelain did not provide clinically acceptable bond strengths and suggested abandoning this technique.
- In a study carried out by Tamer Türk *et al.* stated that samples coated with silane, but not exposed to chemical or mechanical roughening, were considered as the control group but demonstrated bond failures during thermocycling.
- Barbosa *et al.* (1995) reported the premature loss of brackets bonded to glazed ceramic surfaces coated with silane after 7 days of water immersion.
- They explained that this premature loss was due to the high solubility of silane in water.

Barbosa *et al.* (1995)In their study stated that roughening with coarse diamond burs resulted in higher SBS when compared with other groups, i.e. glazed and deglazed surfaces with sandpaper disks. Silane presents a chemical link between the dental ceramic and the composite resin, and the organic portion of the molecule enhances the wettability of the ceramic surface, thereby displaying a closer micromechanical bond (Lu *et al.*, 1992).

However, in order to obtain a viable bond between the orthodontic bracket and the ceramic surface, mechanical or chemical roughening is inevitable (Wood *et al.*, 1986; Kao *et al.*, 1988; Barbosa *et al.*, 1995; Gillis and Redlich, 1998; Huang and Kao, 2001.

**Conclusion**

On comparing the effect of different surface conditioning methods on bond strength of brackets bonded to porcelain fused metal (PFM) crowns the following conclusions were drawn:

PFM surface conditioned with sand blasting followed by application of Silane (group V) produced maximum bond strength comparable or even better than the control group followed by groups III and VI. PFM surface conditioned with 37% Ortho Phosphoric acid (group II) produced least SBS and hence not suitable for bonding Orthodontic brackets in a clinical scenario.

Even though groups III and VI produced clinically acceptable SBS values, because of their technique sensitivity and side effects, they have to be used with great care and caution.

The best porcelain surface conditioning method recommended clinically for bonding Orthodontic brackets to porcelain fused metal crowns was sand blasting followed by the application of Silane coupling agent.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


Soft Tissue Predictions in Orthodontics—A Review

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ABSTRACT

The soft tissue covering the teeth and bone is highly variable in its thickness, and this variation may be greater than the variation found in the position and size of the teeth and bone. An esthetically pleasing face is regarded as one in which various facial features are well proportioned and balanced and relate well to other facial features.

Keywords: Soft tissue, Anthropologists, Puberty

Introduction

Face is beautiful & shows harmonious features if the proportions of its individual components are right”. That means “no individual structure is over emphasized in relation to others”. This is what he refers to as balance.

Soft tissue profiles for what constitute an excellent face have been repeated many times by representation of several disciplines including artists, anthropologists, reconstructive surgeons and orthodontists. St. Thomas expressed a direct relationship between beauty and mathematical numbers, the “FABONCCI SERIES”. According to him symmetry results from dynamic symmetry. In 16th century Leonardo da Vinci’s panting of the face contained in a large square and further divided in to small rectangles was interpreted as geometric recreation, Edward angle, believed that ideal occlusion is necessary for esthetics. He favored Greek profile to be ideal.1

Orthodontists base their treatment planning primarily on cephalometric evaluation. Recognizing that the orthodontic specialty has gone too far with its obsession with the placement of teeth at certain angulation on the basal bone and its effect on facial esthetics. It is common to hear that the treatment goals should be geared to the achievement of an overall facial balance. The true objective from the point of view of esthetics is to treat dentition to the face; however, an average face is considered more esthetic than one that is atypical. By knowing the soft tissue traits and their normal range, treatment plan can be designed to normalize the facial traits for a given individual.2

For a long time, orthodontists have focused on the horizontal lip position as the most important feature in determining beauty. Several lines have been introduced to assess the anteroposterior position of the upper and lower lips and the esthetic quality of the profile. The crux of the need for measuring was stated by Moroney as “It is always useful when we can measure things on a ruler instead of simply calling them big or small. Better treatment goals can be set if we quantitate the soft-tissue features which contribute to or detract from that “physical attractiveness stereotype”

With the advent of cephalometric various hard tissue analysis were used with no attention to soft tissues based on the assumption that soft tissue will anatomically adapt to the corrected dento-skeletal relation. In an article on soft tissue profile fallacies of hard tissue standards by Park and Burstone, showed that though dento-skeletal parameters were corrected to the ideal cephalometric norms soft tissue facial esthetics were not adequate. This land mark article marks the shift of the paradigm.3

One of the commonly used methods to visualize the probable soft tissue outcomes of orthodontic treatment is the cephalometric prediction tracings. However, prediction tracings have their drawbacks like variability in lip thickness, the degree of lip eversion and lip tonicity. Also the final artistic rendition of a predicted tracing may differ from one clinician to another. Therefore, these traditional tracings are often helpful only to the clinician and not the patient, since the
resulting soft tissue changes do not truly represent the patient’s final facial esthetic outcome.

The use of computers has greatly simplified the prediction process. Software systems can be programmed using mathematical algorithms to generate digital cephalometric tracings, capture pre-treatment profile photographs, and blend the tracings and photographs to produce a simulated post treatment appearance.

Konstiantos et al in 1994 did a study to examine the validity of the prediction of soft tissue changes after orthognathic surgery using computer software. The results indicated that for some of these landmarks the amount and direction of soft tissue changes differed from the actual4,5,6.

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Oft Tissue Changes with Growth Changes in Lip Length & Thickness Associated with Growth:
Subtelny measured longitudinal soft-tissue growth of upper & lower lip, the nose, & the soft tissue chin. Upper lip rapidly increases from 1-3 yrs, and then reduced between ages 3-6 yrs and again rapidly increases from 6-15 yrs.3,6,7,8,9,10

Thicknes: Greater thickness in vermilion region than region overlying point A, In both male & female Upper lip increased in thickness from 1 to 14 yrs.

Vig and Cohen documented both upper & lower lip grew more than skeletal lower face. The lip incompetency at age of 6 yrs. corrected by age 16 yrs. The vertical growth of the lips is definitely related to age and gender.

Length rapid increased in 1yr.-3yr. Markedly decreased 3yr,progressive increase in length of the Upper lip until the age of 15 yrs. Thereafter, growth in length slows down appreciably.

Mamandras found that most of the maxillary lip length in female was achieved by age 14. In male upper lip grows by age 18 but not complete. Lower lip length in female was achieved at the age of 16yrs & in males achieved at the age of 18 yrs.

Genecov found that males between age 7- 17, has greater increase in upper lip length than females.

Male -> 2mm vertical height of upper lip.

Females- < 1mm vertical height of upper lip.

Vertical relationship of the incisal edge of the Upper central incisor to the tip of the upper lip was relatively stable after complete eruption of the Upper central incisor.

Relationship of the Lower lip to the incisal edge of the Lower central incisor also established when the Lower incisors finished erupting at the age of about 9 years.

Maxillary lip length:
- Rapid increase lip length was 10 -16yrs in Male, 10 – 14yrs for Female.
- Overall increase of maxillary lip length 21.43% and 12.11% for Male and Female respectively.
- Significantly different between male and female subjects at 0.1, 0.05, and 0.005 levels for the ages of 14, 16 and 18 years respectively.

Maxillary lip thickness:
- Percentage of the overall increase from 46.33% for the Male & 14.68% for the female subjects
Most of the change in lip thickness were seen in Female between 10 and 14 years and in Male between 8 to 16 years of age. After which thinning of lip is seen

**Mandibular lip length:** In male age between 12-16yrs with small increase, half the size, between ages 8 and 12.

In female mandibular lip length increases between the age of 10-16yrs and almost no changes are seen between 8-10yrs & 16-18yrs.

**Mandibular lip thickness**

- Increased steadily for both male and female subjects from 8 - 16 years of age, and reached a plateau between the ages 16 and 18
- Rapid increase lip thickness is seen in Male between 14-16 yrs of age, In Female between 10 - 12yrs & 14 - 16yrs.

**Nasal Growth & its Contribution to the Profile:**

Subtelny documented the downward & forward growth of the nose that occurs during maturity. In male & female vertical dimension of nose showed more growth than A-P projection. In male nasal growth spurt occurred at 10 -16 yrs. & in female nasal growth seen around age 12 years and girls have slightly more nasal growth than boys during the early period of adolescence. Nasal bone growth completed before age 10, but soft tissue grew downward & forward with the maxillary complex. Class II malocclusion subject had more elevation of bridge of nose than did class I malocclusion subject. Class I subjects tended to have straight noses.

Genecov pointed out that nasal projection in females remained virtually constant from age 12 to 17. In males it grew from age 12-17. Nasal tip projection shows an early peak for girls between ages 9 -10 & for boys 13 -15 yr.

**The Chin:** Chin is the third most important soft tissue mass of the face.

Genecov studied soft tissue chin thickness from age 7 -9 measured from pg to pg’, in female it was 11.7 mm & in male it was 10.8 mm, after that 1.6 mm increased to age 17 in female & 2.4 mm increased to age 17 in male. As a result both had similar soft tissue chin thickness at age 17.
**Soft Tissue Changes between Ages 18 and 42**: Class I subjects between ages 18 & 42.

**Changes in males**
- Profile straightened & lips became more retrusive.
- Nose increased in size in all dimensions.
- Increased soft tissue thickness at pg.
- Decreased upper lip thickness with slightly increased lower lip thickness.

**Changes in females**
- Profile did not become straighter, & lips did not become more retrusive.
- Nose increased in size in all dimension.
- Decreased soft tissue thickness occurred at pg.
- Decreased upper lip thickness with slightly increased lower lip thickness.

**Nasal Changes**: Nasal projection increased & nasal tip moved more inferiorly.

**Lip Thickness**: Lips become less prominent & also located more inferiorly.

**Nasolabial Changes**: With the decrease in the lip prominence & lowering of the nasal tip, the nasolabial angle becomes more acute.

**Dental Changes**
- Upper incisor becomes more upright & lower incisor become more protrusive.
- The lower part of face appears to lengthen.
- The interlabial line descends down.

**Discussion**

**Soft tissue prediction is by 3 methods**
1. Cephalometric prediction
2. Tracing overlay method
3. Template method
4. Computer prediction
5. Cast prediction

**Changes with Normal Growth**
- Nasal growth
- Lip growth
- Chin growth

**Lip growth**[^1][^2][^3][^4][^5]: Vertical lip growth goes beyond the skeletal growth
- For males: 18 years
- For females: 14 years
- Mandibular lip growth is greater than maxillary lip growth
- For females: 16 years
- For males: 18 years

Lip thickness increases up to
- Males: 16 years
- Females: 14 years

The differential lip thickness between the two genders is consistently noted in these studies may mean the effect of extraction therapy on facial profile will be more noticeable in females than males because female lips do not thicken much during puberty so any extraction plan for females with straight to convex profile should be considered with caution.

The analysis of lip fullness on 12-13 year old males should include an understanding that although the lip becomes thicker, the rate of nasal growth is proportionally higher therefore lip fullness relative to the nose decreases.

**Nasal growth**
- Downward and forward growth of nose occurs during maturity
- Vertical growth of nose is greater than anterio-posterior growth
- For males growth spurts took place between 10 – 17 years and centered around 13 to 14 years
- Females, have steadier growth curve, till 12 years
- In females at 12 years of age will not have a drastic change in profile after the extraction therapy due to minimal increase in nasal projection in the following 2 years but when considering a boy of same age incisal retraction will produce less optimal result owing to increase in anterio-posterior nasal projection.

Chin growth
- That males and females will attain similar lip thickness of chin by the age of 17 years
- In adolescent patient with marginal lip fullness, orthodontic placement of incisors becomes very important, in these cases incisor retraction to reduce over-jet may result in undesirable effect.\textsuperscript{16}

Changes in Nasolabial Angle with Incisor Retraction:
Nasolabial angle change on incisor retraction is 1.6 °: 1mm, Nasolabial angle: LAFH = 2.2 °: 1mm, Nasolabial angle: mandibular plane angle is 3:1.\textsuperscript{17,18,19}

Changes in Upper Lip with Incisor Retraction: Upper lip thickened 1 mm with 3 mm of retraction of the upper incisors.

Upper incisor retraction to upper lip and lower lip retraction

Was 2.9:1 and 1:1, respectively.

Soft Tissue Prediction Based on
Tooth movement
Skeletal change

Tooth Movement: Not all parts of the soft tissue profile directly follow the underlying skeletal profile because of variation of thickness of soft tissue covering the face.

With incisor retraction, the upper lip rotates backwards around the subnasalae with reduction in prominence of lip relative to their sulcus.

Correlation analysis discloses that upper lip response is related not only to upper incisor retraction but also to lower incisor movement, mandibular rotation and lower lip position.

Lower lip moves less predictably with retraction of incisors than dose the upper lip.

The lower lip is much more self-supporting and not as dependent on the lower incisors.\textsuperscript{20,21,22}

Summary and Conclusion

“\textit{Beauty is in the eyes of the beholder}”

The facial proportions or measurements represent attempts to define preferred norms that are regarded as attractive. Attractiveness or facial beauty is subjective and culturally biased. So we can say that “beauty is in the eyes of the beholder”. Although recognizable, it can neither be defined nor amendable to measurement.

There is no universal ideal face. The facial measurements & proportions outlined are static frontal & Profile measurements. So, in addition to esthetic facial balance, there are other factors that contribute to overall perception of beauty. Among these are skin & hair correlation and style, facial expression and animation.

Careful examination and documentation of soft-tissue features will permit the reversal of negative traits and the maintenance of positive features in individuals, thereby enhancing clinical treatment. If the primary objective is facial improvement, soft tissue analysis becomes paramount in treatment plan.

The controversy still exists as to the ability of an orthodontist to predict soft-tissue changes at the time treatment is planned for a patient. Different study showed that with maxillary incisor retraction there is increase in nasolabial angle, increase in lip thickness of strained lips, retrusion of upper and lower lip, and increase in lip length. The nasolabial angle also increases with increase in LAFH with treatment mechanics as well as increase in mandibular plane angle.

So, during treatment planning one should know the soft tissue changes with maxillary incisor retraction & put them in a harmonious relationship.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Vertical Discrepancies in Orthodontics—A Review

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ABSTRACT

A malocclusion created due to a vertical discrepancy is of great interest in the field of orthodontics, because of its etiology, treatment planning and tendency to relapse in the post treatment period. It is important for an orthodontist to recognize its numerous components and understand their interrelationships. This article reviews some of the relevant literature and also some diagnostic and treatment planning suggestions to the orthodontist

Keywords: vertical discrepancies, open bite, deepbite

Introduction

The two kinds of malocclusions present in a case of vertical discrepancy are- Open bite and Deep Bite. The vertical dimension is unique in that the growth rate is highest and lasts the longest in this direction. Since growth tends to increase the vertical distance between the maxillary and mandibular jaw bases, performing treatment during this period is most advantageous, as stated by Rakosi (¹). He also states that vertical dimension is not stable. Late growth of the mandible may increase an already existing increase in vertical dimension, accentuating the malocclusion thus occurring due to the discrepancy. This work will reveal the review of literature the classification, diagnosis and management of the vertical discrepancies in Orthodontics.

According to Profit (²), Overbite is defined as the vertical overlap of the incisors. Overbite is explained as the percentage of the mandibular incisor crown, that is overlapped vertically by the maxillary incisors, when the teeth are in centric occlusion (²).

Overbite values range from zero to more than 100%. Deep bite is usually more prevalent than open bite (²). Anterior open bites occur more often than posterior open bites (²).

Etiology of Vertical Discrepancies: Vertical malocclusions develop due to interaction of many different etiological factors; most importantly mandibular growth. Habits such as thumb sucking and abnormal tongue resting position (³) abnormal facial height (excessive vertical growth) may cause an open bite malocclusion. Growth processes associated with vertical malocclusions must be understood along with normal and abnormal functioning of the soft tissues, i.e., the lips and the tongue, in order to successfully diagnose and plan treatment for such cases. Growth prediction of the mandible will therefore be of great importance to the treatment plan. The direction of growth of the condyle, direction of the mandibular growth characterize the development of a deep bite or an open bite. Björk and Skieller (⁴) demonstrated that the direction of the growth of the lower jaw varies greatly.

Patients with upward and forward growth of the mandibular condyle often have reduced anterior facial height and deep bite. The direction of the mandibular growth expressed at the chin, is vertical (⁵). Patients with a downward and backward growth of the mandible, with the so-called ‘long-face syndrome’. The associated dental eruption pattern of the posterior teeth is generally vertical.
Classification of Vertical Discrepancies in Orthodontics

I. Classification of Incisor Relationships in the Vertical Dimension: Ballard and Wayman first gave a classification of the incisor occlusion in 1964 (6), which in turn was based on the work of Backlund (7). Brook and Shaw (8) gave the British Standard Institute Classification of Malocclusion, considering incisor occlusion. This classification is considered superior to Angle’s classification because the posterior teeth did not influence the occlusion on the incisors.

The BSI-classification is as follows:

Class I: the lower incisor edge precludes with or lies immediately below the cingulum plateau of the upper central incisors.

Class II: the lower edges lie cervical to the cingulum plateau (middle part of the palatal surface) of the upper incisors.

Div I: there is an increase in overjet and the upper central incisors are usually proclined.

Div 2: the upper central incisors are retroclined. The overjet is usually minimal, but may be increased.

Class III: the lower incisor edges lie coronal to the cingulum plateau of the upper incisors. The overjet is reduced or reversed.

Modified British Standards Institute for Incisor Classification. (9)

Class I: Lower incisor edge occludes with the middle part of the palatal surface.

Class II: Lower incisor edge occludes with the cervical third of the palatal surface.

Class III: Lower incisor edge occludes with the incisal third of the palatal surface.

II. Classification of Deep Overbite: Depending on the etiology, overbite can be differentiated into Developmental deep bite and Acquired deep bite (1)

Developmental deep bite/Genetically determined deep overbites is further classified as:

- Skeletal deep overbite: There is a horizontal growth pattern observed in cases of skeletal deep bite. E.g. Class II Div 1 malocclusion.

- Dentoalveolar deep bite: A dental deep bite is caused by supraocclusion of the incisors. In such cases, the interocclusal clearance is usually small. i.e., the overbite is functionally a pseudo over-bite.

Acquired deepbite maybe caused by the following factors:

- A lateral tongue thrust produces an infraocclusion of the posterior teeth leading to a deep overbite. E.g. Class II div 2 malocclusion.

- Premature loss of deciduous molars

III. Classification of Openbite: Thomas Rakosi (1) states two kinds of factors which are concerned with the etiology of an open bite. They are:

Epigenetic factors: These include posture of the tongue, morphology and size of the tongue, skeletal growth pattern of the maxilla and mandible, particularly the mandible and the vertical relationship of the jawbases.

Environmental factors (10): Andrew Richardson (11), proposed an etiology-related classification:

- Transitional openbite.
- Open bite, due to habits.
- Open bite, due to the presence of:
  - Local pathology.
  - Skeletal pathology.
- Non-pathological or skeletal openbite.
- Skeletal (ab initio) openbite
  - Open bite that is improving.
  - Open bite, which is deteriorating.
  - Improving but later deteriorating type of open bite.
- Skeletal (de novo) openbite
- Open bite, due to the morphology and behavior of the tongue and lips.
Evaluation of Skeletal & Dental Relationships in the Vertical Plane of space

Open Bite

Esthetic Considerations\(^\text{(12)}\): The following relationships may be considered in evaluating esthetics:

- Balance between the nose, lips, and chin profile.
- The nasolabial angle.
- The configuration of the lips.
- A short upper lip
- The length of the lower third of the face and, the relative prominence or retrusion of the chin affects appearance.

Functional Considerations\(^\text{(12)}\): Cayley \(^\text{(13)}\) stated that anterior open bite and tongue thrust swallowing are closely associated. According to Bahr and Holt \(^\text{(12)}\), four types of tongue thrust activity may be differentiated, and subsequently form the basis for differentiating types of openbite:

- Tongue thrust without deformation.
- Tongue thrust causing anterior deformation
- Tongue thrust causing buccal segment deformation with a Posterior open bite
- Combined tongue thrust, causing both an anterior and a posterior open bite is another common dysfunction. This is called a complex open bite by Moyers and is more difficult to treat.

Clinical Considerations\(^\text{(12)}\): Depending on the severity of the malocclusion, various forms of anterior open bite may be observed.

- A simple open bite exists in cases in which more than 1mm of space may be observed between incisors, but the posterior teeth are in occlusion.
- A complex open bite - open bite extends from the premolars or deciduous molars on one side to the corresponding teeth on the other side
- The compound or infantile open bite is completely open, including the molars.
- The iatrogenic open bite is the consequence of orthodontic therapy,

Sassouni\(^\text{(14)}\) constituted facial characteristics of a skeletal open bite clinically as:

- Extruded incisors.
- Lower anterior facial height exceeds the upper anterior facial height.
- Large teeth present in the dentition.
- Crowding and dental protrusion.
- Impaction or ectopic eruption of molars.
- Palatal vault is high and narrow.
- Mouth is wide.
- Broad lips, kept apart at rest.
- Mouth breathing.
- ‘Chinless’ appearance

Cephalometric Criteria \(^\text{(12),(15)}\): Nanda\(^\text{(16)}\) gave the morphological basis of an open bite being associated with:

- Large gonial angle.
- Lack of compensating Curve of Spee.
- Large vertical anterior maxillary dimension(ANS -Mn)
- Anteroposterior rotation of the maxilla and mid -cranial fossa.
- Long mandibular corpus length.

Treatment of Open-Bite in the Deciduous Dentition \(^\text{(12),(17)}\): Treatment with screening appliances or activators is indicated. Extraoral orthopedic appliances such as chin caps can be used effectively to redirect growth. Treatment should begin when patients are 7 to 8 years of age\(^\text{(18)}\).

Treatment of Open Bite in the Mixed Dentition\(^\text{(12)}\): Three types of open -bite malocclusion may be differentiated in the mixed dentition period:

1. Dentoalveolar open bite
   - In the early mixed dentition period, screening therapy is indicated.
   - In the late mixed dentition, with a severe tongue thrust or posture problem, screening
therapy may be unsuccessful\(^{(19)}\). Constricted arches can be expanded during this stage using palatal expanders.

- Swallowing exercises (i.e., swallowing without thrusting, putting the tip of the tongue behind the upper or lower incisors)

2. Skeletal open bite.

- Treatment with activators combined with extraction and extraoral force application is considered.
- In extreme cases, with divergent rotation of the jaw bases, removal of four first premolars and fixed appliance therapy is the best approach to treatment.
- Severe cases might require orthognathic surgery, with impaction of buccal segments and even sagittal split osteotomy in some cases to close the bite and provide stable correction. M. Arat and H. Iseri\(^{(20)}\) evaluated the orthodontic as well as orthopedic approach to the treatment of skeletal open bite

3. Combined openbite: Most skeletal open-bite cases are probably at least partially attributable to abnormal perioral muscle function. Rolf and Christine Frankel \(^{(21,22)}\) supported this.

Elimination of abnormal perioral muscle function resulted in correction of skeletal relationships

**Treatment of Open Bite in the Late Mixed Dentition**

- Functional Appliance Therapy Activator
- Bionator-Open Bite Appliance
- Frankel Function Regulator
- Twin Block Vertical Activation

**Treatment of Open Bite in the Permanent Dentition\(^{(12)}\)**

- **Bite-blocks** intrude the posterior teeth and, thus, make possible autorotation of the mandible
- Transpalatal lingual arch
- Orthognathic surgery

**Recent Advances In Treatment of Open Bite**

**Meaw-Multiloop Edgewise Archwire Therapy**

- It was introduced by Dr. Young. H. Kim \(^{(23)}\).
- Double edgewise brackets with .018 slots with an auxiliary vertical slot are used.
- 16*22 stainless steel wire is used to fabricate the archwire with the vertical and horizontal loops.

**Miniscrews:** Miniscrews are relatively simple and easy to insert, less traumatic, stable for the optimal force, and make it possible to apply a force immediately after insertion\(^{(24)}\). Surgical intervention is the first treatment objective for open bite correction if the periodontal condition is unsuitable for molar intrusion \(^{(25)}\). Since the tendency for relapse is higher in adults, it is important to choose both a stable and predictable treatment method. This can be accomplished using temporary anchorage devices such as osseointegrated implants,\(^{(26)}\) miniplates,\(^{(27)}\) onplants, and miniscrews. Midpalatal miniscrew implants have been recently used for molar intrusion. Intrusion provides a more stable treatment result than extrusion

**Active Vertical Corrector:** The Active Vertical Corrector (AVC) works as an energized bite block. By the use of effective posterior intrusion of teeth, the mandible is allowed to rotate in upward and forward directions. The uniqueness of this appliance is that it allows the clinician to correct anterior open bite problems by actually reducing anterior facial height. The AVC force system generated by repelling magnets is considered superior to a static bite block appliance energized only by the intermittent force from the muscles of mastication

**Deep Overbite**

**The Morphologic Characteristics of the Deep Overbite**

**Dentoalveolar Deep Overbite:** The deep overbite caused by the infraocclusion of molars has the following symptoms:

- The molars are partially erupted.
- The interocclusal space is large.
- A lateral tongue posture and thrust are present.
- The distances between the maxillary and mandibular basal planes and occlusal plane are short.
The deep overbite caused by overeruption of the incisors has the following characteristics:

- The incisal margins of the incisors extend beyond the functional occlusal plane.
- The molars are fully erupted.
- The curve of Spee (compensating curve) is excessive.
- The interocclusal space is small.

**Skeletal Deep Overbite**

**Morphologic Characteristics**

- The posterior border of the ramus is nearly vertical.
- At the dentition level, the upper and lower incisors have their long axes nearly parallel and are vertically extruded, while the molars are intruded.
- The dentition exhibits a tendency towards small teeth.
- At the soft tissue level, the lips are thin with an excess of lip height relative to face height. This gives a curled appearance to the lips. There is a deep furrow or sulcus between the prominent chin and the lower lip.

**Cephalometric Criteria**

- The anterior facial height is short, particularly the lower facial third, whereas the posterior facial height is long.
- Fred F. Schudy, states that the relative anterior dental height (ANS to MN) determines in large measure the character of the act of swallowing.
- The horizontal cephalometric planes are approximately parallel to each other.
- The interocclusal clearance is usually small.

Sassouni enumerated the factors in the development of a deep bite:

- Lack of vertical growth between the cranial base and the maxillary posterior teeth.
- Excess of growth of the ramus and posterior cranial base.
- Mandible rotates in a closing direction.
- Pharyngeal space is large.
- Tongue is set posteriorly.

**Treatment Planning**

**Treatment of Deep Overbite During Growth**

- functional appliance therapy activator
- bionator
- twin block-vertical activation

**Treatment of the Dentoalveolar Deep Overbite:**

During eruption of the posterior teeth, the therapy can be performed with an activator to guide the eruption. In cases of extreme lateral tongue thrust, a palatal plate with a lateral tongue crib can be used to discourage the habit. If an additional cheek-sucking habit is evident, it can be eliminated with a modified labial bow.

**Treatment of Skeletal Deep Overbite:**

The treatment of a skeletal deep overbite requires consideration of the sagittal dimension.

Most skeletal deep overbites are combined with Class II sagittal intercuspation. The treatment of it can be handled with several therapeutic approaches.

- Growth inhibition of the upper jaw and growth promotion in the lower jaw combined with dentoalveolar changes
- headgear in combination with an activator.

**Treatment of Deep Overbite in Permanent Dentition**

**Intrusion Arches**

- K-SIR (Kalra-Simultaneous intrusion and retraction)
- Connecticut intrusion arch
- 3-piece intrusion arch for simultaneous intrusion and retraction
- Intrusion retraction mechanics
- Burstone’s segmented arch.
- Mushroom Loop Archwire.

**Conclusion**

The problem of a vertical discrepancy is multifactorial. Diagnosis is the key to the correct management of the dental and skeletal structures. Pattern, variability and timing of growth is an important concept. In diagnosing a malocclusion in the vertical dimension,
it is important not to concentrate on one aspect of the patient’s overall condition to an extent that other significant features may be overlooked. Orthodontic malocclusions are almost always the culmination of a developmental process and not of a pathologic process. Classification has traditionally been an important tool in the diagnosis-treatment planning procedure. Early orthodontic treatment remains the ‘gold standard’ for contemporary care.

**Ethical Clearance:** Not needed as it is a review article

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Magnets and Orthodontics—A Review

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ABSTRACT

The last few decades visualized magnets being used in orthodontics and dentofacial orthopaedics and attempts have been made to evaluate the biological implications of magnets and magnetic fields during clinical application. This article gives an overview about magnets in general and its possible applications in orthodontics.

Keywords: Applications, magnets

Introduction

A new treatment modality is trying to emerge proving to overcome the reservation and criticism. The practical difficulties associated with the old technique paves way to promulgate a new technique. Before practicing any new technique, a thorough knowledge about it is mandatory.

History

In ancient time, a particular kind of iron called as magnetite was discovered to have the property of attracting unmagnetized iron. It got named after the town of Magnesia from where it was discovered.

The magnets proved to show no adverse bio-effects on human environment. These reports gave entry to magnets in the field of medicine and dentistry and now in orthodontics also. In dentistry, magnets were used first in 1953 as implants for denture retention by Behrman and Egan.¹

In orthodontics, elastics, springs, and screws have been the conventional source of force, with drawbacks like lack of patient’s co-operation, force degradation and irregular activation intervals. Blechman and Smiley used magnets first in orthodontics ² proving magnets to have sufficient duration and intensity. They are operator controlled and controls all three planes with no patient discomfort. Rare earth magnets like samarium cobalt, introduced by Becker in 1970 eventually replaced previously used magnetic alloys like Al–Ni–Co, ferrite and platinum–cobalt magnets which were bigger in size, expensive with risk of demagnetization.

Types of Magnetic Material

Ferrite Magnet Ferrite of barium and strontium are highly resistant to demagnetization and available in both isotropic and anisotropic form. They are not used in orthodontics.

Aluminum–Nickel–Cobalt Magnets They have high field strength at a reasonable cost and are physically strong with density of 7.3 g/cm³. They are available in both isotropic and anisotropic forms. But the risks were demagnetization and large size.

Rare Earth Magnets

More recently Samarium–Cobalt (SmCo) and Neodymium–Iron–Boron (NdFeB) magnets are available. These rare earth magnets are 20-times stronger and smaller than the previous magnets.

Rare earth metals when incorporated, increases their ability to be magnetized, to get coercivity property and increases Curie temperature. The rare earth magnets produce high force relative to their size due to the

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property of magnatocrystalline anisotropy. They also give maximal force at short distance when compared to elastics.

**Samarium–Cobalt Magnet:** It is a powdered, metallurgically processed, inter-metallic alloy of Cobalt and rare earth metals. It is available in two forms, SmCo₅ and Sm₂Co.

1. Superior magnetic properties when compared to other rare earth magnets except Nd–Fe–B magnets.
2. Low demagnetization making it ideal and small for orthodontic use.
3. High resistance to demagnetization with time.
4. High Curie point of 680°C allowing heat sterilization and manipulation with heat up to 200°C without demagnetization.
5. High corrosion resistance since they are parylene coated
6. They are brittle but stronger than NdFeB magnets.

**Neodymium–Iron–Boron Magnet:** The most recently developed alloy with highest magnetic energy per unit volume. It has both isotropic and anisotropic form. When compared to SmCo magnets, they are less brittle and are 240-times more susceptible to corrosion. They are of three types.

1. Neo 1i
2. Neo 3i
3. Neo 5i

**Magnetic Properties**

**Magnetic Field:** The space around a magnet where its influence is felt is known as magnetic field. The poles of a bar magnet experience forces of attraction or repulsion in any magnetic field. Like poles repel and unlike poles attract.

**Hard Magnet:** Magnet that is resistant to demagnetization in the presence of higher magnetic field at higher temperatures and lesser size of 1 mm or less.

**Soft Magnet:** Magnets that become demagnetized in the presence of higher magnetic field at higher temperature and lesser size of 1 mm or less.

**Flux Density (B):** It is the magnetic field strength on the pole face of a magnet which depends on the material and shape. It is measured by Hall Probe. The units of flux density are Gauss (G), Tesla (T) and Millitesla (mT).

**Coercive Force:** It is also known as field intensity and denoted as Hc. It is the strength of the demagnetizing field where flux density is zero. The unit is Oersted.

**Coercivity:** It is the strength of the external field to demagnetize the material. A high coercivity is needed to prevent the magnetization of permanent magnets when they encounter fields produced by other sources.

**Coulomb’s Law:** This law states that the force between two magnetic poles is proportional to their magnitudes and inversely proportional to the square of the distance between them.

**Curie Point:** Rare earth magnets tend to lose their magnetism at room temperature. Pierre Curie (1859–1906) observed that magnets tend to lose their properties if subjected to a specific temperature that causes their domain to return to random distribution. This point of temperature is called Curie point. In orthodontics, this has been overcome by combining magnets with other elements making it effective appliances that can be heat sterilized.

**Three Dimensional Centripetal Orientation of Attractive Magnetic Force:** When two magnets are displaced in all three planes, they attract to a complete overlap. Centripetal attraction in all three spatial dimensions gives the operator complete tooth control on precise engagement.

**No Interruption of Magnetic Force Lines by Intermediate Media:** Any media interposed between two magnets cannot stop the passage of magnetic force lines. Intra-oral magnets remain attracted to each other even if soft or hard tissues get in between them.

**No Friction in Attractive Force Configuration:** Attracting magnets are useful in controlling the three spatial dimension. This feature is called centripetal orientation. When an attractive force configuration is used, frictional forces are excluded. But repulsive forces may induce friction in the appliance and demands an increase in force threshold.
Biologic Concept of Magnetic Force and Histological Changes

- Magnetic forces inflict a minimal stress to a point
- No subcutaneous changes as inflammation occurs under magnets.
- Obvious inhibitory effect on the bone lining osteoblasts which by feed back mechanism promotes osteoclasts differentiation.
- Magnets by making the erythrocytes thinner and longer, enables them to pass through the compressed capillaries in the PDL during orthodontic loading. Thus the chances of necrosis is reduced.
- The dental pulp or gingival tissue remains unaffected on exposure to magnetic field.
- Increased proliferation and systemic activity in fibroblasts in the presence of static magnetic field have been reported by McDonald in 1993 and also a doubling of alkaline phosphatase in osteoblast like cells were noted.

Magnetic Force in Orthodontics: Magnetic force is applied in orthodontics for

1. Relocating impacted teeth.
2. Arch expansion.
3. Distalization/mesialization of teeth.
4. Intrusion of posterior teeth in open bite cases.
5. Class II correction with functional appliance.
7. Closure of midline diastema.
8. Uprighting and derotation of teeth.
9. Retainers.
10. Magnetic brackets.
11. PUMA—hemi facial microsomia.
12. Class II correction with magnetic twin block (Clark). Non-extraction and extraction cases.
13. Non-extraction and extraction cases.
15. Extrusion of fractured teeth.
16. Fixed magnetic appliance.

Magnetic Activator Device (MAD): Used for the correction of

1. Mandibular deviations (MAD I).
2. Class II malocclusion (MAD II).
3. Class III malocclusion (MAD III).
4. Skeletal open bite (MAD IV).

The SmCo magnets when used in attractive or repelling mode achieves orthodontic and orthopedic correction. In MAD, attracting magnets are used on a two piece activator which allows freedom for mandibular movement. In Class II malocclusions with open bite, it is combined with posterior repelling magnets on the maxillary plate for arch expansion which is called magnetic expansion device (MED). MAD IV for skeletal open bite uses a combination of posterior repelling magnets and anterior attracting magnets. (Figure 1)

Figure 1: Magnetic activator device

Active Vertical Corrector: An adaptation of the present day bite block therapy introduced in 1986 by Dr. Eugene L. Dellinger. It is a simple removable appliance with posterior occlusal bite blocks containing repelling magnets for posterior teeth intrusion, rotating the mandible upward and forward thereby treating skeletal open bite.

Growing subjects show more skeletal changes whereas adults show more dental changes. (Figure 2)
**Fixed Magnetic Appliance:** This appliance consists of upper and lower acrylic splints with SmCo magnets placed in repelling mode. The acrylic blocks are bonded and extended along the posterior segment, with a wire continuing from these splints to the incisors, thus transmitting the repelling force to the entire arch (Figure 3).

![Figure 3: Fixed Magnetic Appliance](image)

**Magnetic Twin Block:** Dr. William J. Clark has modified twin block by using SmCo and neodymium-boron as attracting magnets to occlusal inclined planes to maximize the orthopedic response to treatment.

**Attracting Magnets:** built into the initial construction bite pulls the appliances together and encourages the patient to occlude actively and consistently in a forward position.

**Repelling Magnets:** built into the occlusal inclined planes apply additional stimulus to forward posture as the patient closes into occlusion. But the amount of activation is not clear and reactivation of the inclined planes would deactivate the magnets.

**Indications:**

1. Patients with weak musculature who fail to respond to functional therapy.
2. Where speed of treatment is an important consideration.
3. To correct unilateral mandibular displacement in growth.

But if the attractive force is too strong, the appliance may get displaced or acts as a monoblock, loosing the advantage of twin block flexibility (Figure 4).

![Figure 4 (A, B) Magnetic Twin Block](image)

**Repelling Magnets:** Gianelly et al and TakamiItoh et al used repelling magnets for distalizing molars.

A modified Nance appliance, fixed to the maxillary first premolars with a wire extending from the first premolars to the palatogingival surfaces of the incisors is soldered to the framework of the appliance. An acrylic button contacts the incisors. An auxiliary wire, with a loop at its end, is soldered to the labial surfaces of the first premolar bands so that both approximate the mesial surfaces of the first molar bands. Now the magnets could only be separated if the molars moved distally or the incisors moved mesially.

The magnets exert a force of 200–225 g, but drops substantially as space opens. When 1 mm of space opens, the force reduces to 75 g. So retying the ligature once a week is mandatory to ensure at least 75 g of force against the molars. The molars distalize about 3 mm in 7 weeks for patients without second molars and 0.75–1 mm per month for patients with second molars.

Blechman and Alexander introduced miniaturized magnets for distalizing molars. They found that the light force generated by these magnets, is adequate for a rapid and translatory molar distalization (Figure 5).
Magnetic Brackets: It consists of a SmCo magnet with an edgewise bracket on one surface to receive arch wires and a mesh on the other surface that facilitates direct bonding to teeth. They deliver 250 g of force.

Though shorter treatment time and good biocompatibility, it involves complex of laboratory preparations. Kawata developed a modified version with a slot in the magnets, allowing simultaneous edgewise arch wire mechanics with an attractive magnetic force system.

Propellant Unilateral Magnetic Appliance (PUMA): This was introduced for stimulating an autogenous costochondral graft in hemifacial microsomia consisting of SmCo magnets embedded in lower acrylic bite blocks in the repelling mode.

Magnetic Appliance for Treating Snoring Patients with and without Obstructive Sleep Apnea Syndrome: Mats Bernhold and Bondemark designed this appliance in 1998. During sleep, when the masticatory muscles are relaxed, the mandible moves backward and closes the upper airway space. So two intra-oral occlusal splints, maxillary and mandibular, each with four parylene coated NdFeB magnets are used. This appliance demands full tooth coverage of splints to prevent undesired tooth movement.

Rare Earth Magnets and Impaction: Rare earth magnets are used for erupting impacted teeth. A magnetic bracket is bonded to an impacted tooth and intraoral magnet linked to a Hawley type retainer is used to guide the erupting tooth

Functional Orthopedic Magnetic Appliances (FOMA): It is used to correct to Class II (FOMA II) and Class III malocclusion (FOMA III). FOMA II consists of an upper magnet placed anterior to a lower magnet in a non-displayed jaw relationship. Both magnets are incorporated in the upper and lower plates. The FOMA III consists of an upper and lower plates with magnets incorporated in each plate and upper magnet is retracted periodically.

Magnets for Midline Diastema: Rectangular attractive magnets (SmCo) of 5 mm × 3 mm × 1 mm delivers 117.5 g of force on each maxillary central incisor to close midline diastema.

Extrusion of Fractured Teeth: The magnetic system with one or two cylindrical parylene or SS coated NdFeB magnets is placed in the coronal part of the tooth remnant with a thin layer of composite. Axially over the root, another larger parylene coated magnet of 5 mm × 5 mm × 2 mm is embedded in acrylic with a maximum gap of 2 mm. After adequate extrusion, the tooth can be restored.

Magnets in Extraction Cases: The magnetic assembly attached to the upper sectional arch wire is free for sliding through the occlusal upper molar tube and is ligated to the mesial aspect of the upper canine bracket. The lower magnet is attached to a similar sectional arch passing through the occlusal tube of the lower molar band. The upper and lower magnetic pole in attraction must face each other and generates force necessary to move the upper canine distally along the base arch wire. The upper canine retraction can be enhanced if needed by adding a third magnet to the lower sectional arch and positioned mesially to repel the upper magnet. The lower arch anchorage can be protected by a heavy arch wire.

Non-extraction Case: For this, the upper magnet is attached mesial to the upper molar tube and the lower magnet mesial to the upper magnet with 0 mm gap, if maximum force is required. When both magnets are positioned the line of their pole faces is approximately 70° from the horizontal plane to reduce interference from mandibular movement.

Magnetic Retainer: The same magnets used for closing the midline diastema can be refixed on the palatal aspect of maxillary incisors after recycling.

Magnets in Posterior Single Tooth Molar Cross Bite: It is essentially a single tooth intrusion or extrusion system which consists of:
1. **An adjustable magnetic module** attached on the upper molar.

2. **Magnetic module** attached on the lower molar.

3. **A bond on segmental arch wire**

4. **A set-screw wrench.** For adjusting the locking system in the adjustable magnetic module in a repulsion mode (intrusion) onto the tooth, with a buccal offset in the arch wire, allowing cross bite correction to occur simultaneously with intrusion.

**Functional Magnetic Appliances:** Rare earth magnets are buried in acrylic at the midline lingually. A maxillary guiding prong that slides on the lingual acrylic of the lower appliance during closure pushes the mandible forward into the desired protrusive relationships as the attractive magnets contact. This unloads the condyle like other functional appliances except that the functional stimulus is more.

**Recycling:** Recycling does not affect the biocompatibility and force stability of the magnets even though the process involves autoclaving. It is proven that cytotoxicity is high for uncoated SmCo5 magnets and low for NdFeB magnets. But magnets should not be recycled for ethical reasons and they also demagnetize during the process.

**Conclusion**

Though magnets have the potential to pave its way into orthodontics entitled “magnetic orthodontics”, further long term studies are required to probe into the biological effects of magnets.

**Source of Funding:** Nil

**Conflict of Interest:** Nil

**Ethical Clearance:** Not applicable as it is a review article

**REFERENCES**


Mandibular Symphyseal Distraction Osteogenesis—A Review

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ABSTRACT

Mandibular symphyseal distraction osteogenesis (MSDO) is nothing but regular distraction osteogenesis (DO) performed at the symphysis wherein, the new bone formation occurs between bone segments that are gradually separated by incremental traction. Treatment planning decisions in the transverse dimension are based on the mandibular arch width and form. Mandibular symphyseal distraction osteogenesis supplements orthodontic treatment to resolve mandibular anterior width deficiencies or dental crowding. This article focuses on indications, orthodontic preparation, surgical procedures, complications, long term effects and stability of mandibular symphyseal distraction osteogenesis.

Keywords: Mandible, Osteogenesis, Osteotomy.

Introduction

Transverse mandibular symphyseal deficiency is an important cause of mandibular incisor crowding. Transverse mandibular deficiencies in growing patients are commonly corrected with orthodontic expansion, using lip bumpers¹⁻³, Schwarz devices⁴, or functional devices⁵,⁶. These appliances show stable results for younger patients, particularly patients who presented with lingually tipped teeth. Whereas anterior expansion in adult patients is unstable and tends to relapse toward the original dimension. In such cases, mid symphyseal distraction has been suggested for correction of transverse mandibular deficiencies. However there is risk of relapse in MSDO when the osteotomised bone segments are improperly fixed. Greater stability could be expected if the expansion is performed at prescribed rate and rhythm, allowing better adaptation of the soft tissues, and allowing bone to grow in the between osteotomised segments⁷

Distraction osteogenesis (DO) originated as a method to repair skeletal deformities and large, non-healing, segmental bone defects resulting from injuries suffered by Russian soldiers during World War II. The method, which increases the length of bones by causing new bone to form between two surgically separated segments of bone was discovered inadvertently by a nonsurgically trained general practitioner, Gavril Ilizarov, in a small town in Siberia. Subsequently, Professor Ilizarov became a renowned orthopaedic leader due to the revolutionary advancements in bone management arising from DO⁸,⁹.

Symphyseal distraction osteogenesis was pioneered by Guerrero (1990). Tab 1 shows the evolution of distraction osteogenesis

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1901</td>
<td>Alessandro Codvilla</td>
<td>Limb lengthening (biological behavior of bone lengthening)</td>
</tr>
<tr>
<td>1927</td>
<td>Rosenthal</td>
<td>first mandibular osteodistraction by using intraoral tooth-borne appliance</td>
</tr>
<tr>
<td>1948</td>
<td>Crawford</td>
<td>gradual incremental traction to the fracture callus of the mandible by the use of jack screw appliance</td>
</tr>
<tr>
<td>1951</td>
<td>Gavril Ilizarov</td>
<td>Limb lengthening – clinical use</td>
</tr>
<tr>
<td>1955</td>
<td>Trauner &amp; Obwegeser</td>
<td>BSSO for Mandibular Lengthening</td>
</tr>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
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<tr>
<td>1989</td>
<td>Joseph Mccarthy</td>
<td>extra-oral distraction in human craniofacial region</td>
</tr>
<tr>
<td>1990</td>
<td>Guerrero</td>
<td>Mandibular symphyseal DO</td>
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<tr>
<td>1995</td>
<td>Polley and Figuera</td>
<td>rigid external distractor for mid face.</td>
</tr>
<tr>
<td>1996</td>
<td>Chin and Toth</td>
<td>1st alveolar distraction</td>
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**Rationale for Mandibular Symphyseal Distraction**

**Osteogenesis:** With the advent of symphyseal distraction to increase the transverse width to correct imbrigation of lower anteriors, the other methods of increasing transverse width with lip bumpers, myofunctional appliances, midline osteotomy and bone grafting have become obsolete in clinical practice, so much so that symphyseal distraction has become gold standard for transverse width correction in cases of “v” shaped skeletal arch.

While planning for symphyseal distraction, the antero-posterior position must be considered using model analysis by placing them in the anticipated final occlusion to prevent either over- or under-performing the expansion. Such analysis helps in obtaining a appropriate skeletal change as planned, thereby reducing the need for dental compensations.

In patients with a complete buccal crossbite where the maxillary dentition telescopes over the mandibular dentition, the possible etiologies could be related to a habit, an excessively large maxilla, or a skeletal mandibular transverse deficiency associated with hypoglossiahypodactyilia syndrome. Previously, the only method of correction was a vertical symphyseal osteotomy, rotating the two hemi-mandibles laterally, placing a bone graft, and fixating. In MSDO, bone grafts are not needed and the regenerated bone, once ossified, has the same properties as the innate mandibular bone.

Before planning mandibular symphyseal distraction, it is essential to predict the requirement of maxillary transverse expansion. Such maxillary transverse deficiencies can be corrected with rapid maxillary expansion (in adolescents), SARPE (surgically assisted rapid palatal expansion), MARPE (miniscrew anchored rapid palatal expansion) or a segmental LeFort I osteotomy followed by mandibular symphyseal distraction osteogenesis.

In the maxillary arch, it has been suggested that for every 1.0 mm of rapid maxillary expansion, approximately 0.7 mm of arch length gain can be realized. Ricketts et al. (1982) stated that 1 mm of intermolar expansion increased the perimeter by 0.25 mm, although the method for obtaining this guideline was not revealed. According to 3D simulation (Motoyoshi et al., 2002), a 1 mm increase in arch width results in a 0.37 mm increase in the arch perimeter. When these rules are applied, a 1–1.5 mm increase in the arch perimeter is expected permissible limit. To adequately use the arch length in posterior alignment, the teeth adjacent to the osteotomy must first be moved into the regenerate bone.

An occlusogram analysis is an accurate method for planning symphyseal distraction. Conventionally the mandibular arch has been considered as the template for determining arch width and arch form, whereas in cases where MSDO has been planned the maxillary arch is used as the reference arch to determine the appropriate amount of mandibular expansion. The current maxillary width is drawn on a 1:1 copy of the models. Then, the appropriate amount of buccal overjet is transferred to the mandibular acetatesheet. The amount of symphyseal distraction required is the distance between planned transverse dimension and the current mandibular transverse dimension represents.

The occlusogram analysis allows planning of all tooth movements to be performed on an acetate tracing prior surgical procedure, thereby helping the clinicians to determine whether the movements are too large or impractical beyond biological limits before performing any orthodontic or surgical procedures. Such intricate planning reduces unnecessary and inappropriate treatment.

**Pre Distraction Orthodontic Preparation:** Once a heavy rectangular wire is fixed on the maxillary arch, separators are placed on the mandibular molars and premolars.

3-5 days after the separators placement, the bands are fitted and impressions are taken for band transfer. The Hyrax screw is adapted to the bands, and is soldered as anteriorly and vertical (Fig 2A) as feasible to allow near-normal tongue movement and speech. One or two days before surgery, the appliance is placed on the lower arch.

Obtaining the necessary lower incisor root divergence for safe placement of osteotomy cut is one important factor to be considered to avoid root damage.
Proclination of the mandibular incisors during distraction is a clinical concern. Significant proclination was observed in patients who did not have orthodontic wires placed before the distraction procedure. Proclination was probably due to the distraction pattern of the tooth-borne device, which disproportionately rotated the segments laterally and anteriorly. Del Santo et al 2000 in his study observed that patients who had orthodontic wires in place at the time the postdistraction radiographs were taken showed no changes in incisor inclination, suggesting that orthodontic treatment compensated for the proclination produced by distraction. Therefore it is important to bond all the brackets before surgery.

**Types of the Distractor:** MSDO distracters are classified into three types:

- Bone borne variety (Fig 1)  
- Tooth borne variety (Fig 2)  
- Hybrid variety (Fig 3)  

The interdental osteotomy is done generally between the central incisor roots. Osteotomy cuts given for MSDO varies from that of orthognathic surgery by the fact that excessive care must be taken to preserve as much periosteum, endosteum, periodontium, and bone as possible in the distraction site. If too much tissue is traumatized or removed, a greater void is created and callus formation is slower and less organized.

The location and vector of the distraction force are of great importance because they might influence the shape of the distraction gap, if the force is applied near the center of resistance of the mandible, the distraction will produce pure translation of the segments and the distraction gap will have parallel margins. However, if the force is applied above the center of resistance, rotation of the two segments might be expected, resulting in a disproportionally larger gap in the dentoalveolar area than in the basal area.

Bell et al., 15 however, performed mandibular symphyseal DO in monkeys and showed disproportional movement between the bone segments and dental tipping when using tooth-borne DO devices. Hollis et al16 confirmed adverse dental effects with tooth-bone devices in 4 dogs; the teeth moved approximately twice as much as the bone segments. Del Santo et al17 confirmed that symphyseal distraction, using a tooth-borne device, was disproportional because width increases between the second molars were greater than biantegonion width increase. Bone-borne expansion devices have a greater potential for proportional movement than do tooth-borne appliances. Furthermore, the procedure does not involve tooth movement, and more stable results can be expected. Whereas on the other hand the risk of tissue inflammation or irritation 19 is lower when using toothborne distractors, they are much less expensive than the bone-borne titanium appliances, also the need for second surgery to remove the distractor and bone screw is avoided.

Success of DO lies in the formation of a high quality, highly organized callus. Therefore latency period plays a very critical role. Without allowing time for a callus to form, callus manipulation cannot occur. Without a good callus, the quality of the regenerate bone can be adversely affected, resulting in poor quality bone, fibrous union, nonunion, tooth loss, periodontal defects, and other complications. The latency period is five - seven days. young children require a shorter latency period as healing is accelerated and older patients may require a slightly increased latency period because of a slower rate of healing.

Proper rate, rhythm and distraction vector contributes to the success of MSDO.
The tooth-borne expansion appliance - activated 8 turns at the time of surgery (2 mm) or until there is blanching of the gingival tissue.

- The bone-borne appliance - activated 4 turns at the time of surgery (2 mm).

Distracting too fastly can lead to poor bone quality, poor union, fibrous union, or partial union. Distracting too slowly can lead to premature consolidation and an inability to obtain the planned amount of expansion. Prescribed rate of distraction is 1 mm a day. The rhythm of distraction refers to the number of increments required per day to reach the preplanned distraction. Most of the tooth-born appliances are designed for approximately 0.20–0.25 mm per activation, whereas most bone-borne appliances are set at approximately 0.50 mm per activation. After distraction is completed, the expansion screw must be sealed with flowable composite for the stabilization.

**Postdistraction Orthodontic Movement:** CBCT or Intra oral periapical radiographs to be taken every two weeks after distraction is completed to assess the radiodensity of the distraction cite. Tooth movement should be initiated only after radiographic evidence of consolidation is observed. Occlusal X-rays allow accurate visualization of the teeth, distraction site, and evidence of calcification. Stabilization period of three months is sufficient to observe calcification of the site. The distractor should never be removed until this evidence is observed because the rigidity it provides increases the quality of the callus. To prevent premature mesial migration, arch wire stops, an open coil spring, or an acrylic tooth can be placed in the distraction space. Allowing the teeth to move into the gap too early could lead to periodontal defects, bony defects, and potential loss of one or more teeth. Brackets placed presurgically to diverge roots should be repositioned into ideal positions. Application of light continuous force to the teeth adjacent to the distracted bone segments simultaneously when the acrylic tooth is reduced mesially will aid in space closure. The distractor is usually maintained in position for 45-60 days after surgery. The results of a study done by H. İşeri and S. Malko 2005 suggest that a consolidation period of approximately 3 months seems to be sufficient to prevent post-distraction relapse following mandibular widening. If the bone regeneration is slow in the distracted region, the distraction appliance may be maintained in place for as long as three months. To maintain the expansion obtained from distraction, a passive 0.036-inch stainless steel lingual arch should be placed after removal of distractor.

**Retention and Stability:** Essix type retainers may not be rigid enough to maintain the increased transverse dimension. If patient is more concerned about esthetics, it should only be used during the day and a Hawley retainer used for evening wear. A fixed canine-to-canine wire will adequately maintain the canine width and anterior alignment, but it does not aid in maintaining any posterior expansion. Hawleys retainer with integral lingual support wire is a good form of mandibular retention.

Symphyseal distraction significantly increased intercanine and intermolar arch widths, which led to incisal proclination if presurgical orthodontic manipulation was not performed. This dental tipping often results in long-term incisal instability. Long-term follow-up study 17 of PA radiographs did not show any significant transverse change, neither skeletally (bicondylar, bigonion, and biantegonion widths) nor dentally (intermolar and intercanine).

**TMJ Considerations:** Effect of MSDO on the temporomandibular joint and supporting structures is of great importance for a successful treatment. For every 10 mm of expansion approximately 3 degree of rotation occurs at the condyle.20

Study by Braun et al 21 revealed that the condyles are laterally displaced in a linear fashion in proportion to the amount of targeted symphyseal distraction. It is fortunate that the TMJ appears to accommodate these displacements22 because symptoms were not introduced, or, if present before treatment, symphyseal distraction did not exacerbate them.

**Complications**

Complications after mandibular midline distraction surgery are mostly mild or transient. Following is the list of complications that may occur during or immediately post surgery 23, 24:

- Injury to lower incisor root during surgery
- The risk of tissue inflammation or irritation
- Post surgical swelling
- Loosening of screws
Recession development after mandibular midline distraction
- development of scar strictures
- reossification incase of longer latency period

**Conclusion**

Individualized diagnosis and treatment planning are essential to appropriately address each patient’s needs and goals. Symphyseal distraction osteogenesis offers an alternative treatment method to resolve crowding and transverse mandibular deficiencies with more stable results.

**Ethical Clearance:** Not required since it is a review article

**Source of Funding:** Nil

**Conflict of Interest:** Nil

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A Review on Soft Tissue Prediction Techniques in Orthodontics and Orthognathic Surgery—Evolution of Three Dimensional Techniques

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ABSTRACT

The criteria for a successful treatment outcome is not only the correction of skeletal and dental abnormalities but also an aesthetic improvement as judged by both patients and practitioners. The objective of treatment simulation is to allow the clinician to visualize and manipulate the soft tissue structures, so to compare different treatment alternatives. The purpose of this study is to provide a overview on how various three dimensional soft tissue prediction techniques evolved and improved through years.

Keywords: Three dimensional techniques, soft tissue, surgical- orthodontic treatment outcome

Introduction

Facial soft tissue (skin, connective tissues, fat and muscles), facial skeleton (bone and cartilage) and dentition square measure the 3 vital tissue teams in odontology and orthognathic surgery, which can be referred to as a triad. This triad plays a decisive role in planning orthodontic therapy and orthognathic surgery. There are five general methods of visualising, planning and predicting surgical-orthodontic treatment outcomes- starting from acetate tracing to 3-D planning.

Treatment planning and the prediction of treatment outcomes in orthognathic surgery have conventionally relied on tracing of cephalometric radiographs manually and the use of hard-to-soft tissue ratios. However, in recent years, three dimensional (3D) computer planning and CAD/CAM has attained popularity as an accurate surgical simulation that is valuable for clinician to patient communication, surgical planning, and the assessment of treatment outcomes. Various commercial programs are available for 3D soft tissue prediction, which varies by the physical model they utilize. Some are based on models that require landmarking and depends on interpolation between points, whereas others use dense volumetric models, including finite element models (FEM), mass tensor models (MTM), or mass spring models (MSM). Technological developments have led to the development of different three-dimensional (3D) technologies such as multi planar CT and tomography scanning, 3D photography modalities and surface scanning. Moss et al (1988) added emphasis to the previous methods of 3D-planning by including laser scanning to model the soft tissue response to hard tissue movements.

Discussion

Uses of Soft tissue prediction: (Taylor 1998)

1. Plan mechanics.
2. Plan type of surgery and nature of osteotomies.
3. A basis for communication
4. A basis for informed consenting.
5. A basis for splint construction.
7. Assess need for extractions.
8. Provides a reasonable prediction of soft tissue changes, that can provide a basis for computer imaging.

Evolution of various soft issue prediction techniques:

1. The first method has been in use for the past 20 years. “Acetate tracings” (Figure 1 & 2) of skeletal structures are manually repositioned over the original cephalometric tracing to simulate the proposed surgical movements.
2. Manipulation of patient photographs called a "photometric plan".

3. Computerised diagnostic and bobbing up with package that created a soft tissue profile ‘line drawing’ as a result of manipulation of digitised structures of lateral cephalometric radiographs.

4. Computerised diagnostic and coming up with software package that “integrates video images” with the patient’s lateral cephalograph to aid in planning and predicting. Video imaging is advantageous over other prediction techniques in 2 ways: 1. The image facilitates communication between clinician and patient. 2. Valuable aid in treatment planning decisions by providing a manipulatable image for the orthodontist and surgeons to decide on the best soft tissue outcome. (Harradine 1985, Sarver 1988, Sinclair 1995).

5. "Three-dimensional" engineering Figure 1(B) for planning and predicting orthodontic and orthognathic surgery outcome. (Moss et al 1988)

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**Figure 1: Acetate Tracings**

**Figure 2: Three Dimensional Engineering**

2-Dimensional Radiographic Analysis: In order to use a computer programme to plan orthognathic treatment, the radiograph needs to be digitised prior to analysis.

Two methods are described (Travess and Juggins, 2007):

1. **Direct computer digitisation** of the radiograph:
   - The radiograph is placed onto a digitising light box. Anatomical points are entered into computer using a cursor or electronic pen.

2. **Indirect computer digitisation** of the radiograph:
   - Image is captured (scanned image or true digital image) and stored on the computer.
   - Image displayed in orthognathic programme and digitised using a cursor.

Studies have shown that the direct and indirect methods of cephalometric analysis are comparable (Richardson, 1981; Oliver, 1991; Sarver, 1998). There are advantages of using the indirect method:

- Digital storage of radiographs allows easy access when required. Use of magnification, alteration of brightness and contrast allow more detailed visualisation of the image.

**Orthognathic Prediction Software** are programmes available for the analysis and prediction of orthognathic treatment. Few softwares are listed below:

- OPAL image version 2.2
- Dolphin imaging 10
- Dentofacial Planner 8.05
- Quick Ceph Image
- Computer assisted simulation system for Orthognathic surgery (CASSOS)

**Three-dimensional computer technology:** Using 2-D it is not possible to achieve a realistic and acceptable result. From the 1980s, the shortcomings of these techniques induced an increase in the use of three-dimensional(3D) imaging techniques, such as facial surface laser scanning, 3D stereophotogrammetry (3D photography) and (3D) video-imaging to render the facial soft tissue surface. Reconstructions of digital imaging and communications in medicine (DICOM) files from multislice CT (MSCT), cone-beam CT (CBCT) imaging or MRI slices to display the skeletal structures and digital dental models to display the dentition were also investigated.

**3D surface imaging:** Facial scanners provide a complete 3-D topography of the facial structures and surface, analysis of the symmetry and facial proportions. Thus it provides an qualitative and quantitative assessment of the treatment outcome of various esthetic and reconstructive procedures.
Stereophotogrammetry: The various 3-D prediction methods which are mentioned above can analyze facial characteristics in three dimensions whereas stereophotogrammetry is the method of choice in anthropometric research.

Bruke and heard in 1967 introduced the concept of stereophotogrammetry. It is a prediction method that uses means of triangulation and camera pairs in stereo configuration to recover the 3-D distance to features on facial surface. It provides high-resolution representation of the face without direct exposure.

Digitized facial landmarks used in direct and indirect anthropometric measurements: Tr- trichion; G- glabella; N- nasion; Prn- pronasale; C’- columella; Sn- subnasale; Ls- labiale superius; Sl- sublabiale; Pg- pogonion; Me- menton; Ex- exocanthion; En- endocanthion; Os- orbitale superius; Or- orbitale; Ft- fronto temporale; Zy- zygion; Chk- cheek; T- tragion; Pra- preaurale; Sa- superaurale; Pa- postural; Sba- subaurale; Al- alare; Ac- nasal alar crest; Itn- inferior point of the nostril axis; Stn- superior point of the nostril axis; Cph- crista philtri; Ch- cheilion; Go- gionion (Figure 2)

Figure 3: Digitized Facial Landmarks Used in Anthropometric Measurements

Donatsky et al (1997) applied a computerised cephalometric, orthognathic surgical programme (in simulation, treatment planning and postsurgical records, to assess precision and stability of bimaxillary surgery. They concluded that the this programme is useful in orthognathic surgical simulation, planning and prediction, and also in evaluation of surgical precision and stability. The simulated treatment plan can be transferred to model surgery and then on to surgical procedures. The results suggest that this technique yields acceptable postoperative precision and stability.

The limitations of plain film radiographs are well documented and the recent introduction of cone beam computed tomography (CBCT) imaging came into existence enabling three-dimensional (3D) visualization of the bony skeleton and dentition. There are many reported applications for CBCT in the field of orthodontics and maxillofacial surgery, which can allow planning of orthognathic surgery entirely in 3D. A commercially available software package for 3D orthognathic planning (MaxilimH, Medicim NV, Belgium) is independently reviewed by Hashmat Popat and Stephen Richmond in Cardiff University, UK familiarizing the reader with the technique for creating a virtual 3D patient.

Digital three-dimensional image fusion processes for planning and evaluating orthodontics and orthognathic surgery.

This is a new 3-D prediction technique which can capture the complete triad with optimal quality. This technique involves ‘image fusion’ of different imaging techniques to create a 3D virtual head that can display all triad elements. These methods are accurate and reliable tools for documentation, analysis, treatment planning and long term follow up.

Image fusion models. An image fusion model is defined as a composition of at least two different imaging techniques. The principle of image fusion is based on the creation of a single data set that contains all three structures that is the facial soft tissue, the skeleton and the dentition using segmentation by thresholding.

3D data can be fused using three different methods:

1. Point based matching without the use of a reference frame.
2. Point based matching with the use of a reference frame.
3. Surface based matching

Advantages:

1. Multiple simulations of different osteotomies and skeletal movements can be made within the virtual operating room, aiding decision making regarding aesthetic and functional predictions.
2. This fusion model replaces the need for model surgery, since the virtual head can also be used to design a surgical wafer.

3. Post operative evaluation will give feedback on the performed procedure and can be used for teaching purposes.

4. Long term follow up of various orthognathic deformities and procedures

5. Ideally, the data is acquired with an ‘all in one’ imaging technique, which would reduce the differences in facial expression at the moment of acquisition.

Disadvantage:

All currently available fusion models are expensive and need improvements before they meet the demands of improved prediction and simulation.

Knoops et al\textsuperscript{14} compared the prediction accuracy of Dolphin, ProPlan CMF, and a probabilistic finite element method (PFEM). He concluded that Dolphin uses a landmark-based algorithm allowing for patient-specific bone-to-soft tissue ratios, which works well for cephalometric radiographs but has limited three-dimensional accuracy, whilst ProPlan and PFEM provide better three-dimensional predictions with continuous displacements.

Geert Van Hemelen a, Maarten Van Genechten a, Lieven Renier a, Maria Desmedt b, Elric Verbruggen c, Nasser Nadjmi a,\textsuperscript{15} Compared the accuracy of 2-D traditional techniques with 3-D prediction techniques and concluded that the 3D planning approach provides more accurate soft tissue planning. However, the 2D orthognathic planning can be comparable with 3D planning when it comes to hard tissue planning. Possible disadvantages of 3D are the cost of the CBCT scans and software packages, the learning curve, and the greater amount of time required. So 3D planning can only fully replace conventional 2D planning when these issues are dealt with. The accuracy can offer clear guidance to a surgeon during the planning and the interpretation of a 3D surgical procedure

Conclusion

From the literature it can be concluded that the new three dimensional soft tissue prediction techniques are accurate and reliable in predicting the treatment outcome when compared with other conventional techniques, though certain limitations are reported in different studies assessing the validity of different prediction methods. With continued technological advancements we can look forward to more accurate prediction methods that facilitate greater success in orthodontic and orthognathic surgery and greater patient satisfaction.

Ethical Clearance: Not needed as it is a review article

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Conflict of Interest: Nil

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Smart Thinker Brackets—Next Generation

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ABSTRACT

Measuring the three-dimensional force–moment (F/M) systems applied for correcting tooth malposition is highly desirable for accurate spatial control of tooth movement and for reducing traumatic sideeffects such as irreversible root resorption. In this article, we have reviewed the application of smart brackets with CMOS micro-censors on the base of the brackets to quantify these force moment system.

Keywords: Smart bracket · Force · Moment · Measurement · Microsensor · Fixed appliance

Introduction

It is imperative to determine the amplitude of three dimensional force-moment system applied for orthodontic correction to understand the manner of tooth movement and to largely reduce secondary responses¹. When this force-moment system is not taken into consideration, it might lead to many undesirable effects affecting the periodontal structures²³. In contempt of these risks, determining these force moment systems is continuing to pose a practical difficulty.

The three-dimensional force- moment system on individual teeth with an orthodontic multibracket appliance is a complex, statically indeterminate system⁴⁵ (Fig 1)(Proffit, 2000a; Burstone, 2005)

![Fig. 1: Force and moment components in 3 dimensions](image)

**Historical Perspective:** Many apparatus having detachable brackets and extra oral force moment transducer were developed for the measurement of these force moment systems in situ, but they had many constraints like increased chair side time, limited measurement accuracy, increased measurement bias
and the amount of friction between the bracket and the wire was not taken into account.6,7,8

With the development in the field of micromechanical systems, micro electronic chip incorporated with stress sensors encapsulated with the brackets helped in quantifying the external loads.9

In the earlier attempts, the sensors only measured single force systems, later attempts were made to determine all the three dimensional force moment system, i.e, the 6 external forces (force and moment in the x,y,z plane).

The Smart Bracket:

A smart bracket is basically an integration of CMOS (complementary metal oxide semiconductors) and base of the bracket base. A microelectromechanical system with stress sensors spread out over the chip area was structured. The sensors were placed at the base of the brackets (Fig 2) to accurately determine the amount of force acting. They had an epoxy resin coating both above and below the sensor to protect it from external elements.10 The earlier developed smart bracket model had a base of 8 x 8 mm², and was about 2.5 times greater than that of a standard bracket. But then, the recent smart bracket designs have the same size as that of an conventional bracket.

![Fig. 2: smart bracket with CMOS sensor at the base of the bracket](image)

CMOS Sensors: They are second generation image sensors that convert light to electrons.11,12,13 This sensor comprises of diffused silicon resistors capable of measuring stress in the surface of the sensor exploiting the piezo-resistive effect of silicon.14,15

When tooth movement begins and when force levels are exerted on the tooth, the CMOS sensors detect these force and saves it as an energized data. This can be accessed by inserting the sensor into a computer and interpreting the values.18,19

Mechanical Characterization: For calibration, the smart bracket was exposed to different combinations of force-moment that are similar to therapeutically exerted loads on the teeth.20,21 By this, the interrelations between the stress signals in the sensor chip and the force-moment systems externally applied to the bracket were evaluated.

Limitations:

- The sensor in the bracket that is bonded to the tooth structure can be contaminated due to various factors by saliva, temperature changes in the oral cavity etc.
- Undesirable application of force on the dentition can result in dislodgement of the sensor.

Conclusion

The future application of smart brackets in orthodontic therapy may contribute to minimizing the negative side-effects of tooth movement, in particular root resorption, and to increasing therapeutic efficiency.

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Conflict of Interest: Nil

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A Review on Rapid Maxillary Expansion

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ABSTRACT

Rapid maxillary expansion (RME) is an orthopedic procedure that utilizes optimum forces to correct transverse maxillary arch discrepancies. There has been various designs of Rapid Maxillary Expanders that has evolved over time and their usage in various clinical conditions. It has been used not only to correct maxillary constriction but also to create additional space in the dental arches to relieve crowding. The review on the RME renders various evidence-based facts about types, designs and uses of RME appliances and promotes the better understanding of their biomechanical effects and their clinical implications among the orthodontic fraternity.

Keywords: rapid maxillary expansion, mid palatine suture, circummaxillary suture.

Introduction

The type of skeletal expansion where the midpalatine suture is split and the palatal shelves are moved away from each other is referred as the rapid maxillary skeletal expansion. The expansion is caused at the maxillary complex, the palatal vaults, the maxillary teeth and the adjacent periodontal structures. This paper mainly aims at reviewing the various conditions where RME is indicated and about the various designs of RME, the long term stability of the expansion and the recent evolution and paradigm shift in the field of maxillary expansion.

Anatomy: The mean transverse growth of maxilla ranges approximately about 6.5mm between the age 6-17years.

Maxillary bone fuses with the palatine bone and the vomer bone to form complete hard palate and greater part of lateral wall of nasal cavity. The interpalatine suture forms the junction of the premaxillae, maxilla, and the palatine bone. The mid palatine suture is described as an end to end type of suture with its characteristic change in morphology during growth.

Initially, the suture remains as a straight high density suture line that does not have interdigitations, followed by scalloped appearance of high density suture line that are separated only by small low density spaces. Interdigitation increases and fusion occurs in the posterior area first and the ossification progresses from posterior to anterior where resorption of cortical bone occurs with the formation of cancellous bone. This anatomical reason causes the expansion to occur more anteriorly than posteriorly. A significantly greater degree of obliteration was found orally than nasally.

The amount of rapid maxillary expansion depends on the patency of the midpalatine suture. 5% of suture closes by the age of approximately 25 years. Ossification comes very late anterior to incisive foramen – this is important when planning surgical freeing in late instances of RME. The ideal time for proceeding for RME would be CVM category 1 or MP3 F stage. RME is best to carry before CVM 4 or MP3 H stage.

Factors influencing the rapid maxillary expansion: Severe nasal obstruction/stenosis, metabolic and genetic disorders causing premature synostosis and also any systemic disease affecting the suture patency and the flexibility of the craniofacial complex should be treated.
prior to expansion. Intraorally, forces delivered by RME may cause deleterious effects on the periodontium and might lead to traumatic injuries. Choosing the form, rigidity and flexibility of the appliance decides if the expansion occurs only at the inferior free borders of the maxilla or if it reaches to the basal portions. The rate of expansion is maintained around 0.3-0.5mm per day. With increasing age greater rigidity of the bones are seen and the bony movements are restrained. When the maxillary molars are buccally inclined, conventional expansion will tip them further into the buccal musculature and if the mandibular molars are lingually inclined, the buccal movement to upright them will increase the need to widen the upper arch.

**History of Rapid Maxillary Expansion:** In 1860, E.C. Angell successfully split maxilla using a jack screw appliance. He is considered the father of rapid maxillary expansion

FARRAR (1888) and CLARK C. GODARD (1893) discussed the feasibility of lateral expansion with mid palatal suture opening

WRIGHT in 1912 reported a 6.5mm widening of nasal cavity with rapid maxillary expansion.

In late 1940s GRABER advocated RME for the treatment of cleft lip and palate patients. In 1970’s Hass started using RME and he evaluated stability in 1980.

LATHAM (1971) believed that growth at the midpalatine suture ceases at the age of three years

BJORK AND SKIELLER (1974) found that growth at the suture might be occurring as late as 13yrs of age.

PERSSON AND THILANDER (1977) in a study on cadavers found that 5% of the suture was obliterated by age 25years.

EPKER AND WOLFORD (1980) stated that in patients above 16years of age attempts in achieving expansion failed due to fusion of various craniofacial structures.

**Comparison between Slow and Rapid Palatal Expansion**

RME showed significant buccal tipping than SME with increase in the intermolar angle.

Maxilla moved forward, mandible showed backward rotation and, at transversal level both skeletal and dentoalveolar showed significant changes due to Rapid Maxillary Expansion.

SME showed significant dentoalveolar changes. Light forces are applied per activation (2-3 lbs in SME) around 10-20 lbs amount of force is applied in RME. In SME rate of midpalatal suture separation allows a more physiologically tolerable and adaptive response and long term stability is proven to be more in SME

**Contraindications of RME:** Patients with anterior open bites, high mandibular plane, poor periodontal health, patients where suture ossification is complete, Single tooth crossbites, Bone loss on buccal aspect of the teeth, convex profiles, adults with severe skeletal discrepancies.

**Clinical Effects and Indications of RME:** Patients with unilateral or bilateral posterior crossbites involving several teeth, patients with class II division 1 malocclusion or patients with class III malocclusion are indicated for RME therapy. Reichenbach and Taatz stated the foot (mandible) is unable to be moved forward in the shoe (maxilla) due to transverse constriction. The wider shoe (maxilla) will allow the foot to assume its normal relationship.

RME helps in interceptive treatment of palatally impacted canines and provides adequate space for canines to erupt by relieving crowding. In class III growing patients, RME with maxillary protraction appliances, Circummaxillary sutures disarticulates with an element of anterior displacement of the maxilla as a result of the pivoting effect of the pterygoid plates during palatal separation, as well as correcting the associated crossbite. Improvement of hearing in patients who suffer from conductive hearing loss as a result of Eustachian tube stenosis or middle ear problems. The recovery in hearing occurs due to functional normalization of the pharyngeal ostia of the Eustachian tube, secondary to the orthopaedic effects of the RME but long term improvement in hearing remains questionable.

Nocturnal Enuresis can also be controlled by relieving mouth breathing issues. Primary headache symptoms disappeared in 32 patients and reduced in rate and intensity in 9 patients after RME therapy.

**Effects of RME on the Maxillary Complex:** Separation of midpalatal suture, requires 900-4500 grams of force which disarticulates the circummaxillary sutures leading to orthopedic expansion.
The force given by RME appliance compresses the periodontal ligament, bends the alveolar processes and causes dentoalveolar tipping of the molars, and opens the mid-palatal suture.

Bonded hyrax is more preferable in vertical growers. Maxilla gets rotated in both sagittal and frontal planes. Maximum anchorage of the expansion device, using the tissue-borne acrylic appliance, seems preferable in order to minimize the incidence of buccal surface root resorption.15

RME caused increase in nasal cavity width by laterally displacing the wall of the nasal cavity

The maximum von Mises stresses were found along the frontomaxillary, nasomaxillary, and frontonasal sutures, followed by the zygomaticotemporal and sphenozygomatic sutures.16

The transient polymorph response was noted in the first 12 hours followed by an influx of macrophages and fibroblasts into the defect occurred by 24 hours. The margins of the suture underwent bone formation in the following 3-4 days. With the cessation of the expansion force (2 to 3 weeks), remodeling of both the bone and the suture occurred by the osteocytic and fibrocytic cell series until normal sutural dimensions were achieved. The mineral content within the suture rose rapidly during the first month after the completion of suture opening but returned to its initial level within three months. RME is clinically indicated by opening of a diastema between the maxillary central incisors.18 The gap created between the central incisors was about one and half as great as the distance the screw had been opened. The entire cycle was completed in four to six months time even with incisors spaced as much as 8mm after appliance manipulation.18

A 5.1% percent increase in nasal volume has been reported after RME therapy by Deeb W in Pubmed.18

RME might cause about 4mm of expansion in the intercanine width of the lower anteriors and about 6mm in the molars

Retention and Relapse of RME: Transpalatal arch or an acrylic plate may be used as a retainer to maintain the transverse dimensions and extractions should be planned after expansion. The causes of Relapse: High stress accumulated between the articulations of the craniofacial complex. Tension produced in the palatal mucosa, Imbalance between the buccal and lingual pressures. Fixed retainer placement immediately after expansion, followed by intermittent removable appliance is recommended20

Various Designs of RME7: Almuzian et al., explained the various designs of RME. Haas design allows the appliance to be tooth tissue borne with more parallel expansion forces on the alveolus and has the potential for causing palatal tissue irritation. Isaacson and Ingram, reported that single activations of the jackscrew (0.2mm) produce forces ranging from 3 to 10 pounds and that multiple activations can produce forces up to 20 pounds. The Derichsweiler appliance is similar to the Haas design except for the absence of buccal connectors. The Isaacson design, known as Minne-Expander, is similar to the Hyrax expander with the exception that the expansion screw is replaced with a coil spring. Its main disadvantage is continuous expansion force due to latent kinetic energy accumulated.

Haas regimen: Two turns per day, until desired expansion

Timms regimen Adolescents: Two turns/day until desired expansion

Adults: Four quarter turns/day until desired expansion

Isaacson regimen: Two turns/day for first 4–5 days followed by one turn/day

Hybrid regimen: Combination of two or more of the above

Hybrid appliance is bonded by an occlusal cap to abutment teeth and anchored by palatal temporary anchorage devices (TADs) to reduce anchor teeth tipping while maximizing the orthopaedic outcomes. It acts as both bone-borne and tooth-borne appliance.

Fan shaped expander is used in sectional expansion of maxillary anteriors. As stated by CenkDoruk, the upper incisors were tipped palatally in the RME group, but they were tipped labially in the fan-type RME group. Sadeddin found greater expansion in the intercanine
width than in the intermolar width. The fan-type RME avoided tipping posterior teeth. The ratio between the intercanine and intermolar width expansion was nearly 4:1 in the fan-type RME and 0.75:1 in Hyrax.

Sarpe\textsuperscript{22}: In skeletally matured patients, transverse hypoplasia can be corrected by means of a surgically assisted rapid maxillary expansion.\textsuperscript{22} The procedure causes a substantial enlargement of the maxillary apical base and of the palatal vault, providing space for the tongue for correct swallowing and thus preventing relapse. A significant improvement in nasal breathing is found due to the enlargement of nasal valves and increase in nasal volume.\textsuperscript{22} On following distraction osteogenesis, one has to look for optimal equilibrium between maximal mobility of the maxilla and minimally invasive surgery to avoid complications.\textsuperscript{22}

BERGER et al. reported on two groups of patients using both RME and SARME with a hyrax expander. In the RME group the ages ranged from 6 to 12 years. In the SARME group the ages ranged from 13 to 35 years. They concluded that there is no difference in the stability of SARME and RME. Relapse was mentioned without the amount being quantified.

MARPE\textsuperscript{23,24}: Rapid palatal expansion might be recommended for patients at the final pubertal growth stage, and also adult patients with maxillary constriction. It represents a treatment solution that can potentially avoid surgical intervention. When performed in association with rapid palatal expanders, it might enhance the skeletal effects of the latter. Of the various designs of expansion appliances, MARPE (miniscrew-assisted rapid palatal expander) has been modified for better clinical outcomes. MARPE prevents the rotation of the maxillary complex hence produces favourable results in hyperdivergent patients. It represents a treatment solution that can potentially avoid surgical intervention. Of the various designs of expansion appliances, MARPE (miniscrew-assisted rapid palatal expander) has been modified to allow its operational advantages and outcomes to become familiar in clinical practice.\textsuperscript{24}

Recent Trends–Design of Automated Maxillary Expansion Appliances: Various appliance designs available commercially vary from simple tooth tipping devices to rigid orthopedic expanders. Manual adjustment and activation of the screw is one of the major disadvantage. Automated RME appliances overcome this defect as this device serves as a combination of butterfly expander, microgear, micromotor and microcontroller to produce light and continuous pressure on the Midpalatal suture. Self-activation is possible by micromotor under the control of microcontroller. Patient errors such as missed or reversed screw turns are greatly minimized.\textsuperscript{25}

In First phase, tiny hole section of the expander is replaced with microgear followed by mechanical modification of the butterfly expander in phase II. The purpose of this micro gear is to interface with micro motor, and when the micro motor spins it will turn this micro gear to a desired position. The third phase is microcontroller system design. Fourth phase is system integration. In fifth phase, testing and preliminary clinical trial of the new automated RME appliance will be done. At present the construction of the appliance is in phase 4. From this test, more modification can be made, if needed, to make the appliance perform as required.\textsuperscript{25}

Conclusion

The review enables us to understand on the basic biological and mechanical principles involved in Rapid maxillary expansion. Thorough understanding of the design structure enables us in effective clinical applications. The literature review takes us through the evolution of the appliances and the paradigm shift that has took place in the field of maxillary expansion.

Source of Funding: Self

Conflict of Interest: Nil

Ethical Clearance: Not Applicable
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Temporary Anchorage Devices—A Review

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ABSTRACT
In orthodontics, anchorage has been a matter of concern for many years. In addition, the greater number of mutilated cases, uncooperative patients have all added to the growing need for skeletal anchorage. Anchorage Devices brought about a revolutionary change to obtain absolute anchorage without patient compliance. Anchorage promises to serve as controllable and efficient anchors for any type of tooth movements the orthodontist would want to make. The successful use of implants has widened the horizons in orthodontics and has gained much popularity in the recent years.

Keywords: Mini implants, Skeletal anchorage, Osseointegration

Introduction
Anchorage is a matter of great importance in orthodontics. Many techniques to control anchorage like extraoral anchorage, use of opposing anchors, increasing no of anchorage units, relying mainly on patient compliance have been used. Temporary Anchorage Devices (TADs) brought about a revolutionary change to obtain absolute anchorage without patient compliance. Thus, TADs promises to serve as controllable and efficient anchors for any type of tooth movements the orthodontist would want to make.

Evolution of Skeletal Anchorage: It was in AD 600 in the Mayan population that implants were first used. In 1809, Maggiolo inserted gold roots to support teeth. In 1891, Hartman, proposed that dentures be fixed to the jaws using metal screws. In 1945 Gainsforth and Higley published the concept of using implants to enhance orthodontic anchorage by using vitallium screws for canine retraction in dogs.

In the 1960s, P. I. Brånemark, a Swedish physician and orthopedic surgeon, coined the term osseointegration. The first clinically reported use in humans was done by Creekmore and Eklund in 1983. In 1985, Jenner and Fitzpatrick described mini plates. In 1995, Block and Hoffman came up with osplants for orthodontic anchorage. However, mini-implants seldom made its way until in 1997 when Kanomi described mini screws specifically made for orthodontic use.

Classification of TADs
1. According to site
   - Subperiosteal
   - Endosseous
   - Transosseous
2. According to the biological behavior
   - Osseointegrated
   - Non osseointegrated
3. According to insertion technique
   - Self -tapping
   - Self-drilling
4. According to surface characteristics
   (a) Threaded - Non-threaded
   (b) Porous - Non-porous
5. According to implant material
   - Bioactive

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6. According to implant degradation
   - Biodegradable (Polylactide, polyglycolide)
   - Non biodegradable (Titanium)

Primary Versus Secondary Stability: Immediately after placing implants, their retention is entirely mechanical, primarily due to the characteristics and amount of the bone contacting the implant especially the cortical bone. This type of mechanical retention is called primary stability. For orthodontists, this is an advantage as it allows the implant to be immediately loaded, which forms the key for any implant procedure.

Following the placement of an endosseous implant, primary mechanical stability is gradually replaced by biologic secondary stability as the osteoclasts remove old, damaged bone and osteoblasts form new bone. This second phase of increased stability is referred to as secondary stability. It happens due to the osseointegration around the implant. The stability observed clinically is composed of both primary and secondary stability.

The factors responsible for achieving the primary stability are - Implant diameter, implant length, number of flutes and design of threads, cortical bone thickness, bone density, placement technique and location.

After placing the implant the bone regeneration and remodeling contributes to increasing the secondary stability.

Biomaterial Used in Implants: The ideal requirements for implant biomaterial are:

**Biological properties**
- Should provide osseointegration.
- Should not be harmful to hard and soft tissue.
- Should not contain the toxic substances.
- Should be free of a potentially sensitizing agent that can cause an allergic reaction.
- Should not be carcinogenic.
- Should be tasteless and odorless.

**Physical properties**
- Should be stable dimensionally.
- Should be of adequate strength and resilience
- Should resist biting or chewing.

The osseointegrated dental implants are composed of 99% titanium. The medical grade titanium used for general body implants can be classified as grade I to IV. Commercially pure titanium (C P Ti) is used widely for implants because of its superior mechanical properties and excellent biocompatibility. The titanium alloy (Ti - 6Al - 4V) (grade V) is the material of choice for orthodontic miniscrews. Its increased modulus of elasticity, six times that of bone enables the use of long and thinner screws without breakage25.

**Mini Implant Screw Design:** Orthodontic mini screw has 4 components Head, Neck, Platform, Body

**Treatment Considerations**

**Age of the patient:** The patient’s age is important as implants are problematic if used in growing children for the following reasons

1. Implants in anterior maxilla is contraindicated due to the possibility of the mid palatal suture being open
2. Resorption in the posterior part of the maxilla due to growth changes could lead to exposure of implant into the sinus
3. With growth, the posterior aspect of mandible continues to undergo growth changes in all the planes of space and definitive implant placement in this area would be difficult to estimate.

**Periodontium**

**Bone support**

Quality – Best is thick, compact, cortical bone with core of dens trabacular cancellous bone

Quantity – 6mm buccolingual width with sufficient tissue volume is the best

**Mucogingival problems:** soft tissue heights of <2mm or > 4mm may present a challenge

**Oral hygiene:** Good oral hygiene before and after implant insertion is needed
Systemic manifestations
1. Diabetics delays healing
2. Habits – smoking is contraindicated due to delayed or inadequate tissue healing and osseointegration

Radiographic analysis: Things to be noted are

Periapical pathology: Radioopaque/radiolucent regions above the inferior alveolar region or below the maxillary sinus

- Adequate space above IAN or below maxillary sinus (2mm from the inferior alveolar canal or below the maxillary sinus)
- Adequate interradicular area
- Bone quality and quantity

Placement of TADs: Implant insertion sites should be based on the amount of attached gingiva and cortical bone, the angulation and size of implant and foremost, the type of tooth movement.

The most often used insertion sites in the maxilla are: Inter radicular alveolar areas: the width of buccal cortical bone on the entire maxillary alveolar process is less (3mm to 4mm), so it requires longer screws.

- Most common sites are – Between second premolar and first permanent molar
- Between the first and second permanent molar
- Between the two central incisors (intrusion)
- Between lateral incisors and canines (intrusion)
- Infrazygomatic region – zygomatic buttress
- Palatal areas: thickness and quality of cortical bone is excellent.
- Maxillary tuberosity region
- Mid palatal area

The CBCT study by Deguchi et al. suggested that the best available site in the posterior maxilla are:

1. mesial or distal to the first molar,
2. angulation of 30° apical to the long axis of the tooth, and
3. length 6 mm of bone contact and diameter 1.3 mm.

Another site is the palate. Benefits include- quality of palatal bone and noninterference with the roots of the teeth.

In Mandible: Inter radicular alveolar area – since the cortical bone on the buccal area in the mandible is very dense, the screws are of smaller size and the possibility of root contact is less.

- Most common sites are – Between second premolar and first permanent molar
- Between first and second permanent molar
- Between two central incisors
- Between mandibular canine and premolar buccally
- Buccal shelf area
- Mandibular symphysis facially
- Extraction spaces.

Sites to be avoided : inferior alveolar nerve, artery, vein, mental foramen, maxillary sinus and nasal cavity

According to Poggio et al., the mesiodistal widths of the interradicular space are more favourable between the mandibular permanent first and second molars at almost every level, starting 2 mm below the alveolar crest. The region in between the mandibular second premolar and first molar is the second best location.

Bittencourt et al. conducted a study to determine the optimal interradicular spaces for miniscrew placement in the mandible and maxilla using CT images at varying heights of 2, 5, 8 and 11 mm from the alveolar crest. According to him the best site in the maxilla, is at a height of 6-9 mm from the crest of second premolar and first molar and in the mandible, at a height of 9-12 mm between the molars.

Ideally, the screws used for orthodontic anchorage must be thin (1.3mm to 1.5mm) and tapered to avoid accidental root contact. Generally, for maxilla, length should be 8mm to 10mm and for mandible 6mm to 8mm.

Screw Angulation: If we see at the area from canine to the second premolar in the maxilla, the cortical bone
buccally is thin. So angulation is required to avoid screw touching the roots. The space between the roots is shaped like an inverted pyramid. The space gradually increases in width to about 5mm as the root tapers apically.

Placing the implant at an angulation of 30 to 40 degree to the long axis of the teeth in the maxilla will keep the screw in the widest space available between the roots apically. In the mandible, the buccal cortex is made of dense bone and curves out more buccally from gingival margins. So a shorter screw than the one used in the maxilla is acceptable. Also the angulation can be reduced to 10 to 20- degree with little risk of touching the roots.

Application of TADs

**Intrusion:** In a study conducted by Mittal et al., the upper incisors were intruded to a mean value of 2.8 mm(mean time period of 3.3 months) without molar extrusion.\(^\text{13}\) According to Yao et al, the mean intrusive movement of the maxillary first molars was 3-4 mm, with a maximum of over 8 mm. \(^\text{14}\)

**Distalization:** A study conducted by Gelgor et al., to investigate the efficiency of intraosseous screws for maxillary molar distalization, the force resulted in 88% molar distalization and 12% reciprocal anchorage loss with no significant vertical changes. The advantages of this treatment approach were elimination of compliance-dependent complex intraoral and extraoral anchorage aids, relatively predictable treatment outcomes and favorable esthetics. \(^\text{15}\)

**Protraction:** Molar protraction is one of the most difficult tooth movements to accomplish, especially in horizontal growth pattern and a deep bite as molar protraction deepens the bite. For protracting molars, microimplants are generally placed between the roots of the mandibular canine and first premolar or first premolar and second premolar. \(^\text{16}\)

**Retraction:** The retractive force will have intrusive, extrusive and intermediate force depending on the vertical position of the implant. \(^\text{18}\) An RCT carried out by Sibaie et al. \(^\text{19}\) concluded that:

1. En-masse retraction with mini-implants eases the biomechanics involved and effectively controls the antero-posterior and vertical movements of anterior and posterior teeth.

2. It avoids the disto-palatal rotations and distal tipping of retracted canines, and eliminates spaces distal to the lateral incisors following canine retraction.

3. Significantly shortens the treatment duration.

**Uprighting:** In moderately tipped second molars, mini screws can be inserted between the second premolar and first molar. An open coil spring can be used initially to unlock the second molar and later the molar uprighting spring is hooked on the mini screw head to deliver a tip back moment. For severely tipped second molars, a button is bonded to the distal surface of second molar and a miniscrew can be placed in the retromolar region. The third molar position should be considered.

**Tranverse correction:** Tausche et al reported an average increase in the transverse dimension at the alveolar bone to be 7.52 mm in the premolar region and 7.17 mm in the molar region, noting a greater skeletal increase with the use of TADs. \(^\text{20}\) However, Lagravere’s study using CBCT found that immediately after completion of appliance activation, the skeletal and dental changes for both treatment groups were similar. \(^\text{21}\)

**Success/Failure of TADs:** Success of TADs is defined as a miniscrew with minimal mobility and inflammation and the ability to obtain full functional correction either through direct or indirect anchorage. \(^\text{22}\)

Failure is defined as severe clinical mobility of the mini implant requiring replacement, spontaneous loss or loss of a mini implant while checking its mobility with the cotton tweezers less than 8 months after placement or before the end of treatment.

**Surgical Procedure**

1. Topical anesthesia

2. Infiltration anesthesia – to determine whether the implant is touching the roots of teeth or not.

3. Aseptic preparation

4. Drilling

5. The final root position of the screw is to be such that the curved funnel at the neck should be cutting against the bone. The head, neck and hox of screw should be away from the soft tissues.
Loading of Implants: There are two types of loading. Delayed loading and immediate loading.

Branemark, believed that all implants should undergo a healing period of 4-6 months before functional loading.

Tarnow et al believed that immediate loading of implants could be carried out if the implants are splinted together which minimizes the micromotion.

Loading also includes the dynamic (variable force levels) and static (constant loads of uniform force) loading. It has been shown that statically loaded and unloaded implants has more cortical lamellar bone at the neck and the apex of implants. The implants which are dynamically loaded displayed bone craters and howships lacunae around the implant neck showed higher levels of bone resorption.

The Timing of Orthodontic Force Application: For orthodontic mini-implants, as primary stability is more important than osseointegration, no significant difference exists between immediate loading and delayed loading within force limits of 200-300 gms if primary stability is achieved. However, it is better to wait for approximately 2-3 weeks to allow soft tissue healing.

Complications of Orthodontic Implants

Complications During Insertion
1. Trauma to the dental root or periodontal ligament
2. Implant slippage
3. Nerve impingement
4. subcutaneous air emphysema
5. Maxillary sinus and nasal perforation
6. Bending, fracture and torsional stress of implants

Complications under Orthodontic Loading
1. Miniscrew migration
2. Soft-Tissue Complications a. Aphthous ulcers b. Soft tissue inflammation, infection, and peri implantitis c. Soft-tissue covering the miniscrew head and auxiliary

Complications During Removal
1. Screw fracture
2. Partial osseointegration

Conclusion

The introduction of mini implants in orthodontics extended the boundaries of an orthodontists limitation, enabling the clinician to offer more predictable results within a short duration, avoiding complex methods and reducing the fear of undesired side effects of conventional techniques. But long-term clinical trials to establish clinical guidelines in using implants for both orthodontic and orthopaedic anchorage is needed in the near future.

Source of Funding: Self
Conflicts of Interest: Nil
Ethical Clearance: Not Applicable

REFERENCES


Assessment of Facial Asymmetry in Patients Reporting for Orthodontic Treatment

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ABSTRACT

Aim and Objective: To evaluate the prevalence of facial symmetry in patients and its correlation with different morphometric and skeletal malocclusions among those reporting for orthodontic treatment.

Background: Facial asymmetries exist in all individuals. It is commonly stated that the right side of the face is not an ideal replica of the left side. Facial asymmetry can be associated with different types of malocclusion and growth patterns. Significant facial asymmetry causes both functional as well as aesthetic problems. Hence this study was undertaken to evaluate the prevalence of asymmetry in patients reporting for orthodontic treatment.

Materials and Method: This study was conducted on 162 patients in the Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai, within the age group of 14 to 26 years. Extra-oral photographs of the frontal view of patients were taken in a standardised manner. The Rule of fifth was modified and a midline was marked through the sagittal section of the face. The parts on the left and right side of the face were measured in pixels and compared. The deviations were noted in each part and statistically analysed to correlate with the type of malocclusion and growth pattern.

Results: All the three parts in the face were not equal on either side. Facial asymmetry was more concentrated on the lateral part when compared to the other two parts. Asymmetry is seen more in patients with class II malocclusion, horizontal and average growth patterns when compared to other malocclusion and growth patterns.

Keywords: Facial asymmetry, malocclusion, growth pattern.

Introduction

Facial asymmetry is defined as the inconsistency in size, shape and arrangement of one side of the face from the opposite side when viewed in relation to the medial sagittal plane. Facial asymmetry is important in aesthetic evaluation of the craniofacial region. Facial asymmetry within limit is recognized as normal, but, severe asymmetry of the facial features is not acceptable.¹

Many human body parts undergo development with bilateral symmetry. This implies that the right and left sides can be divided into identical mirror images. However, due to biological factors inherent to processes of development as well as environmental disturbances, perfect bilateral symmetry is rarely found.²

The face often presents with a mild degree of asymmetry. It derives from the fact that the lower and midface develop from the medial and lateral nasal processes as well as maxillary and mandibular
processes, and despite being intrinsically coordinated, these structures might imply failure of development or maturation of such embryonic processes.3

In the literature, a number of causal factors have been highlighted in the development of facial asymmetries. Asymmetries could have pathological, traumatic, functional or developmental causal factors.4 The etiology of facial asymmetry can be grouped into hereditary factors of prenatal origin and acquired factors of postnatal origin.5 The causes of facial asymmetry can be grouped into three main categories: (I) congenital, of prenatal origin; (II) acquired, resulting from injury or disease; and (III) developmental, arising during development and of unknown etiology.3

As for the classification of craniofacial asymmetries, the structures involved and established that asymmetries could be classified as dental, skeletal, muscular or functional.1

Based on skeletal analysis of deviation of the chin and bilateral difference between mandibular rami length, asymmetry is classified into 4 types. The four types of asymmetry would be as follows: patients with deviation of the chin and bilateral difference between mandibular rami length; patients with bilateral difference between mandibular rami length, only; patients with deviation of the chin, only; and patients with changes in volume on one side of the mandible, only, without deviation of the chin or discrepancy between mandibular rami length.6

Clinical examination allows asymmetry to be assessed in sagittal, coronal and vertical dimensions, and it is the most important diagnostic tool in assessing the condition.3 At smiling, analysis should assess whether dental midlines coincide with facial midline, inclination of the occlusal plane and the amount of bilateral gingival exposure. Intraoral clinical examination should focus on assessing malocclusion, tipping of posterior and anterior teeth, crossbite and the presence of functional deviation of the mandible.3,7

In order to determine patient’s facial midline, specific soft tissues landmarks and structures are used as reference. Thus, sagittal facial midline corresponds to a line perpendicular to the ground, passing through the glabella. Other landmarks of the upper and midface can also be used as reference, since these regions are less likely to present with bilateral asymmetry. Half the interpupillary distance, the subnasal point or the philtrum can also be used as reference to determine the midline in cases with some sort of imbalance near the glabella. Patient’s tip of the nose and chin, however, present with greater variation.6

In order to have asymmetry assessed, patients must be in upright position, looking forward, with teeth in normal occlusion and relaxed lips. Additionally, having patient’s upper and lower views often aids in determining asymmetry. A common procedure is the use of a piece of dental floss stretched from the region of the glabella to the lower chin, passing through the philtrum.9 Another procedure used to assess inclination of the occlusal plane in vertical direction is asking the patient to bite a wooden sheet, so as to determine how the latter relates to the pupillary plane on both sides.

Clinical examination shall be supplemented with other diagnostic tools like casts, photographs, radiographs, tomography and bone scintigraphy. They help to locate and measure precisely the structures involved in asymmetry.9

Different methods of radiographic assessment are available to locate and measure the magnitude of facial asymmetry. Lateral cephalogram provides limited information, as structures on the right and left sides are overlapped.

Thus, at present, the examination most often recommended to overcome the aforementioned disadvantages and allow thorough assessment of craniofacial asymmetries is computed tomography, especially cone-beam computed tomography (CBCT).9

In dentistry, cone beam CT (CBCT) is used widely because of less radiation dose and low cost. Also, because CBCT ensure high-dimensional accuracy in measurement of the facial structures, CBCT is an excellent method for evaluation of facial asymmetry.10 Previous 3D studies in patients with mandibular prognathism paid attention to the morphology of the mandible such as ramal height, body length and ramal inclination, and showed a result that mandible is a dominant factor in facial asymmetry.11

In general, skeletal deviation more than 4 mm is mandatory to make asymmetry visible in an individual’s face.5,12,13,14 Whenever the degree of asymmetry is lower, the condition tends to be considered mild and unperceivable. Nevertheless, asymmetry perception or
blinding will also depend on individual characteristics, such as soft tissue thickness in that region. For this reason, other authors consider an asymmetrical face as having bone deviations equal to or greater than 2 mm\(^{15,16,17}\).

The purpose of the present study was to investigate asymmetry in soft tissue by means of rule of five with a modification in standardised frontal photographs.

**Materials and Method**

**Selection of Subject:** The study was performed on 162 subjects reporting to the Department of Orthodontics, Saveetha Dental College and Hospitals, Chennai. The chosen patients were within the age group of 14 to 26 years. All the selected subjects had a normal appearance with no obvious deformities. Subjects with history of orthodontic treatment, congenital abnormalities, trauma, cyst, tumours or any pathological abnormalities and missing molars were excluded. The subjects’ age, malocclusion type and growth pattern were recorded.

**Photographic Technique:** A small rectangular mirror was attached to the top of the camera such that the lower border of the mirror was horizontal. The camera was placed on a standard adjustable tripod stand. The arms and adjustable plates of the tripod stand were set so that the camera was horizontal. In this study, a Sony Alpha SLT-A58 digital camera was used which stores the photographs digitally that can be later transferred to the computer. The camera has a resolution of 20.1 Mega pixels with APS HD CMOS Sensor. The inbuilt motorized zoom lens with a lock-on autofocus range to infinity and auto object framing ensured that the images were of high quality. Frontal view photographs in natural head position (NHP) were taken using the digital camera under standardised conditions:

- **Shutter speed:** 1/40 sec
- **Exposure program:** Normal program
- **F-stop:** f/5.6
- **Aperture value:** f/5.6
- **Max Aperture value:** f/5.6
- **ISO speed ratings:** 3200
- **Focal length:** 50.0 ± 5.0 mm
- **Lens:** DT 18-55mm f3.5-5.6 SAM II
- **Pixel dimension X:** 2352 ± 230
- **Y:** 2780 ± 195
- **Orientation:** Normal
- **Resolution X:** 775 ± 50
- **Y:** 775 ± 50
- **Resolution unit:** Inch
- **Compressed bits per pixel:** 1
- **Colour space:** sRGB

The Camera was placed at a distance of 90 cms in front of the subject. The height of the camera was so adjusted such that the lower border of the mirror attached to the top of the camera coincided with the subjects’ eye level. This ensured that the level of each subject’s eyes was constant in relation to the lens. Earrings and eye glasses were removed and long hairs were tied back. The photographic method is a quantitative method that is not only valid and reproducible but also non-invasive, convenient to use, less technique sensitive, low cost and takes soft tissue morphology into consideration compared to radiographic method.

**Photographic Analysis:** The digital photographs are transferred from the camera to the computer for analysis of facial asymmetry. The following divisions were made on the photographs:

1. Right postaurale- right exocanthion (pa r-ex r),
2. Right exocanthion- Right endocanthion (ex r-en r),
3. Right endocanthion- midline (en r-m),
4. Midline- left endocanthion (m-en l),
5. Left endocanthion- left exocanthion (en l-ex l),
6. Left exocathion- left postaurale (ex l-pa l)

This is a modification of the Rule of Fifths where the middle fifth of the face is divided into two by a midline passing through the sagittal section of the face. Thus the face is divided into median, middle and lateral parts on the right and left side of the midline. This is to note the deviation in the left and right sides of the midline in the middle portion of the face which cannot be analysed using the original rule of fifths. Vertical lines were drawn...
and the measurements were made using a digital ruler in the MWSNAP 3.0 version software in pixels.

**Statistical Analysis:** Statistical analyses were performed using SPSS version 22.0. If p-value was less than 0.05 then it was statistically significant. One way ANOVA tests were performed to compare the mean differences between parts, to compare the mean differences between growth patterns in each part separately and to compare the mean differences between parts in each growth pattern separately, to compare the mean differences between malocclusion types in each part separately and to compare the mean differences between parts in each malocclusion type separately. Tukey HSD Post Hoc Tests were performed for multiple comparisons.

**Results**

**Comparison of Asymmetry in Three Parts:**
Asymmetry between the mean value measurements of the three parts are given in table1 and 2. Relation of Asymmetry with skeletal malocclusions and growth patterns are given in tables 3,4 and 5,6

<table>
<thead>
<tr>
<th>Table 1: Comparing the median, middle and lateral parts</th>
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<tr>
<td><strong>Part</strong></td>
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<tr>
<td>Median part</td>
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<td>Middle part</td>
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<td>Lateral part</td>
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<td>Total</td>
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*p<0.05 is statistically significant

<table>
<thead>
<tr>
<th>Table 2: Comparing the right and left of the median, middle and lateral parts</th>
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<td><strong>Part</strong></td>
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</tr>
<tr>
<td>Median part</td>
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<td>Left Side</td>
</tr>
<tr>
<td>Middle part</td>
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<tr>
<td>Left Side</td>
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<tr>
<td>Lateral part</td>
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<tr>
<td>Left Side</td>
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</tbody>
</table>

*p<0.05 is statistically significant

**Comparison of Asymmetry in Different Malocclusions:**

<table>
<thead>
<tr>
<th>Table 3: Comparing the median, middle and lateral parts with the type of malocclusion</th>
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<tbody>
<tr>
<td><strong>Malocclusion type</strong></td>
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<td>Class-1</td>
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<td>Class-3</td>
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<td>Total</td>
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*p<0.05 is statistically significant
### Table 4: Comparing the right and left of the median, middle and lateral parts with the type of malocclusion

<table>
<thead>
<tr>
<th>Malocclusion type</th>
<th>Part</th>
<th>Side</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>t-Value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class-1</td>
<td>Median part</td>
<td>Right Side</td>
<td>75</td>
<td>49.32</td>
<td>9.117</td>
<td>1.190</td>
<td>0.238</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>75</td>
<td>48.40</td>
<td>9.281</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>75</td>
<td>80.27</td>
<td>13.839</td>
<td>0.785</td>
<td>0.435</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>75</td>
<td>79.75</td>
<td>14.267</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>75</td>
<td>85.12</td>
<td>16.523</td>
<td>2.124</td>
<td>0.037</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>75</td>
<td>88.39</td>
<td>13.755</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class-2</td>
<td>Median part</td>
<td>Right Side</td>
<td>76</td>
<td>46.78</td>
<td>7.627</td>
<td>0.745</td>
<td>0.459</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>76</td>
<td>46.18</td>
<td>8.722</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>76</td>
<td>77.55</td>
<td>14.411</td>
<td>1.244</td>
<td>0.218</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>76</td>
<td>76.95</td>
<td>13.473</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>76</td>
<td>85.28</td>
<td>12.967</td>
<td>0.987</td>
<td>0.327</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>76</td>
<td>86.26</td>
<td>12.911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class-3</td>
<td>Median part</td>
<td>Right Side</td>
<td>11</td>
<td>50.09</td>
<td>12.462</td>
<td>0.563</td>
<td>0.586</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>11</td>
<td>48.36</td>
<td>10.376</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>11</td>
<td>83.00</td>
<td>16.031</td>
<td>0.428</td>
<td>0.678</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>11</td>
<td>82.45</td>
<td>15.877</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>11</td>
<td>88.55</td>
<td>19.154</td>
<td>1.499</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>11</td>
<td>92.73</td>
<td>17.822</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Comparison of Asymmetry in Different Growth Patterns:

### Table 5: Comparing the median, middle and lateral parts with the type of growth pattern

<table>
<thead>
<tr>
<th>Growth pattern</th>
<th>Part</th>
<th>N</th>
<th>Mean Difference</th>
<th>Std. Dev</th>
<th>F-Value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>Median part</td>
<td>57</td>
<td>5.67</td>
<td>3.627</td>
<td>13.205</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>57</td>
<td>3.54</td>
<td>2.605</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>57</td>
<td>9.53</td>
<td>9.959</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>171</td>
<td>6.25</td>
<td>6.739</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>Median part</td>
<td>24</td>
<td>5.46</td>
<td>4.549</td>
<td>0.801</td>
<td>0.453</td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>24</td>
<td>4.29</td>
<td>3.085</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>24</td>
<td>5.58</td>
<td>3.922</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>72</td>
<td>5.11</td>
<td>3.888</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Median part</td>
<td>81</td>
<td>5.96</td>
<td>4.238</td>
<td>14.589</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>81</td>
<td>3.65</td>
<td>3.838</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>81</td>
<td>8.01</td>
<td>6.818</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>243</td>
<td>5.88</td>
<td>5.418</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05 is statistically significant*
Table 6: Comparing the right and left of the median, middle and lateral parts with the type of growth pattern

<table>
<thead>
<tr>
<th>Growth pattern</th>
<th>Part</th>
<th>Side</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>t-Value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>Median part</td>
<td>Right Side</td>
<td>57</td>
<td>47.81</td>
<td>8.524</td>
<td>0.333</td>
<td>0.740</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>57</td>
<td>47.51</td>
<td>9.345</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>57</td>
<td>79.32</td>
<td>14.982</td>
<td>1.785</td>
<td>0.080</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>57</td>
<td>78.30</td>
<td>15.070</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>57</td>
<td>85.02</td>
<td>16.765</td>
<td>1.948</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>57</td>
<td>88.47</td>
<td>13.552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>Median part</td>
<td>Right Side</td>
<td>24</td>
<td>50.29</td>
<td>11.638</td>
<td>2.535</td>
<td>0.019*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>24</td>
<td>47.00</td>
<td>9.978</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>24</td>
<td>78.79</td>
<td>15.379</td>
<td>0.267</td>
<td>0.792</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>24</td>
<td>79.08</td>
<td>14.873</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>24</td>
<td>86.88</td>
<td>12.875</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>24</td>
<td>86.88</td>
<td>12.522</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Median part</td>
<td>Right Side</td>
<td>81</td>
<td>47.81</td>
<td>7.941</td>
<td>0.561</td>
<td>0.577</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>81</td>
<td>47.36</td>
<td>8.781</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle part</td>
<td>Right Side</td>
<td>81</td>
<td>79.20</td>
<td>13.580</td>
<td>0.840</td>
<td>0.403</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>81</td>
<td>78.70</td>
<td>13.157</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral part</td>
<td>Right Side</td>
<td>81</td>
<td>85.28</td>
<td>14.572</td>
<td>1.815</td>
<td>0.073</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Left Side</td>
<td>81</td>
<td>87.37</td>
<td>14.231</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05 is statistically significant

Discussion

Facial asymmetry is evaluated by a number of methods such as frontal photographs, radiographs, stereophotogrammetry, 3D photogrammetry etc. (9,14,18–27) Each method has its own advantages and disadvantages. Of these methods, frontal photographs are the most common and easiest methods. This method involves the identification of landmarks and calculated individual linear measurements between them.

The rule of fifth as introduced by Powell and Humphries in 1984, had four lines that divided the face into five segments each with an eye width. However, in such an analysis, the asymmetry cannot be clearly explained in the medial part. Hence a midline was introduced in the rule of fifth, dividing the face into right and left halves and thereby evaluating the asymmetry. This midline divides the medial fifth into right and left parts.

This analysis was performed in random patients reporting for treatment in department of orthodontics in Saveetha Dental College and Hospitals. This analysis would depict the prevalence of asymmetry in this patient population. All measurements were made in standardised photographs and the measurements were done in computer software to prevent method error. These measurements were related to the patients’ skeletal malocclusion and growth patterns.

When the three parts of either side were averaged and compared, there was significant difference between the three parts. There was significant difference when the median part was compared with the middle and lateral parts. There was significant difference when the middle part was compared with the median and lateral parts. Similarly, there was significant difference when the lateral part was compared with the median and middle parts. In the lateral part, there was a much significant difference between their right and left halves.

When the three parts where related with the different skeletal malocclusion, there was no significant difference in the linear measurements. In class 1 and class 2, there was significant difference between the three parts.

When the parts were related to the different growth patterns, there was significant difference in the horizontal growth pattern when compared to the vertical and average growth patterns. In horizontal growth pattern,
there is significant difference between the right and left halves of the lateral part.

**Conclusion**

All the three parts in the face were not equal on either side. Facial asymmetry was more concentrated on the lateral part when compared to the other two parts. Asymmetry is seen more in patients with class 2 malocclusion, horizontal and average growth patterns when compared to other malocclusion and growth patterns. Ironically, there is no significant facial asymmetry in patients with vertical growth pattern or skeletal class 3 malocclusion. This could be due to the less sample size of Class 3 and vertical growing patients.

**Acknowledgement**

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**Ethical Clearance:** Institutional Ethics Committee, Sree Balaji Dental College and Hospital, Committee registered with DCGI. (Registration no: ECR/761/Inst/TN/2015)

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**Conflict of Interest:** Nil

**REFERENCES**


Pigmented Lesions of Oral Cavity—A Short Review

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ABSTRACT

Pigmentation of oral mucosa occurs due to accumulation of pigments and thereby leading to colour change. Pigmented lesions of oral cavity can be physiologic or pathologic. The pigments causing discolouration can be either from external sources (exogenous) or internal sources (endogenous). Certain drugs can also cause pigmentation of the oral mucosa. Benign and malignant tumours of melanocytic origin can also be pigmented in nature. Endocrine diseases (adrenal) can also cause pigmentation. Diagnosing pigmented lesions requires thorough knowledge of various causes and proper diagnosis is important for planning the treatment.

Keywords: Pigmentation, Pigments, Melanocytes

Introduction

Pigmentation of oral mucosa could be due to accumulation of pigments and leads to colour change of the tissues.¹ The normal colour of healthy oral mucosa is pale pink and colour variation can be due to number of factors like inflammation, pigments.² Pigmented lesions can be commonly seen in oral mucosa and it could be physiologic or pathologic in origin. Physiologic like racial pigmentation and pathologic like systemic diseases (Addison’s disease) and malignant neoplasms (Melanoma).³

Pigmented may be exogenous or endogenous in origin. Exogenous pigmentation occurs due to foreign body implantation. Endogenous pigmentation could be due to endogenous pigments such as melanin, hemoglobin, hemosiderin and carotene.⁴

Classification

- Pigmented lesions
  - Physiologic pigmentation
  - Exogenous and Endogenous pigmentation
  - Drug induced pigmentation
  - Post inflammatory pigmentation
  - Heavy metal pigmentation—Lead, Bismuth, Mercury, Silver, Arsenic, Gold
  - Neoplastic
  - Endocrinal diseases

Physiologic pigmentation: Physiologic pigmentation or racial pigmentation is commonly seen in African, Asian countries. This pigmentation ranges from light brown to dark brown. Most common intraoral site of such pigmentation is attached gingiva. Pigmentation can also be seen as brown patches in buccal mucosa, hard palate, lips and tongue.³

Exogenous and Endogenous pigmentation

Endogenous pigmentation: Endogenous pigmentation include melanin, hemoglobin and hemosiderin and they are produced by body’s own metabolism. The endogenous pigmentation are caused by these endogenous pigments.⁵ The most important of endogenous pigment is melanin and this is synthesized by melanocytes (in basal epithelial layer) and transferred to keratinocytes. Melanocytes produce melanin in membrane-bound organelles called melanosomes.⁵

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Melanin related pigmentation can be lesions such as oral melanotic macule, Nevus, Malignant melanoma and basilar melanosis with incontinence. Melanotic macule is benign pigmented lesion. It occurs as brown or brown black pigmentation and asymptomatic. Nevus is pigmented lesion presenting as a flat, slightly elevated or as a tumour. The colour can be bluish gray, brown or black and sometimes non-pigmented.

Ecchymosis also known as bruises occurs after injury and common site is lips. Trauma causes erythrocytes to come into submucosa and appears as red macules and later degrades to hemosiderin giving brown colour.

Hemochromatosis is chronic, progressive disease with excessive iron deposition in organs and tissues and leads to organ toxicity. Hemochromatosis is a genetic defect which causes excessive iron absorption.

**Exogenous pigmentation:** Exogenous pigmentation can be caused by traumatic deposition into submucosa, ingested, absorbed into blood stream and precipitated into connective tissues particularly in gingiva(areas of chronic inflammation).

Amalgam tattoo(blue black in colour) is a focal pigmentation in oral mucosa(gingiva, alveolar mucosa) caused by large amalgam restoration.

Graphite tattoo(gray or black) as permanent discolouration when pencil points broken off into gingival tissue.

Hairy tongue is caused by defective desquamation of filiform papillae and involves dorsal surface of tongue. Depending on the etiology it can be brown, white or green.

Pigmentation can happen with heavy metal ingestion. An increase in the levels of heavy metals such as lead, bismuth, mercury, silver, arsenic and gold in the blood causes oral mucosal discoloration. Bismuthism caused by medicinal use of bismuth preparation cause metallic taste, burning sensation of oral cavity and blue black bismuth line on gingival papillae. Lead in the paints, glazes, cooking vessels, batteries, ointment and containers cause plumblum. Metallic taste, excessive salivation, dysphagia and a line “ Burtonian line ” seen along gingival margin. Mercurialism also called pink disease or acrodynia is caused due to mercury toxicity. Excess salivation and darker gums than normal are usually noticed. Chronic exposure to silver compound called as argyrosis. The exposed body surface such as nail bed shows deep discoloration. Skin is gray, violet or cyanotic and in oral mucosa the pigmentation is diffuse throughout gingiva and mucosal tissue. Arsenic poisoning from industrial exposure or therapeutic consumption. Oral tissues are painful, deep red in color and often produces ulceration.

Auric stomatitis is caused by used of gold for treatment (Rhesus arthritis, lupus erythematosus and leprosy). It leads to vesicle and ulcerations of oral mucosa and faint blue or purple discoloration.

**Drug Induced Pigmentation:** Oral mucosal pigmentation is caused by certain drugs. The pathogenesis of drug-induced pigmentation depends on the drug used. It may involve accumulation of melanin, deposits of the drug or its metabolites, synthesis of pigments by the drugs or iron deposition after damage to dermal vessels.

Drugs such as phenothiazines and minocycline are deposited in the skin or mucosa and react with melanin and form drug pigment complex. Tetracycline, Cotrimazole are common drugs associated with oral pigmentation. Also colchicines, ketoconazole, pyrimethamine and barbiturates may cause pigmentation.

Chloroquine and other quinine derivatives cause blue-grey or blue-black mucosal discoloration commonly in the hard palate. These drugs are used in treating malaria, cardiac arrhythmia, systemic and discoid lupus erythematosus and rheumatoid arthritis.

Patients infected with Human Immunodeficiency virus are treated with Zidovudine(AZT), Ketoconazole and clofazamine. These patients show oral brownish pigmentation.

**Postinflammatory Pigmentation:** Mucosal pigmentation can be seen in long standing inflammatory disease of mucosa(Lichen mucosa). Mucosa shows brown-black pigmented areas adjacent to erosive or reticular lichen planus.

**Neoplastic pigmented lesions**

Melanocytic nevus: Melanocytic nevus is benign tumour resulting as a consequence of melanocytic growth and proliferation. Oral nevi presents over the age of thirty and clinically appears as brown or blue nodule or macule. Oral nevi may be congenital or genetic disorder. It could be acquired with genetic and environmental factors.
Malignant melanoma: Malignant melanoma is malignancy arising from melanocytes. Oral melanoma as a primary lesion accounts only 1% of all melanomas. Oral melanoma presents as a macule, plaque or a mass. They can be well-circumscribed, irregular and pigmented focally or diffusely and sometimes may lack pigment (amelanotic).

Other diseases causing mucocutaneous pigmentation:
Hypoadrenocorticism (Addison disease) caused by trauma, autoimmunity, infection, neoplasia, genetic disease, medications shows decreased corticosteroid levels. The adrenal gland and pituitary gland are linked through a feedback mechanism. Whenever there is reduced corticosteroid levels the anterior pituitary gland is stimulated to secrete Adrenocorticotropic hormone (ACTH). ACTH acts on adrenal cortex and results secretion of corticosteroids. By this feedback causes pituitary to slow ACTH secretion. When there is low corticosteroid levels ACTH secretion persists. The alpha-melanocyte stimulating hormone gene also originate from same host gene harboring ACTH. As the serum ACTH level rises there is increase in alpha melanocyte stimulating hormone. It stimulates melanocytes directly and increases melanin production. This results in diffuse mucocutaneous pigmentation and in the oral cavity diffuse patchy melanosis in multiple mucosal surfaces can be seen.

Cushing disease: Cushing disease is caused by usually neoplastic activation of pituitary activation leading to continuous secretion of ACTH and alpha melanocyte stimulating hormone into the blood stream. Diffuse mucocutaneous pigmentation may be seen as first sign of the disorder.

Peutz-Jeghers syndrome: Peutz Jeghers syndrome is a genetic disease associated with mutation in tumour suppressor gene (STK11/LKB1). This condition is characterised by intestinal polyposis and increased susceptibility to different types of cancer. In this disease labial, perioral and acral macular pigmentation may represent earliest clinical manifestations. Macules are resembling dark freckling but without increase or diminished color intensity due to sun exposure.

Conclusion
Pigmentation in the oral mucosa when noticed should be diagnosed by which it could treated appropriately. Knowledge about the etiologic factors for occurrence of pigmentation in the mucosa and skin aids in diagnosis. The different clinical presentation of pigmentation should also be known by practioners. Muco-cutaneous pigmentation in certain endocrine diseases may be an additional diagnostic feature.

REFERENCES


Common Adverse Effects of Using Mouth Wash in General Population—A Short Review

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¹Reader, ²Professor, ³Professor & Head, Dept of Oral Pathology Sree Balaji Dental College & Hospital, Bharath Institute of Higher Education and Research.

ABSTRACT

People use mouth rinses as a part of their oral hygiene in their day to day life. Although rinses impart some benefits to users, improper use of mouth rinses may result in various side effects. Usually mouthwashes are antiseptic solutions intended to reduce the microbial load in the oral cavity, although other mouthwashes might be given for other reasons such as for their analgesic, anti-inflammatory or anti-fungal action.

Keywords: mouth wash, oral hygiene, antiseptic, allergic reaction.

Introduction

Many person uses mouth rinses as a part of their oral hygiene in their day to day life. Although rinses impart some benefits to users, improper use of mouth rinses may result in various side effects. Usually mouthwashes are antiseptic solutions intended to reduce the microbial load in the oral cavity, although other mouthwashes might be given for other reasons such as for their analgesic, anti-inflammatory or anti-fungal action. Additionally, some rinses act as saliva substitutes to neutralize acid and keep the mouth moist in xerostomia (dry mouth). Cosmetic mouth rinses temporarily control or reduce bad breath and leave the mouth with a pleasant taste. Health Survey suggests that mouth washes are most commonly used by younger adults, but adults of all ages may benefit from them.

Types of Mouth Washes

- **Fluoride Mouth Wash**: Fluoride in mouth washes contains sodium fluoride which helps protect the teeth from cavities and tooth decay. Since fluoride can be found in tooth paste and tap water, too much fluoride contain mouth wash is not good for the tooth.

- **Antiseptic Mouth Wash**: This type of mouth wash is very common usually contain alcohol mostly used by people with mouth infection to stop bacterial growth. This is also helpful for people who have halitosis or bad breath. This is used together with the proper brushing of teeth and flossing. Over use of antiseptic mouth wash result in discoloration of teeth.

- **Cosmetic Mouth Wash**: Cosmetic mouth wash freshen your breath or to mask bad breath.

- **Natural Mouth Wash**: Natural mouth washes are alcohol-free mouthwash. Their ingredients are safer to use as compared to other type of mouth wash.

Benefits of Mouth Wash

- Freshens the breath – mouth wash temporarily reduces bad breath temporarily. It is an effective tool in the fight against tooth decay, gingivitis and promotes the healthy teeth and gums.

- Prevents plaque buildup – various mouth washes help prevent plaque buildup in your gums and in between the tooth

- Removes particles – mouth wash can be used before brushing to rinse out any loose particles in your mouth

- Prevent from cavity forming – regular use of mouth washes before and after brush and floss, reduce the chances of cavity forming. Mouthwashes that contain fluoride can prevent cavities and strengthen the enamel.

**Fluoride Mouth Washes**: Fluoride containing mouth wash used to prevent cavities, fluoride is mineral that helps the teeth stronger and more resistant to decay caused by acid and bacteria. fluorside containing mouth wash leading to serious allergic reaction including rash,
itching, swelling in the face, tongue, throat, severe dizziness, and trouble in breathing.

Most commonly used over the counter mouth wash have antiseptic properties, mouth wash uses more than twice per day increases pre-diabetes/diabetes risk over 3 years. Most mouth wash contain antibacterial ingredients, which could impact oral microbes critical for nitric oxide formation, and in turn predispose to metabolic disorders including diabetes. Mouthwashes generally contains an antiseptic such as benzakonium chloride, antibiotic agents, essential oils used as flavors, alcohol, sodium perborate, zinc chloride menthol, thymol, eucalyptol, glycerine, and boric acid. These substances can cause allergic reaction. Prolonged use of a mouthwash in which the alcohol concentration is high can induce white lesions in oral mucous membrane.

Anti Septic Mouth Washes: Anti septic mouth rinses on the market today have 3 main ingredients. One is called quaternary ammonium compound cetylpyridinium chloride, or CPC—an antiseptic that has been used since 1939 and is still included in many current mouthrinses at formulations ranging from 0.045-0.075%. It’s important to note that 0.045% is the minimum recognized therapeutic concentration; yet, many mouthrinses contain CPC at concentrations below this and do not provide anti-plaque/anti-gingivitis benefits.

A second common antimicrobial ingredient found in mouthrinses is chlorhexidine, or CHX—a bacterial bisbiguanide antiseptic that is found only in prescription products such as Peridex and PerioGuard. CPC can interact with negatively charged ions in toothpaste, which may lower its biological activity and reduce its clinical efficacy. CPC and CHX also may precipitate negatively charged dietary chromogens in food and beverages, which can lead to tooth staining. Chlorhexidine gluconate is a prescription germicidal mouthwash that decreases bacteria in mouth. It is the most effective antiseptic mouthwash primarily prescribes to treat the inflammation, swelling, and bleeding that comes with gingivitis.

Cosmetic Mouth Wash: Cosmetic mouth rinses may temporarily control or reduce bad breath and leave the mouth with a pleasant taste, but none of the cosmetic mouth rinses help reduce plaque, gingivitis, or cavities.

Natural Mouth Wash: Using a natural mouthwash in conjunction with regular brushing and flossing is a good way to reduce oral bacteria and maintain or achieve optimal oral health and hygiene.

A natural mouth rinse, uses pure essential oils extracted from flowers, root stems, cinnamon, and peppermint. Most commercial mouth wash contain of alcohol to kill bacteria, it is only effective for short duration. An alcohol-free mouth rinse is better because it is equally effective at eradicating germs without the irritation.

Oral health is an excellent indicator of overall health. Infections of the oral mucosa can result in inflammation in other parts of the body because the oral mucosa provides a direct pathway into the bloodstream. Use a natural mouth rinse and toothpaste for highly effective cleansing and to help protect against gum disease.

Adverse Effects of Mouth Wash

Staining: Chlorhexidine might cause staining of tooth surfaces, restorations, and the tongue. If patient have anterior white filling dentist do not recommend chlorhexidine mouth wash.

Alteration in Taste: It alters the permanent taste sensation.

Tarter Formation: Regular use of chlorhexidine mouth wash increases the tartar formation.

Allergic Reaction: There is possibility of allergic reaction.

Pregnancy & Breast Feeding: Chlorhexidine mouth wash is not safe for fetus. In breast feeding mother this mouthwash may pass through breast milk and affects the child. In children it is not recommended under the age of 18.

Color Stability of Dental Resin – Based Composite Materials: The color of dental restorative material should be maintained throughout its functional life time in an oral environment. The frequent use of mouth wash may affect the color stability of these composite restorations.

Conclusion

Better to avoid regular use of alcohol-based mouth wash. Natural mouth wash is good without any side effects.
effects. It maintains good oral health & hygiene. For long term use, natural mouth which is extracted from flower, herbs & essential oils are good.

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**REFERENCES**


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Dentoalveolar Abscess—A Review

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ABSTRACT

Periodontal abscess is the third most frequent dental emergency, representing 7–14% of all dental emergencies. Numerous aetiologies have been implicated. The diagnosis is done by the analysis of the signs and symptoms and by the usage of supplemental diagnostic aids. The treatment of the periodontal abscess has been a challenge for many decades. In the past, the periodontal abscess in periodontal diseased teeth was the main reason for tooth extraction. Today, three therapeutic approaches are being discussed in dentistry, that include, drainage and debridement, systemic antibiotics and periodontal surgical procedures which are applied in the chronic phase of the disease. The localization of the acute periodontal abscess and the possibility of obtaining drainage are essential considerations for successful treatment. The aim of this review is to give a clear idea about periodontal abscess and its management.

Prevalence:
Prevalence of Periodontal abscess is relatively high constituting about 6-14% of all dental emergencies, and is also the most important reason for people seeking dental care. It is the third most common dental emergency [1st is Pulpal infection (14%-25%),...
followed by pericoronitis (10%-11%). Among all emergency dental conditions, periodontal abscesses represent approximately 8% of all dental emergencies in the world \cite{2}, and up to 14% in the USA \cite{3-5}

**Pathogenesis:** Entry of bacteria into the periodontal wall initiates the process of periodontal abscess. With the infiltration for bacteria into the periodontium, the presence of bacteria and bacterial products initiates inflammatory process with activation of inflammatory response. Inflammatory cells and extracellular enzymes cause tissue destruction followed by inflammatory infiltrate resulting in encapsulation of bacterial mass and pus formation. Quantitative lowering of tissue resistance and virulence of bacteria present determines the course of infection.

**Classification \cite{1, 2}:**

1. **Based on etiological factor**
   
   - **Periodontitis related abscess:** Infection originates from biofilm (deepened periodontal pocket).
   
   - **Non-periodontitis related abscess:** Infection originate from another local source, E.g- foreign body impaction, altered root integrity.

2. **Based on course of the disease**

   - **Acute periodontal abscess:** Has very short period of development with sudden onset and lasts for few days or weeks. Represents as deep and throbbing pain while biting and patient shows tendency towards clenching. Gums appear red, swollen, tender with no evidence of pus discharge initially, as the disease progresses shows pus discharge and fluctuation with enlargement of associated lymph node.

   - **Chronic periodontal abscess:** Has a longer period of development and usually slow onset. Represents itself with fowl breath, low intensity pain, spontaneous bleeding with tenderness on the adjacent tooth often associated with mobility. Pus discharge maybe evident along with discharge from gingival crevice or overlying mucosa.

3. **Based on number**

   - **Single abscess:** associated with single tooth.
   
   - **Multiple abscess:** confined to more than one tooth.

**Microbiology:** The culture of periodontal abscesses have revealed a high prevalence of the following bacteria:

1. Porphyromonas gingivalis-55-100% Lewis et al \cite{6}
2. Prevotella intermedia- 25-100% Newman and Sims \cite{7}
3. Fusobacterium nucleatum -44-65% Hafstrom et al \cite{8}
4. Actinobacillus actinomycetemcomitans-25% Hafstrom et al \cite{8}
5. Campylobacter rectus- 80% Hafstrom et al \cite{8}
6. Prevotella melaninogenica-22% Newman and Sims \cite{7}

**Predisposing Factors:** Numerous predisposing factors have been proposed, to develop an abscess. The factors are as follows:

- Change in the composition of the microflora, virulence of bacteria or in host defences could also make the gingival pocket lumen inefficient to drain the increased suppuration \cite{9}. Closure of periodontal pockets may lead to the spread of the infection into the surrounding tissues, due to the pressure of the suppuration inside the pocket. Local accumulation of pus because of fibrin secretion, may favour the closure of the gingival margin to the tooth surface \cite{10}. Small periodontal pockets are especially associated with furcation defects. These become isolated and can favour the formation of an abscess. After procedures like scaling where the calculus is dislodged and pushed into the soft tissue.

**The Iatrogenic Factors Which are Associated with Periodontal Abscess:** Post scaling periodontal abscess. eg. Due to the presence of fragments of the remaining calculus that may block the pocket entrance or when a fragment of the calculus is forced into non-inflamed portion of the tissue, Post surgical periodontal abscess When the abscess occurs immediately followed by periodontal surgery. It is often due to the incomplete removal of the calculus in subgingival portion. Perforation of the tooth by an endodontic instrument. The presence of a foreign body in the periodontal tissue (e.g. Suture/pack) Post antibiotic periodontal abscess \cite{11}

**Diagnosis:** Diagnosis of periodontal abscess is primarily based on chief complaint, history of presenting illness; medical and dental history are also essential for proper diagnosis. Severity of pain and symptoms differentiates
between chronic and acute abscess. Important points in history taking includes:

If the patient is under the supervision of any physician or dentist, or is under any medication that might affect periodontal diagnosis and treatment, history of dental treatments which might affect the diagnosis. Habit of smoking might affect as it would severe the condition and reduce the response towards the treatment. Proper history taking is followed by examination of patient and the lesion. The steps include:

Systemic condition- Evaluating medical status of the patient and symptoms indicating any systemic condition, immune status, age, distress, fatigue.

Extra oral examination- Tenderness, symmetry, colour change, presence of fluctuance and sinus tract, limitation in mouth opening, enlargement of regional lymph node.

Intra oral examination- Examining any change in dentition or mucosa; colour, contour and consistency of gingiva; suppuration (if any) either spontaneous or on application of pressure, or from sinus; mobility, extrusion from the socket, tenderness on percussion of the associated tooth; evaluating oral hygiene and periodontal status.

Radiograph\(^{[12]}\): Various radiographic techniques such as periapical, bitewing, OPG are used to assess the periodontal status of the patients, revealing either normal architecture of bone or loss of interdental bone, or evident bone loss along with loss or widening of periodontal space. Periapical and bitewing radiographs are used to assess the marginal bone status or periapical condition of the tooth. Also insertion of gutta percha point into the sinus tract while taking a radiograph shows the track of the abscess.

Vitality Test\(^{[12]}\): Assessing the vitality of the tooth using either thermal or electrical means helps in ruling out any pulpal infection associated with the tooth.

Microbial Test\(^{[10],[12]}\): Culturing and sensitivity testing of the samples obtained from the pus discharge from sinus or abscess or gingival sulcus aids in specific antibiotic administration.

Lab Finding\(^{[2]}\): Elevated count of blood neutrophils, monocytes and leukocytes is suggestive of increased immune response to bacterial toxins in periodontium and aids in confirming the diagnosis.

Others: Presence of multiple abscess is often suggestive of increased blood glucose levels, and altered immune status of diabetic patients. Thus, assessment of blood glucose level by fasting and random blood glucose or glycosylated hemoglobin level is essential before treatment planning, to ensure proper prognosis.

Immediate Management: Immediate management is usually advised in life threatening conditions such as space infections from oro-facial regions or diffuse spreading infections E.g., facial cellulitis. Immediate hospitalization and supportive therapy along with intravenous infusion is always recommended. Based on the general/local signs and symptoms, investigation results and severity of the infection, start of the therapy can be either immediate or delayed to some extent. In case of non-life-threatening condition with systemic signs and symptoms, systemic analgesics and antimicrobial administration can be recommended\(^{[8],[11],[12],[13]}\). But empirical antibiotics are recommended before the analysis of culture and sensitivity test is done which depends on severity of the infection. Commonest empirical antibiotics administered include: metronidazole 200-400mg tds for 5-7 days, Phenoxymethylpenicillin 250-500mg qid 5-7 days, amoxicillin 250-500 mg qid 5-7 days. Alternative antibiotics in case of penicillin allergy include: erythromycin 250-3500mg qid 5-7 days, doxycycline 100mg bd 7-14 days, clindamycin 150-300mg qid 5-7days.

Initial Therapy: Initial therapy is recommended when there is no systemic toxicity or for lesions with resolved systemic toxicity and chronic periodontal abscess\(^{[13]}\). Initial therapy constitutes

1. Abscess pocket irrigation with saline and antiseptics,
2. Removal of foreign body (if any),
3. Scaling on the root surface or sulcus draining using probe,
4. Debridement and compression of soft tissue wall,
5. Oral hygiene instructions,
6. Review after 24-48 hrs; followed by definitive treatment after a week.

Treatment options in initial therapy of periodontal abscess include- drainage through pocket by retraction
or incision; scaling and root planning; periodontal surgery; systemic antibiotics; tooth extraction

**Definitive Treatment:** Definitive treatment is done depending on patient needs and prognosis following the reassessment after initial treatment for restoring function, esthetics and maintaining proper periodontal health of the patient

**Conclusion**

Diagnosis of periodontal condition with lowered periodontal health along with periodontal abscess has high and favorable response towards initial and definitive treatment than a single case with either hindered periodontal health or periodontal abscess condition. Also, in case of extraction of tooth various factors such as degree of furcation involvement, degree of clinical attachment loss, degree of mobility, patient’s susceptibility towards periodontitis due to any systemic conditions should be under taken before proceeding with the treatment. Often reoccurrence of periodontal abscess is noted in patient undergoing supportive periodontal treatment. Hence, Early and timely intervention is essential in management of periodontal disease as it has high chance of tooth loss.

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**REFERENCES**


Drug Induced Lichenoid Reactions—A Literature Review

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ABSTRACT

The terms oral lichenoid reactions or oral lichenoid lesions refer to histologically and clinically similar to oral lichen planus. These lesions are described according to the causative factor involved, including direct contact with dental restoration materials, drug-related lesions, and lesions associated to graft-versus-host disease. Drug-induced oral lichenoid reactions were first cited in 1971 by Almeyda and Levantine. Since then, many drug substances have been associated with such lesions. The most common agents are NSAIDs and ACE inhibitors.

Keywords: Lichen planus, Lichenoid reaction, Dental materials, NSAIDs

Introduction

The terms oral lichenoid reactions or oral lichenoid lesions refer to lesions histologically and clinically similar to oral lichen planus [1]. The literature uses different terms to describe lesions of this kind [2]. The etiological factor involved, including alterations resulting from direct contact with dental restoration materials, drug-related lesions, and lesions associated to graft-versus-host disease [1, 2]. Drug-induced oral lichenoid reactions was first mentioned in 1929, and were later cited in 1971 by Almeyda and Levantine [3]. Many of the cases were documented among United States military personnel during the war in the Pacific, southeastern Europe and Indonesia. They also reported cases with an apparent relationship between the clinical findings in these individuals and the prophylactic use of antimalarial drugs. Since then, many other drug substances have been associated with such lesions [4].

Epidemiology: The accurate epidemiological characteristics of these lesions are difficult to establish, due to the diverse terms used as a final diagnosis of lichen planus where the histopathological and clinical findings are less similar than in classical lichen planus [3]. Second thing, the absence of histological confirmation in most of the published articles on OLP related disorders makes it difficult to establish their actual prevalence or incidence [5]. It is believed that the prevalence of OLRs due drug substances is increasing. According to many authors [6], newly marketed drugs that are generally used among the population, such as antihypertensive agents, can cause such lesions as side effects.

Etiopathogenesis: The etiopathogenic mechanism is not known. The literature has reported a series of triggering factors, such as dental restoration materials, graft-versus-host disease, and a broad range of drugs [6, 7]. Many materials commonly used in restoration treatments in the oral cavity has been identified as triggering elements, including silver amalgam, gold, cobalt, palladium, chromium and even non-metals such as epoxy resins [7,8]. Bäckman and Jontell [9] in turn have pointed to dental material coadjuvants such as dental tartar deposited upon the materials, oral breathing and hyposialia as etiological factors. These authors published the case of a patient with all three factors who developed a lichenoid reaction in the absence of dental restoration. On the other hand, many drug substances are reportedly able to produce such reactions. The most common agents are non-steroidal anti inflammatory drugs and angiotensin converting enzyme inhibitors [10, 11]. These drugs are used

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in combination, thus the possible existence of synergic effects between them is there. A few authors think of it as very likely that the alleged “Grinspan disorder”, in which oral lichen planus is identified with diabetes mellitus and blood vessel hypertension, is in reality essentially a case of oral lichenoid response prompted by the medications at the same time used to treat the last two ailments [12].

**Clinical Manifestations:** The clinical manifestations of oral lichenoid lesions are indistinct from those of oral lichen planus [7] with mainly erythematous erosive lesions. Most of these lesions are characterized by the presence of whitish streaks known as Wickham striae, seen in lichen planus [13]. However, a very significant factor of OLP is their location, and the absence of bilaterality of the manifestations [2, 6]. In sedate actuated lichenoid responses, no particular clinical highlights have been depicted prepared to do solidly separating them from lichenoid responses brought about by different variables. The main piece of information in this sense is a precursor of later or ceaseless introduction to some medication substance. Therefore, a differential analysis must be set up, considering cases related to the utilization of dental materials where the sores are found in contact with or near the helpful materials, and affirming that the patient has no forerunners of join versus-have ailment [14].

**Diagnosis:** The analysis of OLRs depends on their clinical attributes and the histological discoveries [9, 15]. In any case, the affectability and particularity of histological finding are low [4]. What’s more, no complete atomic analytic markers have been set up to date [16]. Van der Meij et al. [6] have proposed an alteration of the demonstrative criteria of the World Wellbeing Association for oral lichen planus and lichenoid responses. As these are cause – impact sores, the most exact symptomatic piece of information is assurance of whether the injuries vanish in the wake of wiping out presentation to the speculate etiological factor [8]. Nonetheless, on account of medication actuated injuries, suspension of the medicine may put persistent wellbeing in danger [13]. Moreover, much of the time such measures are not helpful and solid as an analytic technique, since the sores may take a long time in settling in the wake of suspending the presume prescription [3, 17].

**Final diagnosis of oral lichen planus and oral lichenoid lesions:** The clinical and histopathological criteria must be included in order to establish a final diagnosis. Both the clinical and histopathological criteria must be met in order to diagnose oral lichen planus. The term oral lichenoid lesions is to be used under the following conditions:

1. Clinically characteristic of oral lichen planus but histologically only “compatible with” oral lichen planus
2. Histologically characteristic of oral lichen planus but clinically only “compatible with” oral lichen planus
3. Both clinically and histologically “compatible with” oral lichen planus.

Modified World Health Organization criteria for the diagnosis of oral lichenoid reactions (OLRs), oral lichenoid lesions (OLLs) and oral lichen planus (OLP). Van de Meij et al., 2007 [6].

**Treatment:** The management of such lesions first requires identification of the triggering factor, and the elimination of exposure to it. In the case of drug-induced OLRs, due evaluation of the risk/benefit ratio of suspending the medication is required. As has been commented, even if the causal medication can be suspended, the lesions may take several months in improving. In addition, the pharmacological treatment of OLRs is often not feasible, because the long list of agents capable of causing such lesions includes many substances used to inhibit autoimmune T lymphocytes responses. These drugs are commonly used to treat very severe forms of lichen planus in its atrophic – erosive presentation, and in particular include dapsone, levamisole, tetracyclines and interferon [18, 19].

**Conclusion**

Oral lichenoid rections should be perceived as a separate entity happening because of dental restorative materials, medications, and drugs. In spite of the fact that they share clinical and histological likenesses to OLP adequate information has been exhibited in writing for their separation. It is fundamental that oral clinicians and dermatologists perceive this reality, particularly since their treatment is considerably more issue based contrasted with the exact treatment of OLP. In perspective on late investigations featuring their dangerous potential severe rules should be followed in their administration to maintain a strategic distance from or identify early the harmful changes.
REFERENCES


Oral Manifestations and Complications of Diabetes Mellitus

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ABSTRACT

Diabetes is a clinically and genetically heterogeneous group of metabolic disorders manifested by abnormally high levels of glucose in the blood. Diabetes mellitus is a chronic disease affecting all age groups. There are 2 major types of diabetes mellitus are type I, Insulin dependent type and type II, Non insulin dependent type. Gestational diabetes is a state of abnormal glucose tolerance during pregnancy. It is one of the major disease increasing the mortality and morbidity worldwide. Hyperglycemia in diabetes is caused by insulin deficiency and insulin resistance. The common oral manifestations in diabetics are periodontal diseases, fungal infection, salivary dysfunction, burning mouth syndrome, delayed wound healing etc. This article aims to review and increase the awareness among the dental professionals about oral manifestations and complications of diabetes mellitus.

Keywords: Hyperglycaemia, Xerostomia, Burning Mouth Syndrome, Periodontitis.

Introduction

Diabetes Mellitus (DM) is a metabolic disorder characterized by the presence of chronic hyperglycaemia accompanied to greater or lesser extent by alterations to carbohydrate, protein, and lipid metabolisms¹. The overall prevalence of diabetes among adults over 18 years of age has increased from 4.7% in 1980 to 8.5% in 2014 and the World Health Organization (WHO) predicts this will increase to 439 million, almost 10% of adults in 2030². Therefore, dental professionals can play an important role in diagnosing and managing patients with diabetes.

Oral Manifestations in Diabetes Mellitus: Diabetic patient presents with impaired immune system and decreased bactericidal activity. The severity of symptoms are directly proportional to the degree and duration of the hyperglycemic status. Oral manifestation in diabetes are are Xerostomia, dental caries, periodontal disease and gingivitis, oral candidiasis, burning mouth syndrome (BMS), taste disorders, rhinocerebralzygomycosis (mucormycosis), aspergillosis, oral lichen planus, geographic tongue and fissured tongue, delayed wound healing, salivary dysfunction, altered taste and other neurosensory disorders, impaired tooth eruption, and benign parotid hypertrophy³. Periodontitis is more frequent and severe in patients with diabetes with poor glycaemic control. Dry mouth is the second most common manifestation that occur next to periodontitis. Early identification and/or management of these oral manifestations may help in the early diagnosis of diabetes and in attaining better glycaemic control.

Periodontal Diseases: Periodontal disease is the sixth most common complication of all diabetic complications⁴. Patients on taking food, there is slow release of periodontal pathogens and their metabolic products into oral tissues thereby causes bacteremia and endotoxemia. It results in an increase in serum levels of inflammatory mediators such as Inter-leukin 6 (IL-6), fibrinogen, and C-reactive protein (CRP). Systemic inflammation can also increases insulin resistance level and hence hyperglycemia occurs. The appropriate periodontal treatment by dental professionals can lower the level of proinflammatory mediators, thereby maintaining the blood glucose level⁵.
Table 1: Pathogenesis and treatment of orofacial diseases

<table>
<thead>
<tr>
<th>Oral pathology related to DM</th>
<th>Pathogenesis</th>
<th>Treatment and Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodontal disease</td>
<td>Accumulation of AGEs in periodontal tissues, decreased periodontal regenerative capacity and defective immune regulation</td>
<td>Assessment of risk of disease progression, periodic reviews, dietary advice and perio-dental therapy</td>
</tr>
<tr>
<td>Dry mouth</td>
<td>Reduced salivary flow as a result of polyuria and dehydration</td>
<td>Proper control diabetes and dental hygiene</td>
</tr>
<tr>
<td>Root Caries</td>
<td>As a result of gingival resorption and decreased salivary flow</td>
<td>Use of fluoridated pastes, restorative treatments. The optimal glycemic control prevents progression</td>
</tr>
<tr>
<td>Oral Candidiasis</td>
<td>Because salivary dysfunction, hyperglycemia and impaired immune system</td>
<td>Antifungal nystatin or miconazole treatment. Good glycemic control and prevention</td>
</tr>
<tr>
<td>Pulp necrosis and periodontal abscess</td>
<td>Ischemic tissue damage related pulp own vascular damage from diabetes</td>
<td>Endodontic treatment and control of diabetes</td>
</tr>
<tr>
<td>Delayed wound healing and increased incidence of infections following surgery</td>
<td>Caused by vascular dysfunction and decreased immune on diabetes</td>
<td>Preventive administration of antibiotics and good glycemic control</td>
</tr>
</tbody>
</table>

*AGEs: advanced glycosylation end products.

There are many theories which propose factors such as advanced glycation end products (AGEs), alteration in collagen nature, and altered immune function that causes defects in neutrophils function which sets the favourable environment for accumulation of bacteria in the tissue and also advanced glycation end products, which results from prolonged and chronic hyperglycaemia and increased secretion of pro-inflammatory cytokines such as tumour necrosis factor-α and prostaglandin E-2. The increase in collagenase activity along with the reduction in collagen synthesis will adversely influence collagen metabolism. This altered collagen metabolism would cause delayed wound healing as well as periodontal tissue destruction. Smoking is the primary risk factor for periodontal disease in diabetics.

**Periapical Diseases:** The dental pulp of diabetic patients differ from the normal pulp tissues, and pulpal tissues have dental collateral circulation, impaired immune response, and an increased risk of infection or pulp necrosis. Hyperglycemia is a stimulus for bone resorption by osteoclastic activity, inhibition of osteoblast differentiation, and a reduced capacity for bone recovery. A recent review concluded that current knowledge about the microbiology of endodontic infections and inflammatory reactions is limited, and that such knowledge could help implement new forms of treatment for these patients. Further research is needed to better understand the issue and so increase the success rates of endodontic treatment among these patients.

**Dental Caries:** It is known that diabetic patients are more susceptible to periodontal and salivary (xerostomia) disorders, which can also lead to tooth decay and loss. Salivary secretion dysfunction, periodontal and sensory disorders could increase the incidence of developing new and recurrent dental caries and tooth loss. The cleansing and buffering capacity of the saliva is diminished in patients with diabetes mellitus resulting in increased incidence of dental caries. Decreased salivary secretion, increased of carbohydrate level in parotid gland saliva, growth of oral yeasts, increased count of Mutans streptococci and lactobacilli are other factors responsible for increased incidence of caries.

**Salivary Dysfunction:** Patients with diabetes usually experience polydipsia and polyuria. In most times, constant dryness of the mouth remains and
xerostomia occurs. Xerostomia would cause impact on oral tissues and cause inflammation and pain. It also increases the incidence of periodontal infections and tooth decay. Diabetes mellitus is associated with chronic complications such as neuropathy, microvascular abnormalities and endothelial dysfunction that lead to deterioration of microcirculation and this may play a role in reduction of the salivary flow rate and composition. Sialosis is defined as asymptomatic, non-inflammatory, non-neoplastic, bilateral chronic diffuse swelling mainly affecting the parotid glands. Sialosis has been found to be more prevalent in patients with diabetes mellitus. Xerostomia also increases the level of salivary pathogens.

**Oral Infections:** Fungal infections: Oral candidiasis is an opportunistic infection caused by Candida albicans species. Candidal infection is more prevalent in patients with diabetes. The predisposing factor for candidiasis in diabetics is smoking habit, denture wearing, poor glycaemic control and use of steroids and broad spectrum antibiotics. Xerostomia also increases the risk of occurrence of candidiasis.

Bacterial infections are also common in diabetic patients since they are more prone to it. A prospective study conducted by Rao et al. concluded that submandibular space was more commonly involved in bacterial infection followed by buccal space.

**Taste Dysfunction:** The causative factor for taste dysfunction are metabolic and endocrine diseases. Patients of poor glycaemic control may have this taste dysfunction. Diabetic patients who suffer from neuropathy have a higher taste threshold.

**Neuro Sensory Disorder:** Oral dysesthesia or burning mouth syndrome (BMS) is a burning and painful condition affecting the oral cavity, most commonly palate, tongue, throat and gingivae, usually without any clinical signs. Tingling, numbness, dryness or sore mouth can also occur in combination with BMS. Its etiology includes systemic, local, and psychological factors (stress, anxiety and depression). The common associated conditions for BMS are dry mouth, menopause, candidal infection, diabetes mellitus, cancer therapy, psychological problems and acid reflux. BMS affect the ability to maintain good oral hygiene in patients with diabetes. Diabetic neuropathy could be the underlying cause of BMS in patients with diabetes.

**Delayed Wound Healing:** Delayed wound healing and delayed bone formation are known complications of diabetic patients. Delayed wound healing is due to poor soft tissue regeneration because of altered collagen metabolism such as increased collagenase activity and decreased collagen synthesis. Management of wounds in diabetic patients is more complex than normal individuals. The possible underlying causes for the delayed wound healing are delayed vascularisation, reduced blood flow, a decline in innate immunity, decreased growth factor production, and psychological stress.

**Oral Mucosal Diseases:** Oral Lichen Planus (OLP) and recurrent aphthous stomatitis are most common oral mucosal diseases in patients with diabetes. OLP is common in patients with type 1 diabetes compared to type 2 diabetes. This is because, OLP and type I DM are of autoimmune disease in origin. In type I diabetes mellitus, acute hyperglycaemia causes alteration in the immune responsiveness in diabetes mellitus. Atrophic-erosive oral lesions are more common in patients with diabetes with OLP.

**Conclusion**

There is increasing evidence that chronic oral complications in patients with diabetes adversely affect blood glucose control. Prevention and management of oral complications, especially periodontal disease, in patients with diabetes is important due to their possible adverse effect on glycaemic control. This review implied, an understanding of the way diabetes affects oral health is necessary for both clinicians and patients, therefore research in this field should be encouraged.

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**REFERENCES**


Oral Conditions in Renal Disorders

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ABSTRACT

Kidney disease is a worldwide disease, with higher rate of increasing incidence and prevalence. Chronic renal failure is a disease in which chronic destruction of nephrons occurs and ends up in irreversible loss of kidney function associated with reduced Glomerular Filtration Rate (GFR). Renal function is measured using GFR by estimating Creatinine Clearance (CC). Patients suffering from End Stage Renal Disease (ESRD) may also encounter with hypertension, anaemia, infection, risk of bleeding, adverse effects of drugs and several other oral manifestation. Chronic renal failure cause various oral manifestations which affect both teeth and their surrounding tissues. The aim of this article is to provide knowledge for dentist regarding the association between renal diseases and their oral manifestation and to provide guidelines for managing these patients by improving the dental protocols for those patients. By improving the treatment protocol and oral hygiene of these patients, dentist can be able to prevent endocarditis and septicaemia.

Keywords: Chronic Renal failure, Creatinine Clearance, Dialysis, Xerostomia.

Introduction

Chronic renal disease (CRD), a chronic, slowly progressive and irreversible destruction of kidney architecture resulting in diminished kidney function. Renal dysfunction show definite implications in oral cavity by causing pathology 1. The functions of kidneys are maintaining electrolyte balance, filtering the metabolic products, maintaining the volume of extracellular fluid, endocrine function by producing hormones such as erythropoietin, prostaglandins etc 2. As the kidney functions for a prolonged period, the functional unit of kidneys such as nephrons gets diminished in some individuals. In untreated cases, destruction of nephrons can lead to renal failure.

The normal renal function is assessed by measuring Glomerular Filtration Rate (GFR), which is measured by estimating Creatinine Clearance (CC). Normal GFR value 120-130ml/minute/1.73m2 and varies according to age and gender 3. In Chronic Renal Failure (CRF) cases, GFR fall leads to increase un serum urea level. Creatinine Clearance (CC) gives an acceptable approximation to the value of GFR and indicates when there is a fall. Dentist commonly use plasmatic creatinine level to assess the kidney function before prescribing the drug. The normal value of serum Cr is 0.5-1.4mg/dl and it will be more than 1.5mg/dl for renal disorders individuals.

The most common etiologic factors for the CRF are Diabetes mellitus, Hypertension and glomerulonephritis. Treatment options for CRF includes dietary changes, management of systemic diseases, dialysis or a renal graft 4. Cardiac arrest is the most common cause of death in these patients, followed by infection and malignancy. The objective of this article is to describe the oral manifestations of renal disorders and to delivering the management protocolfor treating these patients.

Oral Manifestations: It is estimated that more than 85% of chronic renal failure patients present with oral manifestation. The proper intervention with dialysis
at the earliest period reduce the oral manifestation. Systemic health of an individual is usually expressed in the oral cavity. Chronic Renal Failure (CRF) is one among the systemic disorders which show manifestations in oral cavity. Most common oral manifestations are dry mouth, altered taste impairment, gingivitis, parotitis, enamel hypoplasia and delayed eruption. It can also manifest some of the mucosal lesions such as leukoplasia, lichenoid reactions, aphthous ulcers, angular chelitis, candidiasis etc.

Dialysis patients usually exhibits pallor of the mucosa mainly due to anaemia which occurred because of reduced erythropoietin synthesis. They also predisposes to ecchymoses, petechiae and haemorrhage in oral mucosa. Bleeding tendency in these patients is usually due to alterations in platelet aggregation and renal anemia.

**Xerostomia:** Xerostomia or dry mouth is a frequent and major complaint among patients undergoing dialysis. The causes for dry mouth are dehydration, decreased intake of water, mouth breathing, chemical inflammation, direct uremic involvement of salivary glands etc. Some other conditions which cause dry mouth are retrograde parotitis, metabolic abnormalities and use of diuretics.

**Mucosal Lesions:** Patients undergone renal transplant and on dialysis usually manifest with white patches and ulcerations. Use of immunosuppressive drugs by these patients may cause lichenoid reactions and oral hairy leukoplakia. Uremia usually associated with the incidence of Epstein-Barr virus (EBV) infection and infection resolves on treating uremia. White patches in skin of these patients are called “uremic frost”, which are formed due to deposition of urea crystals on the epithelial surfaces. It is rare in oral cavity because of saliva evaporation.

**Uremic Stomatitis:** Uremic stomatitis can be seen in renal failure patients because of increased levels of urea and other nitrogenous wastes in blood which may be acute in onset. Clinically it may represent as white plaques present on buccal mucosa, floor of the mouth and tongue. Lesion usually present with pain, burning sensation and unpleasant taste. Physician usually detect an odor of ammonia or urine in the patient’s breath. Uremic stomatitis can be of four types such as Erythemopultaceous, Ulcerative, Hemorrhagic and Hyperkeratotic.

**Renal Osteodystrophy:** It is a chronic, spectrum of bone metabolism disorder linked with various pathogenic pathways. In renal osteodystrophy, bone demineralization with trabeculation and cortical loss, giant cell radiotransparencies or metastatic calcifications of the soft tissues occurs. As the bones are demineralized at higher rate, patients were highly susceptible to fracture of bones during dental procedure especially extraction and impaction. Maxillary and mandibular jaw enlargement with dental malocclusion are also common in these individuals. Other some conditions common in renal failure patients are enamel hypoplasia, widening of periodontal ligament, delayed eruption, loss of lamina dura, periodontal damage, tooth mobility, drifting, pulp calcifications.

**Taste change:** Metallic taste is the most common manifestation in CRF patients, which is due to urea content in saliva and splitting to ammonia and carbon dioxide by bacterial urease in saliva. Metabolic disturbances, adverse effects of drugs, decreased taste buds, changes in salivary flow and composition can also cause metallic taste. Higher levels of urea, dimethyl and trimethyl amines and low levels of zinc might be associated with decreased taste perception in uremic patients.

**Mucosal Petechiae and Ecchymosis:** This manifests because of abnormal thrombocyte function, decrease in platelet factor III, decrease in platelet aggregation. Anti coagulants used during hemodialysis can also cause bleeding tendencies in some renal failure patients.

**Candidiasis:** Oral candidiasis will affect 20 to 30% of renal transplant patients. Candidiasis may present as angular chelitis, pseudomembranous or erythematous ulceration or chronic atrophic infection. Anti fungal agents can be given in the form of lozenges and topical gels. Lozenges are effective in curing mild candidal infections. In post transplant recipients viral infections such as herpes simplex virus are predominantly common and use of anti viral agents such as acyclovir (5%) has significantly reduced the frequency of viral infections.

**Periodontal Disease:** Chronic Renal Failure patients show periodontal manifestation such as gingival inflammation, increased levels of plaque and calculus, gingival recession, pocket formation, aggressive periodontal damage etc. Patients with renal failure may receive calcium channel blockers which will cause gingival hyperplasia. Gingival hyperplasia can be treated...
by surgical resection. Platelet dysfunction and effects of anticoagulants cause petechiae and ecchymoses in oral mucosa of CRF patients.

Oral Malignancy: An increased susceptibility to oral malignancy of the lip attributable to the treatment following renal treatment has been reported. The increased risk of malignancy in CRF is because of effects of iatrogenic immune suppression, which in turn increases mucosal susceptibility to virus-related tumors, such as Kaposi’s sarcoma or non-Hodgkin lymphoma.

Dental Considerations: Haemostasis should be ensured by the dentist while they doing any surgical procedures. Most preferable day for patient undergoing dialysis is a day after day of dialysis, since the patient feels more comfortable and the effect of heparin has worn off at the maximum on this period. The haematologist opinion may be required in most of the cases. Various haemostatic agents used in these patients are desmopressin which provide haemostasis for up to 4 hours, cryoprecipitate for up to 36 hours etc. Conjugated estrogen also helpful in haemostasis which persists for 30 days.

Renal failure patients are more prone to infections as they are immunosuppressed because of drug intake. They are at higher risk of getting septicaemia usually without any signs of inflammation. Dialysis may also predisposes blood borne viral infections such as hepatitis. Antibiotics such as erythromycin, penicillin, metronidazole, cephalosporin are given in lower doses, since higher dose can cause damage to central nervous system. Renal failure patients should be considered for antimicrobial prophylaxis before undergoing any invasive dental procedures such as extraction, impaction, periodontal surgery etc. Patients with polycystic kidney and patients receiving peritoneal dialysis may develop bacteraemia which result in peritonitis. Nonsteroidal anti-inflammatory drugs and COX-2 inhibitors should be avoided, as they can cause excessive gastrointestinal damage and nephrotoxic in these patients. Anti histamines can cause xerostomia in patients undergoing dialysis. Systemic fluorides are avoided in these patients because of minimal excretion rate of fluoride in urine by these patients, hence fluoride can be given as topical agent for caries prophylaxis. Antacids containing magnesium, calcium and aluminium should be avoided since they have minimal excretory and absorption rate.

Local anaesthesia is safer unless there is a bleeding tendency in patients. Relative analgesia is given for conscious sedation cases. Most commonly used agent is midazolam rather than diazepam, because diazepam may cause thrombophlebitis at higher risk. Renal failure patients with anaemia are contraindicated for general anaesthesia. General anaesthetic agent can cause myocardial depressant effects such as hypotension. Most commonly used agents are isoflurane and sevoflurane. Thiopentone is used as inducing agent for anaesthesia which is maintained by nitrous oxide at constant administration.

In case of dry mouth, alcohol free mouthwashes and salivary substitutes are recommended. Usually before any procedure, chlorhexidine mouthwash for 60 seconds is recommended. Dosage of pharmacologic therapies must be adapted to creatinine clearance.

Conclusion
The number of renal failure patients and patients under dialysis are increasing day by day. These patients also indeed of dental treatment. Hence intervention of dentist and coordination with the nephrologist is mandatory to fulfil the dental needs of these patients. A proper examination of the hard and soft tissues of oral cavity in patients with renal disorder is essential to diagnose pathologies at an early stage of multi-system disease. Therefore, these patients should be routinely evaluated for oral lesions and treated accordingly.

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Conflict of Interest: Nil

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Hemodialysis and Oral Health

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ABSTRACT
It is a well-known fact that many systemic diseases are manifested in the oral cavity. The ideal management for treating such manifestations is treating the primary cause first and then providing local therapy if needed. Systemic disease which a dentist can encounter in his practice is chronic renal failure (CRF) or end stage renal disease (ESRD). Renal failure is an uncommon condition when compared with ischemic heart disease, stroke, diabetes and cancer and, therefore, may appear to be a relatively minor public health problem.

Keywords: renal failure, dialysis, oral health

Introduction
Chronic renal failure is defined as a progressive decline in renal function and irreversible loss of renal function which is associated with a reduced glomerular filtration rate (GFR). It is important to estimate the severity of the CRF to determine time-related consequences for the patient and the responses required. Patients with CRF, undergoing dialysis or renal transplants, are more susceptible to a number of infections. Its because of the depression of the immune functions and masking of the classic signs of inflammation and infection. Lymphocyte number and function are reduced; neutrophil chemotaxis and phagocytosis are impaired.

Hemodialysis: Haemodialysis is the most common therapeutic modality, which is an artificial method of removing nitrogenous and other toxic products of metabolism from the blood by using a haemodialyzing system. An exchange occurs between the patient’s plasma and dialysate across a semipermeable membrane that allows uraemic toxins to diffuse out of plasma, while retaining the formed elements and protein composition of the blood. It is a life saving intervention which has reduced the mortality of this still fatal disease.

Transient bacteraemias occur in a wide variety of dental treatments, particularly those associated with mucous membranes. Dental management of these patients includes prevention and control of bacteraemias which are of dental origin. Thus, an antimicrobial prophylaxis is essential in these patients. The benefit of dialysis outweighs the risk of life-threatening uraemic complications, but this modality can lead to numerous complications which are of importance to the dentist.

An international group defined published the Kidney/Dialysis Outcome Quality Initiative guidelines, which classify the five stages of kidney disease according to the severity of renal failure as follows:

Stage 1: normal or increased GFR but some evidence of kidney damage reflected by microalbuminurea/proteinurea, hematuria or histologic changes;
Stage 2: mild chronic kidney failure (60-89 GFR milliliters per minute per 1.73 square meters);
Stage 3: moderate chronic kidney failure (30-59 GFR mL/minute/1.73 m2);
Stage 4: severe chronic kidney failure (15-29 GFR mL/minute/1.73m2);
Stage 5: ESRD in which renal replacement therapy has to be considered (< 15 GFR mL/minute 1.73 m2 on dialysis).

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Oral Manifestations: The specific oral manifestations were classified into subjective and objective findings. Subjective findings that were included were dry mouth, change in taste of tongue and/or burning sensation on the mucosa. Objective includes uraemicodour, tongue coating, mucosal petechiae or ecchymosis and ulceration. Uraemicodour was recorded by smelling the odour when the patient was talking. Tongue coating, mucosal petechiae or ecchymosis and ulceration were recorded under a torch light illumination. Enamel hypoplasia was noted as diffuse opacities seen on the surface of the teeth.9

Dental Management of Renal Patients: Patients with renal failure require special considerations in relation to dental treatment, not only because of the conditions inherent to the disease and its multiple oral manifestations, but also because of the side effects and characteristics of the treatments they receive.

1. Consultation with the nephrologist provides information on the state of the disease, the type of treatment, the best timing of dental management.10 Any modification of the usual medication used by the patients or of other aspects of their treatment must first be consulted with the nephrologist.11

2. Close cooperation between medical and dental professionals is desirable in order to improve the oral and general health of the patient, based on the creation of a dental care program in the context of a multidiscipline approach to the disease.11

3. Prior to any invasive dental treatment, a complete blood count is to be obtained, together with coagulation tests, in view of the possible hematological alterations.12

4. It is essential to eliminate any infection in the oral cavity as soon as possible, with the consideration of antibiotic prophylaxis when bleeding and/or a risk of septicemia is expected (extractions, periodontal treatments, endodontics and periapical surgery, the placement of orthodontic braces, tartrectomy when bleeding is expected, implant surgery, and the reimplantation of avulsioned teeth).

5. Blood pressure is to be monitored before and during treatment, with the administration of sedation to lessen anxiety.

6. The metabolism and elimination of certain drugs are altered in situations of renal failure

Conclusion

More research in this direction is needed in the future, especially those which concern associated systemic illnesses and CKD and its effects on oral manifestations. Also, other correlating factors such as duration of dialysis, duration of CKD, the medications which are being taken by patients and salivary pH and urea levels have to be evaluated, to properly assess the clinical manifestations

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REFERENCE


Non-Neoplastic Platal Swellings-Differential Diagnosis

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ABSTRACT

Palatal swellings can at times be a challenging task for a clinician to diagnose. A mass or swelling of the palate can result from developmental, inflammatory, reactive or a neoplastic process. In differential diagnosis, swellings of origin must be considered for diagnosis and treatment. This article reviews various non-neoplastic palatal swellings.

Keywords: palatal swelling, palate, begin, non-neoplastic

Introduction

Palatal swellings may result from a variety of etiological factors, and can originate from the structures within the palate or beyond it. They may be painful when infected or painless as in the case of benign swellings. They may be congenital or acquired in origin. Swellings of congenital origin are associated with unerupted teeth and torus palatinus while acquired conditions resulting in palatal swellings include dental abscess, salivary gland neoplasms, fibro-osseous lesions, fibrous lumps, epithelial and connective tissue neoplasms such as papilloma, squamous cell carcinoma of palate or antrum, brown tumor etc. These swellings can be best examined by inspection and palpation similar with most oral lesions. Radiographs can aid in ruling out pathologies such as abscesses and periapical inflammatory conditions. Routine panoramic radiography can help to discover bony masses arising from the maxilla. As with any lesion, the final diagnosis is achieved after the histological examination; a biopsy must be performed which either will be excisional for a small lesion not thought to be malignant or incisional for a possible malignant lesion or a large lesion. We hereby present a review of the various palatal swellings1,2.

Classification of Non-Neoplastic Palatal Swellings3,4,5:

<table>
<thead>
<tr>
<th>Developmental</th>
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<tr>
<td>Palatal torus</td>
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<td>Inflammatory/Reactionary</td>
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<tr>
<td>Periapical abscess</td>
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<tr>
<td>Fibroepithelial polyp</td>
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<tr>
<td>Pyogenic granuloma</td>
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<tr>
<td>Adenomatous hyperplasia</td>
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<td>Atypical lymphoproliferative disorder/follicular lymphoid hyperplasia</td>
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<td>Cysts</td>
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<td>Radicular cysts (periapical cyst)</td>
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<td>Dentigerous cyst</td>
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<tr>
<td>Nasopalatine cyst</td>
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<td>Odontogenic keratocyst</td>
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Palatal Torus: The torus palatinus is a common exostosis that occurs in the midline of the vault of the hard palate. The pathogenesis of these tori has long been debated with arguments centering on genetic versus environmental factors, such as masticatory stress.

Most palatal tori are small, measuring less than 2 cm in diameter; however, they can slowly increase in size throughout life—sometimes to the extent that they fill the entire palatal vault. Most tori cause no symptoms, but in some cases the thin overlying mucosa may become ulcerated secondary to trauma. The torus palatinus usually does not appear on routine dental radiographs.
RARELY, IT MAY BE SEEN AS A RADIO-opacity ON PERiapical FILMS if THE FILM IS PLACED BEHIND THE TOrUS WHEN THE RADIograph IS TAKEN. ALMOST ALL STUDIES FROM AROUND THE WORLD HAVE SHOWN A PRONOUNCED FEMALE-TO-MALE RATIO OF 2 : 1. THE PREVALENCE PEAKS DURING EARLY ADULT LIFE.

**Histopathologic Features** of the torus shows a mass of dense, lamellar, cortical bone. An inner zone of trabecular bone sometimes is seen.

**Periapical Abscess:** The accumulation of acute inflammatory cells at the apex of a nonvital tooth is termed a periapical abscess. Acute inflammatory lesions with abscess formation may arise as the initial periapical pathosis or from an acute exacerbation of a chronic periapical inflammatory lesion. Maxillary tooth with periapical abscess may involve the buccal or the palatal aspect. On involving the palatal aspect it should be differentiated and diagnosed with other palatal swellings.

The initial stages produce tenderness of the affected tooth that often is relieved by direct application of pressure. With progression, the pain becomes more intense, often with extreme sensitivity to percussion, extrusion of the tooth, and swelling of the tissues. The offending tooth does not respond to cold or electric pulp testing. Radiographically, abscesses may demonstrate a thickening of the apical periodontal ligament, an ill-defined radiolucency, or both; however, often no appreciable alterations can be detected because insufficient time has occurred for significant bone destruction.

**Histopathologic Features** from pure abscesses are uncommon because the material is in liquid form. Abscesses consist of a sea of polymorphonuclear leukocytes often intermixed with inflammatory exudate, cellular debris, necrotic material, bacterial colonies, or histiocytes. Phoenix abscesses can maintain a soft tissue component; they present as subacutely inflamed periapical granulomas or cysts intermixed with areas of significant abscess formation.

**Fibroepithelial Polyp/Fibrous Hyperplasia:** The epulis fissuratum is a tumorlike hyperplasia of fibrous connective tissue that develops in association with the flange of an ill-fitting complete or partial denture. Typically appears as a single or multiple fold or folds of hyperplastic tissue. There is a pronounced female predilection. This characteristic lesion is a flattened pink mass that is attached to the palate by a narrow stalk. Usually, the flattened mass is closely applied to the palate and sits in a slightly cupped-out depression.

**Histopathologic Features** of the epulis fissuratum reveals hyperplasia of the fibrous connective tissue. Often multiple folds and grooves occur where the denture impinges on the tissue. The overlying epithelium is frequently hyperparakeratotic and demonstrates irregular hyperplasia of the rete ridges. In some instances, the epithelium shows inflammatory papillary hyperplasia or pseudoepitheliomatous hyperplasia. Focal areas of ulceration are not unusual, especially at the base of the grooves between the folds. A variable chronic inflammatory infiltrate is present; sometimes, it may include eosinophils or show lymphoid follicles. If minor salivary glands are included in the specimen, then they usually show chronic sialadenitis.

**Pyogenic Granuloma:** It is an inflammatory hyperplasia which is not uncommon in the oral cavity. Although PG may be seen at any age, the peak incidence is seen in 2nd decade with increased predilection towards the female sex. Anterior gingiva is more commonly affected. PG presents as a solitary smooth or lobulated mass, majority being pedunculated and some sessile. The surface of the lesion is usually ulcerated, friable and covered with white necrotic material resembling pus, because of which the clinicians may have called this lesion as PG. The colour vary according to the age of the lesion, the younger lesions usually appear highly vascular when compared to older ones which appear pink. The diameter of pyogenic granulomas varies from few millimetres to few centimetres.

**Histopathological features** These lesions consist of proliferating endothelial tissue, which is canalised into a rich vascular network with minimal collagen support, presence of polymorphs and chronic inflammatory cells can be appreciated in the edematous stroma along with microabscess formation, mixed inflammatory cell infiltrate of neutrophils are seen near the ulcerated surface, whereas deeper areas show chronic inflammatory cells. Even though the diagnosis of pyogenic granuloma can be accurately done clinically, radiographs and histopathology aid in the confirmation and treatment. Radiographs help to know the underlying bone loss which will rule out peripheral giant cell granuloma, malignancies and other similar appearing conditions.

**Adenomatoid Hyperplasia:** Adenomatoid hyperplasia (AH) is a rare disorder of the minor salivary glands. The true nature of AH is still unknown, and undetermined making it a lesion less explored and hence is the least
considered differential diagnosis. Many believe that it’s a hamartomatous proliferation of minor salivary glands while others consider it as a hyperplastic lesion. Common in the 4th through 6th decades of life with a wide age range. Male preponderance has been noted. Clinically, AH appears as sessile, nodular lesion, most commonly occurring on the palate - hard and soft. The lesion is mostly asymptomatic but occasionally may be painful. AH may vary in size from a few millimeters to larger lesions up to or over 3 centimeters. The lesion may be present for a few months or years but most often is routinely discovered by clinicians. The mucosa over it will be intact and has been said to be of normal color whilst some authors have reported the mucosa to be slightly erythematous or bluish. On palpation, AH will be firm and nontender. Radiographic investigations, often done to rule out erosion of underlying bone, have been routinely done but yielded negative results.

**Histopathological Features:** Under the microscope, the H and E sections show normal salivary acinar lobules, with some showing acinar hyperplasia and dilated ducts with mild chronic inflammatory infiltrate. These help differentiate AH from other benign or malignant salivary pathologies.

**Follicular Lymphoid Hyperplasia:** Follicular Lymphoid Hyperplasia (FLH) of the palate is a poorly understood and very rare non-neoplastic lymphoproliferative disease in the oral mucosa, which may be confused clinically and histologically with malignant lymphoma. The condition most commonly affects elderly women. Usually occurs as a painless, slow growing nonulcerated mass in the posterior hard palate. It is often unilateral but occasionally it may be bilateral or involve a large area of the hard palate. Radiographically, there is no osseous abnormalities, and others laboratory investigations are usually normal.

**Histopatological features** shows lymphoid aggregates in the lamina propria of connective tissue, arranged in structures with discrete lobular appearance, showing numerous lymphocytes in the periphery with scanty cytoplasm and homogeneously basophilic nuclei, forming the mantle zone. In central areas of these lymphocytic formations, germinal centers showed up, showing cells with large and dimly stained nuclei, sometimes revealing conspicuous nucleoli and scanty cytoplasm, tingible-body macrophages and occasional mitotic figures.

**Radicular Cyst:** Radicular cyst is the most common odontogenic cyst which arises from the epithelial cell rests of Malassez in response to inflammation. These cysts can occur in the periapical area of any teeth, at any age but are seldom seen in association with primary teeth. They are most commonly found at the apices of the involved teeth, but sometimes may be seen at the lateral aspects of the roots in relation to lateral accessory root canals. Clinically the cyst appears as a well defined swelling with consistency ranging from hard to soft. RC is usually located in the anterior part of the upper jaw where traumatic injuries are common. The cyst is usually painless and may become painful when secondarily infected. Radiographically most of these cysts presents as a pearshaped or round unilocular radiolucent lesions in the periapical region of the involved tooth. Radiographically, it is difficult to distinguish between a granuloma and a cyst. Aspiration of the swelling helps in differentiating between a cystic and solid lesion.

**Histopathologic features:** The cyst is lined by stratified squamous epithelium, which may demonstrate exocytosis, spongiosis, or hyperplasia. As seen in dentigerous cysts, scattered mucous cells or areas of ciliated pseudostratified columnar epithelium may be noted in periapical cysts. Although some maxillary periapical cysts lined by pseudostratified columnar epithelium may have originated from the adjacent sinus lining, the presence of mucous cells or respiratory-like epithelium. The cyst lumen may be filled with fluid and cellular debris. Dystrophic calcification, cholesterol clefts with multinucleated giant cells, red blood cells, and areas of hemosiderin pigmentation may be present in the lumen, wall, or both. Due to the inability of macrophages and giant cells to remove cholesterol, its presence may be partially responsible for failure of healing of cysts in which the original focus of infection was treated appropriately.

**Dentigerous Cyst:** The dentigerous cyst is defined as a cyst that originates by the separation of the follicle from around the crown of an unerupted tooth. This is the most common type of developmental odontogenic cyst, making up about 20% of all epithelium-lined cysts of the jaws. The dentigerous cyst encloses the crown of an unerupted tooth and is attached to the tooth at the cementoenamel junction. Most often they involve
mandibular third molars. Dentigerous cysts may be encountered in patients across a wide age range, they are discovered most frequently in patients between 10 and 30 years of age. There is a slight male predilection. Radiographically, the dentigerous cyst typically shows a unilocular radiolucent area that is associated with the crown of an unerupted tooth. The radiolucency usually has a well-defined and often corticated border, but an infected cyst may show ill-defined borders.

**Histopathologic Features** of dentigerous cysts shows the fibrous connective tissue wall is loosely arranged and contains considerable glycosaminoglycan ground substance. Small islands or cords of inactive-appearing odontogenic epithelial rests may be present in the fibrous wall. Occasionally these rests may be numerous, and at times pathologists who are not familiar with oral lesions have misinterpreted this finding as ameloblastoma. The epithelial lining consists of two to four layers of flattened nonkeratinizing cells, and the epithelium and connective tissue interface is flat. In inflamed dentigerous cyst, the fibrous wall is more collagenized, with a variable infiltration of chronic inflammatory cells. The epithelial lining may show varying amounts of hyperplasia with the development of rete ridges and more definite squamous features. A keratinized surface is sometimes seen, but these changes must be differentiated from those observed in the OKC3,4.

**Nasopalatine Cyst:** Nasopalatine cyst (NPC) or Nasopalatine canal cyst or Median anterior maxillary cyst occurs in 1% of population, usually seen from 4th to 6th decades with 3:1, male to female ratio and shows predilection. The cyst is often asymptomatic unless they are infected. Sometimes minor tolerable symptoms such as swelling, burning sensation, numbness over palatal mucosa and discharge may be present. A combination of swelling, discharge and pain may be seen. Discharge may be mucoid, in which case the patients feel a salty taste. This tumor presents as a slow growing, firm painless mass. Its MRI is an essential tool for the imaging of soft palate tumors as it aids in determining the extent and nature of the lesion, local spread and also the neoplastic status.

**Histopathologically feature,** a mixture of neoplastic glandular epithelium and myoepithelial cells are seen in this tumor. Along with this a variety of patterns may also be seen1.

**Odontogenic Keratocyst:** The OKC arises from cell rests of the dental lamina. This cyst shows a different growth mechanism and biologic behavior from the more common dentigerous cyst and radicular cyst. OKCs may be found in patients who range in age from infancy to old age, but about 60% of all cases are diagnosed in people between 10 and 40 years of age. There is a slight male predilection. Mandible is the most common site of incidence, but can also occur in maxilla which include 13% in the anterior region, 2% in the premolar region and 20% in the posterior region. Small OKCs are usually asymptomatic and discovered only during the course of a radiographic examination.

**Histopathological features** Microscopically, the thin fibrous wall is usually devoid of significant inflammation. The epithelial lining is composed of a uniform layer of stratified squamous epithelium, usually six to eight cells in thickness. The epithelium and connective tissue interface is usually flat, and rete ridge formation is inconspicuous. Detachment of portions of the cyst-lining epithelium from the fibrous wall is commonly observed. The luminal surface shows flattened parakeratotic epithelial cells, which exhibit a wavy or corrugated appearance. The basal epithelial layer is composed of a palisaded layer of cuboidal or columnar epithelial cells, which are often hyperchromatic. Small satellite cysts, cords, or islands of odontogenic epithelium may be seen within the fibrous wall. These structures have been present in 7% to 26% of cases in various reported series3,12.

**Conclusion**

It is well understood that the palatal mass can pose a difficult diagnostic dilemma for the clinician. The swelling may present with the common characteristics and may be indistinguishable clinically. Emphasis is placed on the importance of obtaining a thorough and comprehensive history and collecting relevant laboratory information. Finally, a biopsy of the palatal mass may be necessary to arrive at definitive diagnosis and determine the optimal management of the patient.
A Comparison View of Non-Neoplastic Swellings of Palate

- **Palatal Torus**
  - Histopathology: Palatal Torus
  - Radiograph: Palatal Torus

- **Periapical Abscess**
  - Histopathology: Periapical Abscess
  - Radiograph: Periapical Abscess

- **Fibroepithelial Polyp**
  - Histopathology: Fibroepithelial Polyp

- **Pyogenic Granuloma**
  - Histopathology: Pyogenic Granuloma

- **Adenomatous Hyperplasia**
  - Histopathology: Adenomatous Hyperplasia
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Dental Consideration and Diagnosis of TMJ Arthritis—
A Curren Review

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ABSTRACT

TMJ is a unique joint in which translatory as well as rotational movements are possible and where both the ends of bone articulate, in the same plane, with that of other bone. It is a hinge that connect the jaw to the temporal bones of the skull, which are in front of each ear. Temperomandibular joint (TMJ) diseases and disorders are refered to a complex and less understood set of conditions, and disorders of TMJ are manifested by pain in the area of the jaw and associated muscles, and limitations in the ability to make the normal movements of speech, facial expression, eating, chewing, and swallowing. Among the various disorders of TMJ this article is focused on a brief review on TMJ Arthritis.

Keywords: TMJ, Arthritis, Disorder, TMJ pain.

Introduction

According to the medical definition arthritis is defined as the inflammation of a joint. When joints are inflamed they develop stiffness, warmth, swelling, redness and pain. There are over 100 types of arthritis. Out of which TMJ arthritis is a common disease that can cause severe pain and dysfunction in temporomandibular joint (TMJ). TMJ arthritis can occur as a separate finding of a patient or can be associated with any other arthritis affecting the body. And according to Weldon Bell classification TMJ arthritis or osteoarthritis of TMJ is been classified under degenerative join disorder with inflammation. It is primarily a disorder of movable joints characterized by deterioration and abrasion of the articular cartilage with formation of new bone at the joint surface. There is destruction of the soft tissue component of the joint and subsequent erosion with hypertrophic changes in bone. There is breakdown of the connective tissue covering the condyle, articular eminence and the disc. Recently, there are some evidences suggesting that there are some inflammatory components present in osteoarthritis1,2,3.

Anatomy: In order to understand the etiopathogenesis of the disease, the anatomy of the tempromandibular joint has to be viewed. The TMJ is located between the mandibular fossa (glenoid fossa), the inferior surface of temporal bone and condylar process of the mandible. It is a synovial type of joint and it is distinguished from most of the joints by following points.

- Fibrocartilage—articulating surface of the bones is covered by avascular, fibrous connective tissue, which may contain variable number of cartilage cells. Thus called as fibrocartilage.
- Point of closure—the two articulating surface complex of bone carry teeth, whose shape and position influence the movement of joint. It is the only joint with rigid end point of closure.
- Articulation—it has bilateral articulation with cranium, so both the joints must function together. TMJ is a complex joint as it has an articular disc interposed between the condyle and the temporal bone.
Articular Disc: It is composed of dense fibrous connective tissue devoid of any blood vessels or nerve fibers. The central area is the thinnest and is called as intermediate zone. Both anterior and posterior to the intermediate zone, the disc becomes considerably thicker. The posterior border is generally slightly thicker than the anterior border. The disc is generally thicker medially than laterally. The precise shape of the disc is determined by the morphology of the condyle and mandibular fossa.

During movement, the disc is somewhat flexible and can adapt to the functional demands of the articular surface. The articular disc is attached posteriorly to an area of loose connective tissue that is highly vascularized and innervated it is called as retrodiscal tissue. Superiorly, it is bordered by the lamina of connective tissue, which contains many elastic fibers, the superior retrodiscal lamina. This gives necessary freedom for anterior movement of the disc. Since this region consists of two areas, it is called as bilaminar zone.

Attachment of the Articular Disc and its Associated Structures: The articular disc is attached to the capsular ligament anteriorly, posteriorly as well as medially and laterally. This divides the joint into two distinct cavities; the upper or superior cavity which is bordered by the mandibular fossa and superior surface of the disc and the lower or inferior cavity, which is bordered by the mandibular condyle and inferior surface of the disc.

Synovial Fluid: The internal surface of the cavity is surrounded by specialized endothelial cells that form the synovial lining. This lining along with a specialized synovial lining located at the anterior border of the retrodiscal tissue produce the synovial fluid, which fills both the joint cavities. The synovial fluid is formed of viscous fluid, (plasma, protein and mucin), containing varying types of cells (monocyte, lymphocytes, sometimes multi-nuclear leukocytes and macrophage). The main function of the synovial fluid is to provide lubrication to joint surface thereby reducing the wear during joint function and to provide nutrition to disc and the articular surfaces. Thus, TMJ is referred to as a synovial joint.

Etiopathogenesis: The etiology to this disorder can be of three major causes:

1. Overload on the joint: The lesion is brought by an increase in the functional demands of the healthy tissue due to repetitive overload on joint. This will result in breakdown of the joint. The articular surface is covered by fibrocartilage and the underlying subchondral bone which is stress sensitive and subject to extensive remodeling.

Excessive mechanical stress is characterized as a key factor inducing cartilage degradation in the TMJ (Tanaka et al. 2008).

Recent studies have focused on the molecular pathway of articular cartilage degradation and mechanical sensing. The effect of mechanical stress on the mandibular condylar chondrocytes has been evaluated in vitro and in vivo. Excessive mechanical stress induces activation of the plasminogen activator (PA) system, which may lead to proteolysis of extracellular matrix components (Chen W et al. 2013). Long-term experimental disordered occlusion also results in subchondral bone loss and increased osteoclast activation, and the new bone subsequently formed exhibits lower bone mineral density and poor mechanical properties (Zhang J et al. 2013). Other research reported that endoplasmic reticulum stress-induced cell death has an important role in the mandibular cartilage thinning induced by mechanical stress and may be a novel mechanism of chondrocyte apoptosis induced by mechanical force (Li et al. 2013). Excessive joint loading and abnormal dental occlusion have been used to establish TMJOA models (Jiao et al. 2011). Considerable evidence exists that aberrant biomechanical stimulation possesses an important function in the initiation and progression of TMJOA.

2. Deterioration of functional capacity of joint: There may be normal load to the joint but functional capacity is reduced as a part of aging. This occurs due to:

- Slower replacement of chondroblasts—as age advances there is slower replacement of chondroblasts and chondrocytes in the joint.
- Susceptible fibers—the cartilage matrix turns over less rapidly resulting in available fibers to work for longer period of time. This will make them susceptible to fatigue.
- Poor nutrition to joint—as matrix contain less water, the marrow blood flow diminished
which results in poor nutrition to the joint. This will make joint desiccated and brittle⁸⁻¹⁰.

3. Abnormal Remodeling of Subchondral Bone:
By another theory, bone growth does not cease completely after puberty and remodeling of the joint progresses under functional demands. Degenerative joint disease may develop when the remodeling rate of bone exceeds that of the cartilaginous repair. The gross evidence of these changes is the formation of marginal osteophytes with development of new bone in the area adjacent to the cartilage. Studies suggest that increased turnover of subchondral bone plays a role in the initiation or progression of TMJ arthritis. In the TMJ arthritis induced by orthodontic disturbed dental occlusion, subchondral bone loss and decreased bone mineral density were observed following degradation of the cartilage. The chondrocytes within the degraded cartilage may regulate osteoclastogenesis by increasing the ratio of the receptor activator of nuclear factor (NF)–κB ligand (RANKL) and osteoprotegerin (OPG) and ultimately result in subchondral bone loss in TMJ arthritis (Jiao et al. 2011)¹¹.

4. Inflammation: TMJ arthritis is classified as a “low-inflammatory arthritic condition,” as opposed to rheumatoid arthritis, which is classified as a high-inflammatory condition (de Souza et al. 2012). However, considerable attention has been on the importance of inflammation in the progression of TMJ arthritis. Interleukin (IL)–12 and several other inflammatory cytokines, including IL-1β, IL-6, and tumor necrosis factor (TNF)–α, are increased in the synovial fluid of patients with TMJOA (Vernal et al. 2008; Cevridanes et al. 2014). Monocyte chemoattractant protein (MCP)–1 is also elevated in the inflamed synovial tissues and fluids of patients with OA and is highly upregulated in IL-1β–stimulated synoviocytes of the TMJ (Ogura et al. 2010). MCP-1 is speculated to play an important role in recruiting mononuclear cells to inflamed synovial tissues. Expression of IL-1β and TNF-α is reported to be increased in the experimental chronic inflammation of rodent TMJs, implying that they can be one of the causes for the degenerative changes of TMJ; moreover, the biomechanical property of the disc is decreased (Wang et al. 2014), implying that chronic inflammation in TMJ deteriorates the adaptive capability of the TMJ.

The other possible etiology of TMJ arthritis could be:
- **Chondrocyte apoptosis:** Chondrocyte death caused either by apoptosis or necrosis is assumed to be a central feature in the degeneration of osteoarthritic cartilage.
- **Catabolic Enzyme:** The upregulation of catabolic enzymes in the cartilage matrix, such as MMP and a disintegrin and metalloproteinase with thrombospondin motifs (ADAMTS), is involved in the pathology of TMJ arthritis.
- **Estrogen:** TMJ arthritis has a female preponderance and occurs mainly after puberty during the reproductive years (Zhao et al. 2011), suggesting a possible function of female hormones in the disease process. Therefore, the effects of estrogen on condylar cartilage and subchondral bone have been evaluated. Conversion of estrone/17β-estradiol to proinflammatory metabolites can be found in Osteoarthrisis synovial cells of the knee joint; this finding implies that proinflammatory metabolites in synoviocytes may be an important mechanism underlying the proinflammatory effects of estradiol in the inflamed TMJ (Schmidt et al. 2009). Estrogen inhibits the mandibular condylar chondrocyte proliferation via an estrogen receptor (ER)-β–dependent mechanism (Chen et al. 2014). By contrast, estrogen possesses a protective effect on the TMJ chondrocyte through inhibiting the expression of nitric oxide (Hu et al. 2013). Therefore, the role of estrogen in TMJ arthritis pathogenesis is still inconclusive. Moreover, the effects of other female hormones, including progestin and relaxin, on the progression of cartilage degradation in the TMJ should be evaluated further¹²⁻¹⁵.

Clinical Features: Age and sex—it occurs in patients older than 40 years of age and 85% of them are older than 70, with a mean age of 53 years. Females are affected 6 times as frequently as males.
- **Symptoms**—there is unilateral pain over the joint, which may be sensitive to palpation. Patient also experience pain on movements or biting, which
may limit mandibular function. Pain usually worse in the evening.

- Signs—there is deviation of the jaw towards the affected side. Affected joint is swollen and warm to touch. Stiffness of the joint.
- Crepitations—there is presence of crepitation of the joint, the sound indicates degeneration within the articulating surfaces of the joint or disc.
- Jaw movement—there is limitation of jaw movements, which becomes increasingly apparent with function. Pain is usually located to the immediate preauricular region.
- Spasm of muscle—early signs may progress to spasm of the masticatory muscles resulting in stiffness and locking of the jaw. If not treated at this stage, it may lead to irreversible changes in the TMJ.
- Course—normal course is between 1 to 3 years. Severe symptoms last for about nine months, but gradually burn out leaving little or no disability.

Radiographic Findings: Degenerative changes located on the lateral and anterolateral wall of the fossa. Erosion of condyle is the first evidence on a radiograph which occurs on an average, 6 months after the onset of TMJ pain. This will result in enlargement and shallowing of mandibular fossa. Fully developed lesions are saucer shaped on PA view. This is also called as the destructive phase. During the later stages articula eminence is flattened or almost removed and anterior half of the superior convex surface of the condyle is converted into a flat plane.

Management: Elimination of the cause—it includes occlusal adjustment or replacement of the missing teeth and ill fitting prosthesis, grinding, treatment of caries and periodontal disease.

- Relieving the pressure on joint—occlusal adjustment and occlusal splints may reduce pressure on joint and relieve the symptoms.
- Analgesic and anti-inflammatory drugs—for the relief of pain, nonsteroidal anti-inflammatory drugs and analgesics should be given.
- Physiotherapy—heat therapy, diathermy and ultrasonic.
- Myotherapy—muscle exercises, injection of local anesthetic in TMJ.
- Arthroscopic lavage—arthroscopic lavage may give relief in some patients.
- Doxycycline—nowadays, low dose doxycycline (collaganease inhibitor, anti matrix metalloproteinase) is giving relief in many patients.
- Other therapy—glucosamine, chondroitin sulfate have also shown some success in osteoarthritis of TMJ.

Conclusion

Most cases can be successfully treated, although initially it may be difficult to diagnose the problem and find an effective solution. Some cases of pain go away on their own, without treatment. The TMJ-related pain tends to be cyclical and may return again in the future. If the cause is night-time clenching, treatment can be particularly tricky because it is a sleeping behavior and that is hard to control. Patients with ear symptomatology tend to have a prolonged course of illness. Known complications of long standing TMJ dysfunction include alterations in dentition, chronic facial pain and malocclusion. The establishment of a multidisciplinary pain team can assist the practitioners in reducing such complications.

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REFERENCES

Dental Materials and its Allergic Reactions in Dentistry—
A Review

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ABSTRACT

Various dental materials used in dentistry has a potentiality to cause allergic reaction of oral cavity in patients. Certain materials can cause allergic reaction to dentists and technicians. The most common allergic reactions seen in dentists and other dental staffs are allergies to latex, acrylates and formaldehyde. While polymethylmethacrylates and latex trigger delayed hypersensitivity reactions, sodium metabisulphite and nickel cause immediate reactions. Dentists should have proper knowledge about the allergic reactions to dental materials in patients because over the last few years there is a rise in number of patients. Dental materials are suspected to have biocompatibility problems. The materials are composites, latex gloves, local anaesthetic agents, endodontic materials, impression materials and metals. In order to manage the allergic condition, clinician should know about the documented allergic reactions so that they can frame the treatment plan accordingly.

Keywords: Allergic reaction, hypersensitivity, lichenoid reaction.

Introduction

General population are more exposed to allergic reactions now a days. and the dental materials used for restoration, orthodontic instruments etc should provide biocompatibility specifications because they are used for a long time in the oral cavity. Dental metal allergy occurred due to amalgam restorations in the oral cavity which results in stomatitis and dermatitis around the anus (Fleischmann 1928). Manifestations of allergic reaction are in the form of urticaria, swelling, rash and rhinorrhea, where it can also cause laryngeal oedema, anaphylaxis and cardiac arrhythmias which is a life threatening condition. Contact allergy of the oral cavity is a T-cell-mediated (delayed) hypersensitivity reaction. The clinical manifestations differs from burning, pain and dryness of mucosa to nonspecific stomatitis and cheilitis. Certain dental materials are suspected with biocompatibility problems. They are composites, latex gloves, local anaesthetic agents, endodontic materials, impression materials and metals. Currently, due to globalization, liberalization and modernization of dentistry various materials are used for treatment. Hence, the aim of this review article is

- To promote a good evaluation and to monitor the spread of allergic reaction to dental materials
- To create awareness about the incidence of allergy among dentist; thereby progression of allergies can be prevented by recognising it earlier.

Allergy to Resin Materials Composites: During restoration, maximum exposure of formethyl methacrylate (MMA), 2-hydroxyethyl methacrylate (HEMA), ethylene glycol dimethacrylate (EGDMA), and triethylene glycol dimethacrylate (TEG-DMA) is
observed 4. Methacrylates commonly causes contact dermatitis and asthma to dental personnel. Occupational contact allergies are caused due to HEMA, EGDMA and TEG-DMA. Most of the patients have lichenoid-like reactions of lips due to composite components. These patients can be treated by providing antifungal treatment and replacing the existing restoration 5. Although resin-based restorative materials are safe to use, their composition can leach out and cause allergic contact stomatitis in the gingiva and buccal mucosa 6,7. Fisher discovered that MMA monomer is the most commonest causative agent for allergic dermatitis in dentists and dental personnel 8. Percentage of contact allergy to methyl methacrylate is 1% 9,10. Leachable substances from acrylic dentures can be reduced by different methods such as immersing in hot water (50°C) for one hour before inserting into the oral cavity 11 or ultraviolet light 12. In order to reduce the exposure of MMA to patient and dentist, optimum room ventilation is provided. Mucosal irritation can be caused due to overnight denture wear. In order to prevent this condition, patient is instructed to avoid usage of denture at night. 13.

Fissure Sealant: Hallstrom U reported an isolated case, where after fissure sealant placement adverse reactions such as asthma and urticaria were observed and the symptoms disappeared after its removal, Hence suggestive of allergy 14.

Allergy to Amalgam Restoration: Amalgam restorations causes delayed hypersensitivity reactions which are seen as erythematous, pruritic lesions on the oral mucosa and skin of the face and neck. Oral lichenoid lesions (OLL) is the commonest manifestation of this reaction. 15 Burning mouth syndrome (BMS) is another manifestation of mercury allergy. Patch test is performed for identifying BMS in patients, remission can be achieved after replacing mercury restoration. 16 Collecting patient’s complete history of complaint and clinical course is the first step in recognizing allergy induced disease. In 1976, the Council on Dental materials and devices advised to use conventional amalgam condensers instead of ultrasonic amalgam condensers. 17 Mercury vapor production can be avoided by using air conditioners, proper ventilation of the operating rooms and proper handling of amalgam scraps under sulphide solution 18.

Allergy to Nickel-Chromium: Among all metals, Nickel is the common sensitizer 19. It was one of the cause of allergic contact dermatitis in women by Fisher 20. In 1889, Goldman reported the first case of Nickel dermatitis which was characterised by sensitivity to nickel compounds 21. The percentage of nickel allergy is 0.1-0.2% 22. Nickel sensitivity is common in women (4-10 times) than men 23 whereas chromium allergy is rare and is common in men than women (10% in males and 3% in females) 24.

Clinical signs and symptoms of nickel allergy:
- Burning sensation,
- Gingival hyperplasia,
- Numbness on sides of tongue and finally it is confirmed with the help of patch test using 5% nickel sulphate in petroleum jelly 25.

Systemic allergic contact dermatitis is observed in sensitized individuals when they are exposed to nickel 26. If nickel hypersensitivity is diagnosed, then the Ni-Ti arch wire must be replaced with stainless steel wire or titanium molybdenum alloy (TMA) 27. Usually orthodontic treatment with stainless steel appliances does not causes hypersensitivity reaction 28. Non-nickel containing orthodontic brackets include ceramic brackets, polycarbonate brackets and gold brackets are used commonly 29. In children who were treated with old generation SSCs (72% nickel), nickel sensitivity was observed. When this condition was treated by replacing old SSCs with new generation SSC (9-12% nickel) no sensitivity was seen. 28 Invitro nickel leaching from orthodontic materials, space maintainers and arch wires is maximum within the first week and then it decreases 29. Nickel allergy is frequently associated with chromium and cobalt reactivity 30.

Allergy to Titanium: Prevalence rate of Titanium allergy is 0.6% and it has symptoms such as urticaria, eczema, redness of the mucosa. 31 In patients with titanium implants, certain titanium allergic symptoms are observed. They are de-keratinized hyperplastic reactions of the peri-implant tissues and drug rash with eosinophilia and systemic symptoms (DRESS) syndrome. 32 Elements in titanium alloys such as beryllium (Be), cobalt (Co), chromium (Cr) can cause allergic reactions in dental implant patients 33. Patch tests have limited use due to poor sensitivity 34 and the test used to detect titanium sensitization is MELISA test 35. Alternate substances s like Polymethaetherketone (PEEK) which gives mechanical properties and bone forming capacity same as that of titanium are also under investigation. 36
Allergy to Latex Gloves: In 1979, Nutter reported first case of latex allergy. Latex allergy includes children with spina bifida (highest risk), patients who underwent surgery before one year of age, latex-fruit syndrome (allergy to various fruits) and healthcare workers (second highest risk) (Kean T) who have greater risk of latex allergy due to sweating and multiple glove changing. In general population, prevalence of latex allergy is less than 1%. Blinkhorn and Leggate reported a case of angioneurotic edema due to dental rubber dam in a boy. Three cases of patients with delayed hypersensitivity to rubber were described by Smart et al.

For diagnosing latex allergy, there is no test which is 100% accurate. Diagnostic methods are:

- Obtaining medical history,
- Skin patch testing for type IV delayed hypersensitivity,
- Measurement of serum IgE for type I immediate hypersensitivity and
- Glove testing when there is no correlation between patient’s history and IgE results.

The American society of Anaesthesiologists Task Force of Latex Sensitivity recommends patients with latex allergy should undergo surgical procedures in the morning. As directed by FDA, protein levels of gloves should be mentioned on package labels by the manufacturers of NRL gloves as directed by FDA.

Allergy to Local Anaesthetics: Even though LA is a well-tolerated drug, they have adverse reactions. Adverse reactions to lignocaine, prilocaine, mepivacaine or to their components like methylparaben or metabisulphite were reported. Allergic reactions can be caused by psychogenic or intravascular injections. Sensitization reactions are attributed to ester anaesthetics which is one of the breakdown products is the antigenic agent p-aminobenzoic acid. Allergic reactions are reported by local anaesthetics including esters and amides. Syncope is the most commonest adverse reaction of LA. Distinguishing true anaphylaxis from other causes of cardiovascular collapse is important. Hence, anaphylactic nature of these reactions can be confirmed by the serum-mast cell tryptase test.

Skin test helps in identifying true allergy to LA but if the skin reaction is not clear, challenge test is carried out where patient is given subcutaneous injection with graded doses of LA till the therapeutic dose. Three cases of death were reported in a literature, where one with prilocaine combined with felypressin; another with lignocaine alone and third with prilocaine combined with adrenaline. LA may be considered as a factor in these cases. Immediate treatment and active prevention are the treatment plan for adverse reactions with LA. By slowly injecting the aspirating syringe, fear and anxiety can be ruled out.

Conclusion

Since oral cavity is frequently exposed to sensitizing substances, allergic reactions are caused which in turn contributes a rise in healthcare expenditures annually. Allergies to latex, acrylates and formaldehyde are common in dental staff. When polymethylmethacrylates and latex trigger delayed hypersensitivity reactions, sodium metabisulphite and nickel leads to immediate reactions. In order to establish a diagnosis, proper allergic history, clinical examination and confirmatory tests like patch tests and MELISA must be obtained from the patient. Hence dentists should be aware about the allergic reactions to prevent the patient from allergic manifestations in dental clinic since more patients have allergies to different dental materials.

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REFERENCES


Drug Induced Mucosal Disorders—A Review

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ABSTRACT

Generally, drug induced reactions are more commonly seen in population. Certain drugs have the capacity to cause pathologic reactions in the oral and perioral region. Drug induced diseases can help the clinician to determine the relationship with a particular group of drugs. The underlying mechanism is unknown but the final outcome of the disease can be predicted by pharmacodynamics and/or pharmacokinetics. Xerostomia, Swelling, Dysguesia, Nonspecific Ulceration, Vesiculobullous or ulcerative mucositis, pigmentation of mucosa, Gingival enlargement, oral malodour, taste alterations, discoloration of teeth are the clinical presentation of drug induced reaction. This review article gives a brief description about the diseases caused by drugs, so that dentists can update their knowledge for a better diagnosis and treatment.

Keywords: Adverse drug reactions, Drug induced xerostomia, Salivary gland diseases.

Introduction

Patients who intake several drugs for systemic factors may have oral diseases. WHO defined an adverse drug reaction as “a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, therapy of diseases or for the modification of physiological function”. Recently, different patterns of diseases have been identified and this can help a clinician to determine a possible cause and adverse reactions of a particular or group of medications. Dentists should take a thorough medical history and should be aware of the problems related to medications and its effects in oral cavity since majority of the population are consuming prescribed and non prescribed medications. This should be done because drugs has its own potential effects on diagnosis and treatment plan ²⁻⁴.

Salivary Gland Disorder: Variety of drugs may affect the function of salivary gland, which may lead to xerostomia, ptyalism, Salivary gland pain and discolouration of saliva.

I. Xerostomia: Diminished secretion of saliva and decreased calcium phosphate concentration in saliva leads to dryness of mouth or Xerostomia. It was found that more than 250 medications claim xerostomia as an adverse effect. Xerostomia can occur in patients with an underlying autoimmune etiology (eg. Sjogren Syndrome) especially to those who also present with Xerophthalmia or evidence of parotid gland swelling. Oral manifestations of reduced salivary flow are increased dental caries, fungal infections, bacterial infections, aphthous lesions, and dysphagia. Drug induced Xerostomia can be managed by Pilocarpine and Bethanechol ⁵.

II. Ptyalism: Increased salivary flow leads to Ptyalism or sialorrhoea. Physiological factors such as menstruation or early pregnancy, local factors such as teething, oral inflammatory lesions, food, medication, or by nasogastric intubation causes salivary hypersecretion ¹¹. Ptyalism can also be caused by heavy metal toxins (mercury and thallium), from exposure to irreversible
acetylcholinesterase inhibitors (insecticides and nerve agents) and by a few other drugs such as yohimbine, mucosa irritanting antibiotics.12

III. Salivary Gland Pain: Salivary gland pain can be caused by antihypertensives, anti-thyroid agents, chlorhexidine, cytotoxics, ganglion-blocking agents, iodides, phenothiazines, and sulphonamides13. Salivary gland pain is rarely associated with guanethidine or guanacline. Drugs which causes salivary gland pain and swelling are Bethanidine, Bretylium, Catecholamine inhalation, Cimetidine, Clonidine, Clozapine, Deoxycycline6-10

IV. Discolouration of Saliva: Discoloration of saliva and other body fluids into red or orange colour are noticed in patients who are treated with clofazimine, levodopa, rifampicin, and rifabutin therapy14.

Oral ulceration: Ulceration in the oral epithelium exposes the nerve endings to the underlying lamina propria, which results in pain or soreness specifically while eating spicy foods or citrus fruits. Oral Ulcers are Inflammatory lesions of the oral mucosa that affect approximately 20% of thepopulation.15 Immunological alterations, infections, nutritional deficiencies, repetitive trauma to the mucosa, food and contact allergies, autoimmune diseases and neoplasms, as well as psychosomatic, genetic and environmental factors are the numerous factors that causes ulceration.16

1. Nonspecific Ulceration: As a result of direct application of drugs like aspirin, hydrogen peroxide, potassium tablets, and phenol containing compounds oral ulceration can be caused. The affected mucosa seems to be whitish and corrugated, with erosion and ulceration of the damaged areas.20

2. Aphthous Ulceration: Aphthous ulcers are the ulcers which resemble recurrent aphthous stomatitis. There are certain examples, they are: Behcet’s syndrome, gastrointestinal diseases, such as gluten-sensitive enteropathy or inflammatory bowel disease, immunodeficiency syndromes such as infection with HIV, cyclic neutropenia and adverse reactions to medications.21 A number of drug are implicated in the development of nonspecific ulceration and oral mucositis, and the lesions are often associated with an equally nonspecific histologic appearance at biopsy. These include barbiturates, beta-blockers, dapsone, NSAIDs, phenazone derivatives, thiazide derivatives, phenolphthalein, sulfonamides, tetracyclines, and sirolimus.22

3. Fixed Drug Eruptions: Initially it appear as edematous areas and erythema that promotes localized, nonspecific ulceration. Most frequently it involves labial mucosa and a clinical course of recurrence at the same location after drug use is diagnostically helpful, but this relationship is not always easy to establish. A number of drugs are involved in the development of nonspecific ulceration and oral mucositis, and the lesions are often associated with an equally nonspecific histologic appearance at biopsy. These include barbiturates, beta-blockers, dapsone, NSAIDs, phenazone derivatives, thiazide derivatives, phenolphthalein, sulfonamides, and tetracyclines.23

4. Mucositis: In Oral mucositis and ulceration, chemotherapy regimens plays an important role particularly those involving methotrexate, 5fluorouracil, doxorubicine, melphelan, mercaptopurine, or bleomycin.24 Within days of commencement of therapy, sloughing and ulceration arises with associated pain which often requires opioid therapy & alteration or cessation of chemotherapy.

5. Pemphigoid Like Reactions: Pemphigoid like reactions can be restricted to the oral mucosa, or they can affect other mucosal or cutaneous sites. Lesions appear as relatively sturdy vesicles or bullae, clinically that break down into shallow ulceration. Thiolcontaining drugs and sulfonamide derivatives are among the most commonly involved medications, as are the therapeutic classes of NSAIDs, cardiovascular agents, antimicrobials, and antirheumatics.25 In drug induced pemphigoid particularly penicillamine-induced disease, oral mucosa is commonly affected.

6. Pemphigus: Although pemphigus foliaceous is uncommon in the oral cavity Pemphigus like reactions may have features of neither Pemphigus vulgaris nor Pemphigus foliaceous. Drugs which
are capable of promoting pemphigus are divided into two main groups according to their chemical structure. They are drugs containing a sulphydryl radical (thiol drugs or SH drugs) and non-thiol. Pemphigus vulgaris may occasionally be combined with drugs active thiol groups in the molecule. Drugs implicated are penicillamine, phenol drugs, rifampicin, diclofenac, and other ACEinhibitors.

7. Lupiod Reactions: Wide variety of different drugs induces systemic lupus erythematosus (SLE). Over 70 agents have been involved in causing drug-induced lupus. They are procainamide and hydralazine, although drugs less commonly associated include chlorpromazine, isoniazid, methyl dopa, penicillamine, and quinine, as well as whole groups of drugs such as anticonvulsants, beta-blockers, sulphonamides.

8. Erythema Multiforme: Drug induced Erythema multiforme is commonly associated to agents such as barbiturates, cephalosporins, NSAIDs, estrogens, phenothiazines, progestogens, protease inhibitors, sulphonamides, sulphonylurea derivatives, and tetracyclines—may give rise to erythema multiforme, and it may be a challenge clinically to differentiate drug-induced erythema multiforme from disease due to other causes.

Oral Malodour: Oral Malodour or Halitosis is bad breath resulting from poor oral hygiene, dental or oral infections, ingestion of certain foods, use of tobacco, and some systemic disease and medications. Drugs which induces xerostomia, may indirectly cause or aggravate this problem, but other drugs, such as isosorbide dinitrate, dimethyl sulphoxide, or disulfiram, can directly cause halitosis.

White Lesions

Lichenoid Reactions: Lichen planus is a chronic systemic disease of the established immune mediated pathogenesis. It is usually a persistent disorder and may persist for many years inspite of several treatment strategies. Certain drugs can promote oral disorders resembling lichen planus and hence they are termed as oral lichenoid drug reactions. After drug withdrawal Oral lichenoid reactions which is an uncommon condition disappears. A characteristic white lace pattern is observed. Lichenoid reactions follows the use of HIV protease inhibitors, antihypertensive agents, antimalarials, phenothiazines, sulphonamides, tetracyclines, thiazide diuretics, and many others.

Oral Candidiasis: Oral Candidiasis is the most common opportunistic infection seen in dental practices. Clinically it appears as creamy, white plaques on the tongue and buccal mucosa, when it is scraped it leaves a red, painful ulcerated surface. Pseudomembranous candidiasis occurs secondary to therapy with broad-spectrum antibiotics, corticosteroids - systemic and inhaler preparations, and other immunosuppressive regimens (e.g., ciclosporin) and cytotoxic therapy.

Black Hairy Tongue (Lingua villosanigra): An elongation of filliform papillae of the tongue to form hair like growth which becomes stained brown or black due to the proliferation of chromogenic microorganisms. This condition is known as Black hairy tongue. On administration of oral antibiotics, poor oral hygiene and excessive smoking in adults this condition can be observed.

Taste Alteration: Individual under various medications may present with subjective complaints of taste changes. Many drugs are associated with taste alteration, which manifests as hypoguesia (decreased taste), dysguesia (distortion of the correct taste), aguesia (no taste). ACE inhibitors, anti-thyroids, beta-lactam antibiotics, biguanides, chlorhexidine, opiates, and protease inhibitors are particularly implicated. Certain patients treated with ACE inhibitors may have dysgeusia, although this adverse effect is self-limiting and reversible within a few months, even with continued therapy. There are newer therapies such as the anti-HIV protease inhibitors, therapy with tripotassiumdicitrato bismuthate chelate, clarithromycin, and lansoprazole therapy for H. pylori infection, terbinafine, intravenous pentamidine, and isotretinoin.

Mucosal Pigmentation: Oral discoloration may be superficial or deep. Superficial discolouration can be due to extrinsic causes and deep discolouration can be due to intrinsic causes.

Extrinsic discolouration is usually caused by habits such as:

- Use of tobacco or betel nut
Intake of coloured foods or beverages
Consumption of drugs (such as chlorhexidine, iron salts, cocaine, minocycline, bismuth subsalicylate and lansoprazole)

The primary causes of intrinsic mucosal hyperpigmentation are: 38

- Amalgam or other tattoo
- Nevus - Melanotic macule
- Peutz-jegher’s syndrome
- Racial pigmentation
- Drugs such as antimalarials and oral contraceptives
- Addison’s disease
- Pregnancy Pigmented lesions of the tongue (dark macular patches) are reported to occur in heroin addicts who inhale the smoke.39

Teeth Discolouration: Teeth stain are mainly caused by the antimicrobial agents such as tetracycline and minocycline. Systemic consumption of tetracycline causes irreversible staining in developing teeth and bones. The most affected region is cervical third of the tooth and staining is directly proportional to the age at drug exposure, dosage and duration of therapy.40 In case of Minocycline, staining occurs after the teeth are fully developed and erupted. It penetrates easily into both soft and calcified tissues. Thus pigmentation is produced by incorporation of the drug from the pulp into the dentin and enamel. Bluegray staining in the middle and incisal thirds of the teeth is produced by the salivary oxidation and gingival crevicular fluid. Minocycline produces irreversible staining. Metals, such as lead or mercury, or drugs that contain metals, such as gold salts, promotes changes of pigmentation at the gingival margin. 41 Overdose with barbiturates, dichloralphenazon, and carbon monoxide can produce discolouration similar to POSTMORTEM PINK-RED COLORATION (a condition where the tooth discoloration is due to hemolysis and exudation of hemoglobin to the dental pulp which is enhanced in the presence of moisture and increased venous pressure.).43

Swellings

A. Gingival Hyperplasia: Gingival Hyperplasia is a known adverse effect of anticonvulsant phenytoin, the immunosuppressant cyclosporine, and the calcium channel blockers which is used for hypertension and angina. Drug induced gingival enlargement can be localized or generalized and it is changed based on the degree of severity. Gingival enlargement typically affects the labial tissues and begins in the interdental papillae.

B. Mucosal Swelling: Drugs are the most common cause of urticarial reactions in adults affecting approximately 15-20% of young adults. Urticaria is a vascular reaction in the superficial layers of the skin, characterized by local edema and raised capillary permeability with wheals (hives), often involving severe itching. Drugs like penicillins, local anesthetic agents, cephalosporin derivatives, angiotensin-converting enzyme inhibitors, aspirin, and barbiturates—may promote angioedema.

Conclusion

Many drugs have the capability to cause adverse effects in the oral cavity. Drugs has the capability to cause conditions such as salivary gland disease, oral ulceration, taste alterations, discoloration of teeth, mucosal pigmentation, white lesions, swellings and oral malodour. These side effects interfere with the patient function and increase risk of infection, pain and possible tooth loss. Most common side effects of drugs are xerostomia, Altered taste and stomatitis. It is important for every health professionals to understand the adverse effects of medication on the oral health of their patients. To diagnose and treat the patients, a proper medical history with prescribed medicines, over the counter drugs and diet should be recorded. Thus healthcare professionals can identify the causative agent and treat the patients accordingly.

Ethical Clearance: Not required since it is a review article

Source of Funding: Nil

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REFERENCES


Cervical Lymphadenopathy in Dentistry—A Review

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ABSTRACT

On examination, lymph node enlargement may be an incidental finding, or may be associated with a patient complaint. Over half of the patients examined every day may have enlarged lymph nodes in the head and neck region. Oral health care providers must be able to determine when lymphadenopathy should be investigated further since it has a high frequency of occurrence. But it is the duty of the clinician to search for a precipitating cause and examine other nodal locations to exclude generalized lymphadenopathy. Generally, lymph node larger than 1 cm in diameter is considered as an abnormal lymph node. Malignancy should be considered when palpable lymph nodes are identified in the supraclavicular region, or when nodes are rock hard, rubbery, or fixed in consistency. Patients with unexplained localized cervical lymphadenopathy presenting with a benign clinical picture should be observed for a 2- to 4-week period. This article reviews common causes of lymphadenopathy, and clinical approach to a patient with cervical lymphadenopathy.

Keywords: Cervical lymphadenopathy, toxoplasmosis, tuberculosis

Introduction

Lymphadenopathy is one of the common finding in patients where enlarged lymph nodes in the head and neck region are observed. Aetiology and management of cervical lymphadenopathy varies from patient to patient. Benign lymphoid hyperplasia or reactive cervical lymphadenitis are identified in majority of patients with cervical lymphadenopathy. The spectrum of serious illness such as lymphoma, metastasis from oral cancer, distant metastasis from other primary cancers, acquired immunodeficiency syndrome, tuberculosis (TB), amyloidosis, and deep fungal infections are seen in some cases with enlarged cervical lymph nodes.¹,² Hence dental practitioners should be familiar with various diseases of cervical lymph nodes.

Mycobacterium tuberculosis causes Tuberculosis which is a granulomatous inflammatory process. Commonest form of extrapulmonary Tuberculosis is Tubercular lymphadenitis. In recent years, incidence of tuberculosis started to rise worldwide with increased number of HIV-infected population.³ Manifestations of Tuberculous cervical lymphadenitis are chronic, persistent, painless, slowly growing mass in the neck. Diagnostic modalities such as fine needle aspiration cytology, imaging, etc., are helpful for investigation. Treatment of choice is anti-tuberculous chemotherapy, with or without surgical excision of the involved cervical lymph nodes.⁴

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Causes of Cervical Lymphadenopathy

<table>
<thead>
<tr>
<th>Immunologic diseases</th>
<th>Rheumatoid arthritis, Mixed connective tissue disease, Systemic lupus erythematosus, Dermatomyositis, Sjogren’s syndrome, Serum sickness, Drug hypersensitivity, Primary biliary cirrhosis, Graft-vs-host disease, Silicone-associated</th>
</tr>
</thead>
</table>
| II. Infectious Diseases | Viral—infectious mononucleosis (EBV, CMV), infectious hepatitis, herpes simplex, HHV-6, VZV, rubella, measles, adenovirus, HIV  
Bacterial—streptococcus, staphylococcus, cat-scratch disease, brucellosis, tularemia, chancroid, tuberculosis, atypical mycobacterial infection, primary and secondary syphilis, diphtheria, leprosy  
Fungal histoplasmosis, coccidioidomycosis, paracoccidioidomycosis  
Chlamydial—lymphogranuloma venereum, trachoma  
Parasitic—toxoplasmosis, leismaniasis, trypanosomiasis, filariasis, |
| III. Malignant diseases | Hematologic (Hodgkin’s, non-Hodgkin’s, ALL, CLL, hairy cell leukemia, T-cell lymphoma, multiple myeloma with amyloidosis)  
Metastatic—from primary sites |
| IV. Other disorders | Castleman’s disease (giant lymph node hyperplasia)  
Sarcoidosis  
Dermatopathic lymphadenitis  
Lymphomatoid granulomatosis  
Kikuchi’s disease (histiocytic nectrotizing lymphadenitis)  
Kawasaki’s disease (mucocutaneous lymph node syndrome)  
Histocytosis X  
Severe hypertriglyceridemia |

Drug Reactions

The disease may be related to a hypersensitivity response since the mechanism is unknown. This hypersensitivity response includes mucocutaneous eruptions, fever, hematologic abnormalities, organ involvement such as hepatitis or interstitial nephritis, and lymphadenopathy. The hypersensitivity reaction resolves after drug withdrawal. The mortality rate is increased upto 10% even after drug withdrawal.4,5

Infections

**Upper respiratory infections:** Acute bilateral cervical lymphadenopathy is due to viruses and bacteria infecting the upper respiratory tract in both adults and children. Certain viruses causing upper respiratory infections such as adenovirus, influenza virus & respiratory syncytial virus. Bacterial pharyngitis, which is a type of upper respiratory infection is most commonly caused by Group A beta hemolytic Streptococcus. Other common bacteria causing infection are groups B, C, and G hemolytic Streptococci, Corynbacteria, and several anaerobes.

**Symptoms:**
- Cough
- Sinus congestion
- Rhinorrhea, and occasionally fever and
Malaise.

Cervical lymph node may be swollen and tender and persists for weeks.

**Diagnostic Tests:**

- Viral cultures of the nasopharyngeal region
- Bacterial throat cultures or serologic antigen detection are useful in persistent infection cases.

**Local Infection:** Cervical lymphadenopathy is a common feature of localized infection. Cervical adenopathy is often caused due to local bacterial infections of head and neck. The symptoms of bacterial infections are warm, erythematous, enlarged and tender lymph nodes. More than 50% of the time submandibular node involvement is noticed. Staphylococcus aureus and Streptococcus pyogenes are common bacterial pathogens. The origin of local infection may be viral, commonly herpes simplex virus or Coxsackie virus. Primary herpetic stomatitis and herpangina are caused by the above viruses respectively. These diseases are most commonly seen in children and adolescents. Clinical findings are acute painful ulcers of the oral cavity or oropharynx, enlarged bilateral tender lymph nodes in the anterior triangle of the neck, impressive submandibular and submental adenopathy, and occasionally fever and malaise. There are other systemic complications including hepatosplenomegaly or generalized lymphadenopathy but it is not present in these viral infections.

Chronic cervical lymphadenopathy is the most common presentation of nontuberculous mycobacteria (NTM) in children. Most common isolates of NTM are Mycobacterium avium and M. scrofulaceum. Atypical tuberculosis (TB), usually present as a nontender mass in the submandibular region and is most commonly seen in children. Weakly tuberculin skin test is done to the patient where the result may be positive or negative and not have pulmonary symptoms. The infection proceeds gradually with nodal enlargement occurring within weeks to months.

**Cat Scratch Disease:** Clinical feature is Subacute adenopathy which involves cervical region. Bartonella species is the causative organism for this disease. A gram-negative bacterium, specially B henselae known to be pathogenic to humans. Cervical lymphadenopathy involving parotid and submandibular glands have symptoms such as fever, headache, and malaise. Symptoms develops in 10 to 30 days after an infected pet inoculates the host, usually through a scratch. Surface around these nodes is warm, tender, erythematous, and may be indurated or suppurative. Infection with Bartonella species may cause conjunctivitis, encephalopathy, bacillary angiomatosis, peliosis hepatitis, and bacteremia. are also observed. Oral manifestation of cat-scratch disease is bacillary angiomatosis.

**Diagnosis**

- Cat-scratch skin test
- Serologic testing for the presence of antibodies to B henselae.
- Lymph node biopsy with special staining demonstrate cat-scratch bacilli well but culturing this organism requires a 6-week incubation period is required.

This disease is self-limiting in immunocompetent hosts and it resolves without treatment within 2 to 3 months. B henselae infection is seen in immunocompromised individuals, where they have greater morbidity and mortality, for which initiation of antibiotics such as trimethoprim-sulfamethoxazole or erythromycin, may be necessary.

**Tuberculosis:** Mycobacterium tuberculosis is an infectious and communicable organism which causes tuberculosis. There is no definitive signs or symptoms for the individuals with TB. If symptoms becomes clearly visible, then the infected individuals will have signs and symptoms such as weight loss, night sweats, fever, malaise, or anorexia. Persistent cough is commonest symptom associated with pulmonary TB. Other symptoms such as hemoptysis and nonpurulent sputum helps in diagnosis. Mycobacteria may cause chronic granulomatous lymphadenitis, typically within the nodes draining salivary glands. One of the most common extrapulmonary manifestations of tuberculosis is Tuberculous cervical lymphadenitis, or scrofula. Peripheral node disease accounts for approximately 20% of extrapulmonary tuberculosis.

**Toxoplasmosis:** 30% of the human population worldwide have toxoplasmosis which is caused by a parasite Toxoplasmosis gondii that infects a wide range of warm-blooded vertebrates. Cause and source of infection is contact with infected uncooked or undercooked meat.
**T. gondii** is excreted in feces

Up to one year, it survives in soil

Infection can occur due to the ingestion of cysts and oocysts directly from the soil or present in infected meat

After initial phase of infection, pseudocysts disperse to other organ tissue and proliferation of the organism ceases with the host response.

The formed cysts lie dormant and intact within the host, unless the patient’s immune system becomes suppressed.

**Mode of transmission:** *T. gondii* can be transmitted to humans through organ transplant procedures, blood transfusions, or transplacental transmission.

**Common Manifestation:** Lymphadenopathy, with firm, tender enlargement of the cervical nodes.

![Fig. 1: A patient with cervical lymphadenopathy](image)

**Sequelae of congenital infection are**

- Mild nonspecific disease,
- Failure to thrive,
- Lymphadenopathy,
- CNS involvement,
- Intracerebral calcification,
- Ocular disease, and
- Myocarditis.

Diagnosis of toxoplasmosis is based on history and exam findings, and confirmation is done by rising antibody titers—*IgG* titers are typically high during acute infection and will remain at low titers for life. *IgM* titers indicates acute infection and are useful markers during pregnancy. Other diagnostic methods are isolation of *T. gondii* from blood or other bodily fluids, or detecting the parasite by polymerase chain reaction in tissue or body fluid.

**Infectious Agents:** There are broad range of infective organisms which has the potentiality to cause cervical lymphadenitis. It is difficult for clinicians to investigate all the possibilities. In many cases of infections, there are typical signs and symptoms of lymphadenopathy.

**Malignancy:** In a malignant conditions, enlarged palpable lymph nodes of the head and neck may be present. Several metastatic tumors may present as cervical lymphadenopathy; these are tumors of the skin and appendages, oropharynx, larynx, thyroid gland, salivary gland, and nasopharynx. Malignancies from cells in the immune system may also results in lymphadenopathy. The initial manifestation of Hodgkin’s disease and non-Hodgkin’s lymphoma is lymphadenopathy at any site; chronic lymphocytic leukemia and myeloid leukemia may also present with initial signs of lymphadenopathy. Supraclavicular lymph nodes seems to be present in metastasis from remote sites than cervical nodes. Primary sites of tumor presenting with supraclavicular lymphadenopathy include ovaries, lungs, and gastrointestinal tract. The chief complaint of patient can be fever, sweats, weight loss, and anorexia, particularly with acute hematologic malignancies. Other signs and symptoms may include hoarseness, paresthesia, hemoptosis, hematuria, occult blood in the stool, or abdominal pain.

Clinical features of malignant lymph nodes in later stages: firm, rock hard, and fixed-to-deeper tissues
nodes. Nodes may present as unilateral and multiple, or bilateral. In lymphoma, there will be larger, symmetric, firm, mobile, and nontender nodes. In cases of rapidly progressive neoplasia, such as acute leukemia, lymph node enlargement may be painful or tender because of rapid expansion of the node which results in pain. Lymph node biopsies and further diagnostic tests helps in diagnosing malignancy and origin of the tumor can be established.

**Clinical Evaluation**

**Medical History**

- Duration of lymphadenopathy is noted
- Presence of constitutional symptoms such as fever, sweats, weight loss, and anorexia should be gathered.
- History of underlying systemic disease must be taken into consideration.
- Concomitant events should also be investigated since they may correlate with the onset of the patient’s lymphadenopathy
- Associated constitutional symptoms, or other nonspecific signs or symptoms including oral lesions, dental problems, recent trauma, breathing difficulty, odynophagia, or dysphagia should be noted.

**Social and Family History:** History such as patient’s age, occupation, travel experiences, exposure to pets, dietary habits should be obtained. If a definitive diagnosis cannot be made based on the patient’s history and physical examination, then clinical examination is done to obtain a cause. When the history is suggestive of a particular etiology, confirmatory testing is mandatory to identify the illness.

**Clinical Features:** Physical examination of the patient helps in clinical assessment. The prior thing required for clinical evaluation is understanding of head and neck surface anatomy. Identification of the major structures, along with knowledge of the distribution of lymph nodes in the head and neck, will help to find out normal versus abnormal and also the physical findings.
Complete physical examination includes evaluation of the skin, neck, ears, eyes, nose, and throat. Intraorally, the patient’s oropharynx should be examined.

Palpable lymphadenopathy is common in young children. They are frequently exposed to new antigens, and enlarged nodes are typical. Larger lymph nodes (1 cm) are not considered normal in either adults or children. Palpable nodes less than 1 cm in the groin is considered normal in adults. Hence, size of the lymph node is an important criteria for lymphadenopathy. The consistency of the node is also an important factor in lymphadenopathy.

**Location:** The extent of lymphadenopathy is important in differentiating between localized and disseminated disease. Location of enlarged lymph nodes may lead to a source of infection, particularly if the node is tender with inflammation of the surrounding structures. Enlarged cervical lymph nodes are found frequently. Suboccipital nodes may be associated with scalp infections. When supraclavicular nodes are enlarged, there is a strong suspicion of malignant disease, particularly lymphoma or metastatic disease. Virchow’s node present in the left supraclavicular region, indicating metastatic infiltration from a primary GI cancer.13

**Hematologic Testing**
- A complete blood count (CBC) with differential will be helpful to detect cases caused by infectious mononucleosis, leukemia, or lymphoma.
- Neutropenia and thrombocytopenia helps in diagnosing systemic illnesses
- Serology tests are performed to detect toxoplasma, EBV, CMV, herpes simplex virus (HSV), or chlamydia

**Other Diagnostic Tools**
- Imaging studies such as chest x rays, CT scans, MRI and FNAB21
- Chest x rays- to rule out mediastinal lymph node.
- CT scans- used to evaluate the location and nature of the lymph nodes
- MRI-used to evaluate the extent of lymphadenopathy
- FNAB (Fine Needle Aspiration Biopsy) is an adjunctive evaluation of lymphadenopathy.

**Conclusion**

Though lymphadenopathy occurs commonly, we should remember some salient points:
- Most patients doesn’t require a biopsy
- Certain patients do not require laboratory evaluation
- Antibiotics should not be prescribed unless there is a serious complication
- On clinical examination, location, symptomatology, and consistency should be addressed
- If the history and physical findings are suggestive of benign lymphadenopathy, follow up is recommended in 2 to 4 weeks
- The patient should be instructed to report soon if the nodes increase in size
- Investigating the etiology should be improved.

Patient’s medical status should be evaluated to determine if a known illness is causing lymphadenopathy. Malignancy must be considered in a differential diagnosis. If these steps provide no clues for diagnosis then CBC with differential should be ordered. If a patient is found to have an enlarged lymph node, follow up is required for 2-4 weeks to rule out the condition.

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**REFERENCES**


Biopsy Report: A Guide For Beginners

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ABSTRACT

Descriptive pathology is essential for writing histopathological reports. It is often performed under the pressure of time and accuracy. Precision is important because the patient is still alive and the pathologists must act quickly on the diagnosis. Most of the reports are reviewed and produced by a single pathologist. Therefore, it is possible to make errors or mistakes. Therefore, it is usually possible to make mistakes in writing a biopsy report. A clear unambiguous writing style is important to meet the report's requirements. This review article provides a comprehensive review of different parameters to be considered in writing oral lesion histopathology report.

Keywords: Biopsy, reports, pathology, diagnosis.

Introduction

Oral and maxillofacial pathology is one of the specializations in dentistry that engages with diagnosis, study of etiological factors and effects of disease which usually affects oral cavity, jaw and face. Usually, pathologist will diagnose the disease by clinical, radiographic, microscopic, biochemical investigations or other investigations like examination of organs, tissues, molecules and cells¹. An oral pathologist writes all of the findings that he examines macroscopically and microscopically in a biopsy report that works to help the surgeons and doctors plan further treatment¹. Biopsy writing is also known as descriptive pathology. Descriptive pathology is to identify, describe, explain or interpretate pathological lesions or abnormalities and record all findings in biopsy report². And any misdiagnosis can cause serious problem. Quality control in histopathology is extremely important in order to minimize the potential for misdiagnosis¹.

Components of Gross Description: The analysis of gross lesions starts when the unusual findings are identified and characterized². Before coming to the diagnosis, we should observe the abnormal findings carefully, understand about the lesion and the we have to interpretate. Subsequent features must be noted.

Specimen Received: fresh, in formalin or saline, referred by any surgeon etc³.

Sample tissue in formalin

Specimen Identified: labelled (biopsy number, date, name of patient)³

Describe: whether the tissue is attached with any bone³.

Distribution: geographical arrangement of lesion in the organ or tissue².

Lesion or abnormalities may occur with different distribution pattern, that can be the indicators of disease and help to predict the extent or significance of the findings.

Symmetrical – certain degree of organisation is evident or same

Random – not related to specific structure of organ or tissues.
Focal – a single established lesion
Multifocal – more than one discrete lesion
Miliary – numerous small foci
Segmented – well circumscribed segment or portion of tissue is abnormal
Diffuse – full or entire part of organ is affected.

**Demarcation**: boundaries/limits of a lesion defined from neighbouring tissue.

Well demarcated – discrete, well defined boundaries
Poorly demarcated – abnormal, discontinuous, blurred or undefined boundaries.

**Contour**:
- Raised – heightened or increased tissue or organ to cause expansion. Eg: ulcer, fibroma.
- Depressed – lowered or removed. eg: ulcer, necrosis.
- Flat – lesion is neither elevated nor depressed.

**Shape**: geometric figure which represents the lesion beyond the contour.
- Round
- Ovoid
- Irregular

**Color**: one of the most evident attributes the lesion, especially when the lesion varies from normal color.
- Innate color – colourless or white
- Special pigments - eg: bile
- Dark tissues – high proportion of pigment to tissue. Eg: spleen
- Light tissues - Low proportion of pigment to tissue. Eg: brain.
- Red to reddish black – usually represents blood or haemoglobin pigment.
  (shows haemorrhage or congestion)
- White to grey or yellow – lack of blood. Eg: exudate, fibrosis.
- Brown to black – eg: melanoma.

**Size**: measurement of tissue or organ.
- Uniform and non uniform

**Texture**: appearance of tissue
- Smooth, glossy, rough

**Consistency**: thickness or viscosity.
- Soft, firm, hard.

**Location**: Anatomic sites
- Eg : floor of mouth, vestibular region, buccal mucosa.

**Chronicity**:
- Acute – sudden and short
- Chronic – gradual and extends to long period.

**Severity**: Mild, Moderate, Severe.

**Fundamentals of Pathology Report:**
- Date
- Patient’s details
- Biopsy number
- Referred by
- Type of biopsy
- Site of biopsy
- Clinical findings
- Preoperative diagnosis
- Gross specimen:
  - Number
  - Size
  - Shape
  - Consistency
  - Colour
  - External surface
Margins
Microscopic description
Staging and grading
Lymph node status
Special stains
Final diagnosis
Pathologist signature

Description:

Date¹: Date of receiving, date of biopsy date of reporting has to be mentioned in biopsy report.

Patient’s details¹:
- Name, age, sex has to be mentioned in report
- This segment includes the personal details of the patient that sometimes helps with the diagnosis.

Biopsy number¹:
- A specific number is issued to every patient.
- This number enables the specimen to be tracked at any point in the process.
- Medico-legal lesion

Referred by¹: If the biopsy sample is referred by any doctor/surgeon it had to be mentioned in biopsy report.

Type of biopsy¹:
- Incisional/excisional/cytology
- It gives an idea about the size and location of lesion

Site of biopsy¹:
- Anatomical sites or location has to be mentioned
- Schematic description of the oral cavity should be included in the requisition that would allow the surgeon to identify the biopsy site. Site helps to identify features of the tissue when analyzing them.

Clinical findings¹:
- This section gives a detailed overview of patient’s medical, habit history and history relevant to tissue sample.
- Medical history – cardiac problem, diabetes, cancers, diabetes mellitus.
- It allows an individual to take steps to reduce their risk
- Habit history: smoking/alcohol/areca nut chewing along with frequency has to be mentioned.
- It helps the doctors to rule out any habit related lesion is there or not in patient’s oral cavity

Pre-operative diagnosis¹:
- The clinical diagnosis indicates what doctors expect before the descriptive diagnosis.
- This diagnosis were given before the confirmatory diagnosis.

Figure 2: Gross Examination

Number¹
Shape¹:
- Irregular – Squamous cell carcinoma, leukoplakia.
- Spherical – adenomatoid odontogenic tumor
- Round – mucocele

Outer/External Surface¹:
- Verrucous: verrucous carcinoma
- Smooth: benign tumor
- Corrugated: Odontogenic keratocyst

Margins¹:
- Ill defined – myxoma, squamous cell carcinoma
- Well defined – lipoma, pleomorphic adenoma
Consistency:
- Soft: lipoma, papilloma
- Firm: fibroma, pyogenic granuloma, leukoplakia
- Hard: odontoma, amelogenesis imperfecta
- Mucinous: mucocele

Color:
- Yellow – lipoma
- White – odontoma
- Grayish white – mucocele
- Grayish black- carcinoma

Chronicity:
- Acute
- Sub-acute
- Chronic

Histopathologic Features of Chronic Lesion Shows:
- Uncontrolled cell proliferation,
  - OSMF- Excessive Deposition of extra cellular matrix,
  - Pyogenic granuloma - fibro vascular proliferation.

This is the key component of pathology description. First, pathologists should be familiar with the following before starting interpretation:
- Name of the tissue or organ,
- Site of biopsy,
- Method of fixation,
- Provisional diagnosis,
- Stains used.

There are no standard guidelines for describing histological sections of oral lesions, but tissues of biopsy can usually be described as follows in eight steps.

Magnification of 4X: (Scanner View): Before writing the report, some features should be reported below 4x in the tissue segment:
- Identify all biopsy tissue components and their correlation
- with the provisional diagnosis
- Identification of abnormal/diseased tissue and normal/healthy
- tissue within lesion
- Check the relationship between normal tissue and diseased tissue
- Check for other different processes like degeneration, invasion,
- Proliferation, metastasis, mineralization, decay, necrosis, and
- atrophy

Gross description:
- Identify the epithelium, connective tissue stroma and
- deeper connective tissue stroma.
- Check for cellularity (densely cellular or sparsely cellular)
- Check for margins (well defined or ill defined)
- Encapsulated or unencapsulated
- Deep invading structures like blood vessels, glands,
- neurovascular bundle.

Fig. 3: 4X view of Basaloid squamous cell carcinoma

Magnification of 10X View: Hallmark pattern of cell proliferation in lesion: (Figure 4)

Neoplasm:

In epithelium: Tombstone pattern, honeycomb pattern, palisading arrangement (sheets, islands, cords)
**In connective tissue:** Herring bone pattern, bundle stream, storiform appearance, rosette like arrangement, epitheloid arrangement, fascicular arrangement.

**In salivary gland:**
- Cribriform pattern – adenoid cystic carcinoma.
- Tubular pattern – adenoid cystic carcinoma and basal cell adenoma.
- Canalicular pattern – salivary gland adenoma or carcinoma.
- Acinar pattern – acinic cell carcinoma of salivary gland.
- Comedo pattern – salivary duct carcinoma.

**Odontogenic tumors:** Plexiform sheets, kite tail pattern, corrugated pattern
- Follicular pattern – follicular ameloblastoma
- Fibro-osseous lesion:
  - Chinese script pattern, mosaic pattern

**Type of stroma in sarcoma:**
- Type of proliferation
  - Collagenous stroma – OSMF
  - Cellular stroma – cementifying fibroma
- Necrosis – malignancy and inflammation
- Mixed stroma
- Hyalinized
- Myxoid stroma – myxoma
- Supporting structures(inflammatory) – mild, moderate, dense.

**Magnification of 40X: (Figure 5)**

**Cellular Features:**
- Size: large or small
- Shape: cuboidal, columnar, round, oval, polygonal, pleomorphic.
- Cytoplasmic border: distinct or indistinct
- Cytoplasm:
  - Color: eosinophilic or basophilic
- Amount: scanty, moderate, abundant
- Character: homogenous, fibrillar, granular
- Content:
  - Mucous – empty
- Multiple nuclei – giant cells
- Granular – ameloblastoma

**Nuclear Features:**
- Shape: round, oval, elongate, spindle.
- Location: eccentric, central, compressed
- Chromatin: stippled, vesicular, clumped
- Staining: hyperchromatic
- Mitotic figures

**Nucleolar Features:**
- Number & color - increased in malignancy
- Characteristic features: Fibrous dysplasia – Chinese letter pattern,
- Giant cell granuloma – multinucleated
- Mitotic activity
- Features of malignancy:
  - Invasion, necrosis, haemorrhage, dystrophic calcification, depth of invasion

![Fig. 4: 10x view of basaloid squamous cell carcinoma](image)

![Fig. 5: 40x view of basaloid squamous cell carcinoma](image)
**Pathologic Staging System:** TMN (tumor, metastasis, node invasion) is the medical staging method recommended by the American Joint Commission on Cancer (AJCC) used by many pathologists.

**Grading System:***

- **BORDER’s classification:**
  - Well differentiated (GRADE I) – <25% undifferentiated cells
  - Moderately differentiated (GRADE II) – <50% undifferentiated cells
  - Poorly differentiated (GRADE III) - < 75% undifferentiated cells
  - Anaplastic or pleomorphic (GRADE IV) - >75% undifferentiated cells

**Guidelines for Writing Microscopic Description:**
- Concise, complete, well-organised microscopic description is mandatory
- Specify the major event first and minor event at the end briefly.
- Describe each and every component/parts of lesion. Eg: CYST – lumen, epithelial lining and connective tissue capsule
- Explain the features shown by the majority of cells
- It is not necessary to describe normal tissue
- Use the right term given in the literature.
- Don’t write any useless terms in biopsy report
- Correct punctuation, grammar and spelling is important while writing the report
- Always write the report in active voice/present tense
- Male follow-ups if necessary.
- All histopathologic descriptions should match with your final diagnosis.

**Special Markers/Tests:** Use special stains, immunohistochemical markers, electron microscopy and molecular biology technique if needed.

**Final Diagnosis:** Should be based on all findings in the report.

**Pathologist’s Signature:** The pathologist who signs the report will be responsible for its contents.

**Conclusion**

In view of treatment plan and prognosis, a carefully prepared biopsy report with accurate representation of the lesions can be a valuable complement to oral histopathologist. It takes an hour to establish recommendations for the oral biopsy report format for all types of oral lesions that have not been thoroughly investigated and documented in dental literature. So we have to standardize a biopsy report format inorder to avoid misdiagnosis and to help budding pathologist by providing well-standardised format.

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Current Trends in Smart Materials—A Review

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ABSTRACT

Various fields of dentistry have been revolutionized by smart materials. The need for an ideal restorative material resulted in invention of newer generation of materials in dentistry called the smart materials. The smart materials possess the properties which may be altered in a controlled fashion by various stimuli like, stress, temperature, moisture, pH and electric or magnetic fields. Some of the smart materials are biomimetic and mimic the natural enamel or dentin. The current dental materials were worked on to improvise their properties in order to make them smarter. The use of smart materials holds a promising future in terms of improved efficiency and reliability in dentistry. There is a strong trend in material science to develop and would potentially allow newer ground breaking dental therapies with drastically enhanced treatment outcomes.

Keywords: Materials, Resin, Implants, Fibers.

Introduction

The terms ‘smart’ and ‘intelligent’, to describe materials and systems started in 1980’s in United States. Traditional dental materials were designed to be passive and inert without interacting with the oral environment. The current trend in dentistry is changed with the introduction of various smart dental materials which are active, functional and undergoes a purposeful change in the oral cavity. The smart materials can undergo alterations in color, refractive index, distribution of stresses and strains or a volume change etc. They are highly responsive and possess the inbuilt ability to sense and react according to changes in the oral environment, hence called as smart materials[1]. Smart behaviour usually exhibits when a material senses the stimuli from the oral environment and responds in a beneficial, reproducible, reliable and reversible fashion. The significant feature of smart behaviour is its property to return to original state even after the retrieval of stimulus [2]. These properties aids in beneficial application of smart materials in various fields of dentistry. This paper focuses to describe the recent trends in development of smart materials and its applications in dentistry.

Characteristic Features: The smart materials can be altered in a controlled fashion by stimuli, such as stress, temperature, moisture, pH, electric or magnetic fields and has an ability to return to the original state after the removal of stimulus. The shape memory alloys or shape memory polymers are the thermo-responsive materials [3,4] which adopts different shapes at different temperatures with controlled changes in structure. The shape of the magnetic shape memory alloys changes their shape in response to a change in magnetic field. The piezoelectric materials when subjected to stress produces a voltage or vice versa [5]. When voltage is applied to these products, they can undergo changes in shape or dimensions. The materials like pH-sensitive polymers are influenced by the pH of the surrounding media and they swell or collapse [4]. Some of the materials can produce change colour in response to changes in pH, light or applied voltage. Polymer gels exhibits smart behaviour [6]. They have cross-linked polymer networks which may be inflated in the presence of solvents like water.
**Classification:** Smart materials are broadly classified into active and passive materials \(^7\). Active materials sense the external environment and respond to changes respectively. Passive materials respond to external change without the influence of the external control. They also possess self repairing characteristics.

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<th>Passive</th>
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<td>Glass ionomer cements</td>
<td>Smart impression material, Smart material coated dental implants.</td>
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<td>Resin-modified glass ionomer cement</td>
<td>Smart composites,</td>
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<td>Amorphous calcium phosphate releasing pit and fissure sealant.</td>
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**Smart Impression Material:** The smart impression materials are void free due to hydrophilic nature. The property of shape memory aids in elastic recovery and resists distortion. The enhanced toughness resists tearing and faster setting pattern without distortion results in precise fitting of restorations. The working and setting time is reduced by atleast 33% with increase in flow of the material by lowering the viscosity \(^8\).

**Smart Coatings for Dental Implants:** The smart coating makes the surgical implants bond more closely with bone and ward off infection. The crystalline layer is created surrounding the implant and an amorphous layer formed reaches the bone. The bone growth is favoured by the dissolution of amorphous layer, by the release of calcium and phosphate thereby promoting the osseointegration. The silver nano particle incorporated implants minimizes the chances for infection in site due to their antimicrobial property.

**Smart Composites:** They are light-activated alkaline, nano filled glass restorative material. When the salivary pH values drop below the critical pH of 5.5, the smart composites releases calcium, fluoride and hydroxyl ions to counteract the demineralization of the tooth surface and thus favours remineralization\(^9\). The smart composites are indicated for class 1 and class 2 lesions in both primary and permanent teeth and could be bulk filled to about 4mm thickness.

**Smart Ceramics:** Smart ceramics are metal free, ultra-thin monolithic material, which contributes maximum strength, biocompatible life like restorations. The restorations are milled from a monolithic block of solid yttria-stabilized zirconia. The combination of high flexural strength, high fracture toughness, and partially stabilized zirconia increases the lifespan of restorations and made the process of restoring teeth to natural form easy and predictable \(^10\).

**Nickel-Titanium (Ni-Ti) Rotary Instruments:** Ni-Ti endodontic instruments contain approximately 55% (wt) Ni and 45%(wt) Ti, equivalent to 50%(at) Ni and 50%(at) Ti \(^11\). The smart behavior of Ni-Ti alloys is because of “super elasticity” and “shape memory”. The advantage of using rotary Ni-Ti files are minimal chances of instrument fracture within the canal during instrumentation, less transportation, less fatigue to the operator and minimal post-operative pain.

**Smart Prep Burs:** They are polymer burs used to remove only the infected dentin \(^13\). The affected dentin which has the ability to remineralize is left intact. The chances of removal of affected dentin and over cutting of tooth structure while using conventional burs can be avoided by using smart preparation burs.

**Smartseal Obturation System:** The C Point system (EndoTechnologies, LLC, Shrewsbury, MA, USA), a
Smart seal obturation system is a point-and-paste root canal filling technique that consists of premade, hydrophilic endodontic points and an accompanying sealer. The deformable endodontic point (C Point) is available in different tip sizes and tapers and is designed to expand laterally without expanding axially, by absorbing residual water from the instrumented canal space.

**Smart Fibres for Laser Dentistry:** Hollow core photonic crystal fibers (PCFs) for the delivery of high-fluence laser radiation capable of ablating tooth enamel have been developed. Sequences of picosecond pulses of Nd: YAG laser radiation is transmitted through a hollow-core photonic crystal fiber with a core diameter of approximately 14 micrometers and is focused on a tooth surface to ablate dental tissue [14].

**Smart Glass Ionomer Cement:** Davidson first suggested the smart behavior of GIC [15]. In response to the stimulus like temperature, change in pH, the gel structure of smart GIC absorbs or release solvent rapidly. The smart ionomer mimics the behavior of human dentin. Resin-modified glass ionomer cement, compomer or giomerare also seen to exhibit these smart characteristics.

**Smart Composites:** Smart composites containing ACP (amorphous calcium phosphate) exhibiting the most rapid conversion to crystalline hydroxyapatite (HAP). ACP when integrated into specially designed and formulated resins to make a composite material, will have an extended time release nature to act as a source for calcium and phosphate which will be useful for preventing caries. ACP-filled composite resins have been shown to recover 71% of the lost mineral content of decalcified teeth [16].

**Smart Antimicrobial Peptide:** The specifically Targeted Antimicrobial Peptides (STAMP) have been developed based on the fusion of a species-specific targeting peptide domain with a wide spectrum antimicrobial peptide domain. This pheromone-guided “smart” material peptide is targeted against the killing of Streptococcus mutans, the principal microorganism responsible for dental caries. They have the probiotic property that will selectively eliminate pathogens while preserving the protective benefits of a healthy oral flora [17].

**Smart Sutures:** They are thermoplastic polymers that have both shape memory and biodegradable properties. When the temperature is raised above the thermal transition temperature, the suture shrinks and tightens the knot, applying the optimum force. The thermal transition temperature is close to human body temperature and this is of clinical significance in tying a knot with proper stress in surgery. Smart sutures are made of plastic or silk threads covered with temperature sensors and microheaters, which can detect infections.

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**Conflict of Interest:** Nil

## REFERENCES


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